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Vladimir N. Bocharnikov
Alina N. Steblyanskaya *Editors*

Humans in the Siberian Landscapes

Ethnocultural Dynamics and Interaction with Nature and Space

Springer

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Springer Geography—now indexed in Scopus

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ISSN 2194-315X ISSN 2194-3168 (electronic)
Springer Geography
ISBN 978-3-030-90060-1 ISBN 978-3-030-90061-8 (eBook)
https://doi.org/10.1007/978-3-030-90061-8

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Preface

Historians and culturologists usually study the history of ideas, worldviews, beliefs, and other cultural achievements, wondering how they generate the population's mentality and culture and influence their values, goals, and intentions. The book's primary idea is to reveal the patterns of penetration, settlement, development, and adaptation of Siberia's population in the last half-millennium. The book has 21 chapters, where the authors determine various specifics and multidirectional vectors of the ethic's development (social, cultural, economic, and legal) in the Siberia regions. This book contributes to the field of Siberia science exploration based on a long-term research series made by more than 80 Russian scientists, who specialized in history, anthropology, geography, economy, ecology, and linguistic and cultural studies. Thus, there are many valuable opinions, comments, and views of a large team of people who have lived in Siberia for a long time. Every book chapter is a unique attempt to describe how society and nature developed in Siberia over the last five hundred years.

Modern society has historically formed two directly opposite opinions in a fundamental relation to Siberia. Within the framework of the first position formulated by Mikhail Lomonosov, Siberia is an essential component of the country, a powerful potential for Russia's development. Another position regards Siberia as a negative factor hindering its social development. As a result, two spectra of geographic images concerning Siberia have been developed—positive (the space of freedom and will, prosperity, and boundless expanses) and negative, harmful with an accent on Siberia's remoteness and difficult survival conditions, such as "Siberia is the extreme point for exiling prisoners".

Siberia may sound like an exotic topic for scholars worldwide, but close examination of this unique region should become a fundamental theme within Life Science, Earth Science, and Human cultural and historical heritage. It is a multidisciplinary book that narrates and interprets the historical, cultural stages, and geography during Siberia's conquest and exploitation from the Pleistocene till nowadays. Siberia is "roughly everything lying east of 60°E and north of 50°N", causing these territories to occupy almost one-third of Asia's northern landmass. However, Siberia is still not well known. Even till now,

several books have been published about this incredible and legendary world region. Siberia is usually considered an extension and integral part of Russia—its eastern treasure-house of mineral wealth awaiting exploration. Nowadays, the great majority of Siberia's inhabitants are Russians; however, the situation was not the same in the eighteenth century, so, in the book, attention was paid to Siberia's indigenous people's historical background.

The book determines the main patterns of human–environment interaction in Siberia and the Russian Far East in antiquity (Palaeolithic–Middle Ages). The permanent settling of the whole of Siberia occurred approximately 30,000 years ago. Throughout the Palaeolithic, hunting, fishing, and gathering were the main economic activities. In the Bronze and Early Iron ages (ca. 5000–1500 years ago), new types of economy appeared—animal husbandry and agriculture. The book presents the case studies of human–environment interaction in the past in Siberia and the Russian Far East.

From the historical perspective, the authors also consider Siberia's geocultural self-development from the fifteenth–nineteenth century point of view. The authors described the first steps in the territory development of Siberia development, nomadism and settlement structure, the Cossacks' life activity, landscape's bioecological and geographical development, Siberian peoples' ethno-cultural society adaptation, and the adaptation of cultural values and nature. In the book, the authors give attention to the scientific, religious, ideological, moral, and spiritual culture of the Siberia peoples in the twentieth–twenty-first centuries. From the historical point of view, it examines how the ancient groups' survivors and the representatives of newly evolved ones have colonized and adapted to the unique Siberia environment.

Siberia wilderness is in many ways a unique resource. It is one of the largest landmasses in the world, comprising about 9% of the entire world's dry landmass. Most part of Siberia is distinguished by the natural and climatic inclemency, poor development, and low population, but at the same time has unique territorial and raw material resources.

Siberia appears to be an incredibly vast (6.61 mil km2, or 38.6% of the territory of the Russian Federation, 4.4% of the land area of the entire planet), but relatively sparsely populated macroregion (23 mil people approximately, or 15.7% of the population of Russia). Aboriginal people have long inhabited Siberia. This is where Siberian ethnic groups have historically derived all of the goods, services, and resources. In this book, the authors also focus on Siberia's nature conservation problem, because the original habitat of the native peoples is threatened by the inevitable destruction of forests and tundra. Siberia is one of the world's surviving natural spaces with Baikal Lake that supports the ecological balance of the entire Eurasian continent, and the environmental fate of the world is guarded here.

Siberian geography concerns nature, ancient humans, and lands' invisible curiosity from a historical and cultural perspective. With the cultural–ecological development of the Siberian people, it has become possible to understand the essential links between peoples and their physical environments. Siberia's space is heterogeneous in all senses, and especially in natural and civilized terms. It is viewed in the context of various experiences, understanding, and conceptualization practices.

Siberia's natural and cultural sub-regions complexes are considered an essential part of Russia (throughout Northern Eurasia) and therefore a unique testing ground for geographical study and an essential link for Russia's concept. At this stage in the development of geographical thought, another "rethinking" of Siberia and its place in Russian space is taking place. This is manifested in attempts to find new concepts for the region (Asian Russia, Eastern Russia, and Trans-Ural Russia). There is a horizontal territorial differentiation of Siberia's sub-regions, distinguished on ecological and geographical grounds (Siberian rivers basins, mountain systems, and the Arctic and Pacific coasts).

Siberia is also a unique position for the whole Russian science development. In the book, the authors emphasize the Siberia-oriented development models, the Soviets' territorial-production complexes concepts, the Irkutsk landscape school evolution, and other historically valued concepts. Thus, the authors present the system role of Siberia's natural and social fields, and the development and structuring of space through socio-economic diffusion. The authors show the process of building Siberia's management system and analyze the design of natural and economic systems and territorial industrial complexes. It is emphasized that the fragmentation of Siberia's economic space causes focal development. The general lack of coordination between the modes of transport in Siberia could be explained historically by the active use of railways as the panacea for region growth. Construction of the Transsib (The length of the highway is 9288.2 km, it is the longest railway in the world), Baikal–Amur, and Amur–Yakutsk highways with the parallel creation of industrial complexes is optimal for the development of Siberia. The development of railways remains crucial for the development of Siberia and the formation of international corridors.

The authors consider Siberia's ethno-cultural and geoecological development's primary milestones. Siberia generates the ethno-geo-ecosystems codes within the unique ethnic space. The reader should pay attention and record the periods of the changes, referring to the most important historical and geographical evidence and natural phenomena. The authors display the geophilosophy sequence of "anthropogenic presence" in Siberian landscapes and historical and chronological changes in ethnic presence within the territory. There is an introduction into the "ethnic code" and "ethnoecological balance" interdisciplinary conceptual categories. The authors declare the methodological significance and qualitative assessment of Siberia's ethnosocial development analysis. The primary goal for future generations is to support the unique ethnic groups in a unique natural environment from the perspective of their sustainable development.

The authors reveal the theme of Siberia from different sides and a person from any corner of the world will find something of his own in reading the book. The authors hope it would be easy and exciting for the reader to follow Siberia's cultural essences and mental maps.

Vladivostok, Russia — Vladimir N. Bocharnikov
Harbin, China — Alina N. Steblyanskaya
June 2022

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History of Siberia: People, Traditions, Landscapes

Conceptualization of Siberian Space: The Landscape–geographical Aspect

Dmitry V. Chernykh, Vladimir N. Bocharnikov, Roman Yu. Fedorov, Vladimir L. Kagansky, Vladimir N. Kalutskov, Vladimir P. Melnikov, Vladimir N. Nevsky, and Roman Yu. Biryukov

Abstract Scientific and popular science notes of the first researchers of Siberia contain descriptions of not only natural processes and phenomena, but also the material and spiritual aspects of human activity. After a long break in Russian geography, which for a long time showed a tendency to oppose the artificial (cultural) and the natural, attempts are being made to integrate the geographical representations of natural science and humanitarian disciplines. The territory of Siberia is an excellent proving ground for retrospective and prospective reflection and application of geographical thought. The first aim of this chapter is the submission of the current state of knowledge concerning the conceptualization of Siberian space within the landscape paradigm. The second aim is to consider the main highlights of the Siberian environment in the context of perception by local and external people. So, when dividing Siberia into regions that differ in peculiarities of human interaction with the original natural landscape, it was concluded that, along with the physiographic regionalization, it is advisable to take into account the basin organization of

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V. N. Bocharnikov and A. N. Steblyanskaya (eds.), *Humans in the Siberian Landscapes*, Springer Geography, https://doi.org/10.1007/978-3-030-90061-8_1

the territory. River valleys often play a crucial role in the development of the territory, and basin boundaries, especially in the mountains, are often difficult-to-overcome barriers. Cryosophy, a system of ideas about the cold world and its role in the genesis and evolution of material–energy interactions in the origin and maintenance of life, about the development based on the created system of knowledge about the universe and the formation of the guidelines for multidisciplinary research of living and inert matter of the universe, was formed on the material of Siberia, the main part of which is located in the cryolithozone. In contrast to traditional judgments about Siberia as a periphery (a remote, hard-to-reach, wild, rich in resources, but impoverished region), ideas about the centricity of Siberia are being developed, where this region is regarded as a zone of common interests, a significant part of the Ecumene. Thanks to Siberia, Russia is a great Eurasian power.

Keywords Siberia · North Asia · Landscape · Cryosophy · Adaptation · Geographical picture of the world · Geocultural space · Geocultural border · Geoconcept · Frontier · Periphery · Moscow-centricity · Theoretical geography · Physiographic regionalization

Glossary

Cold	the state of living and inert matter due to changes in its aggregate parameters and structure at low temperatures.
Cryodiversity	countless micro-and macro-objects, processes, and conditions, owing to their origin to the cold of celestial bodies and the cosmos.
Cryogenic resources	resources created by cryogenic processes, conditions, and formations that have a beneficial effect on human life support as factors of climate formation, regulators of water resources and microbial psychrophilic communities, as well as the storage of solid gas (gas hydrates) and information about the geological past.
Cryosophy	a system of ideas about the world of cold and its role in the origin and evolution of material–energy interactions, in the origin and maintenance of life, developing on the basis of the created system of knowledge about the universe and forming guidelines for multidisciplinary

	studies of the living and inert matter of the Universe.
Frontier	a vector border between cultures with an active and a passive attitude to space; a dynamic geocultural border.
Geoconcept	a toponym that is saturated with cultural meanings and is an inherent part of the geographical picture of the world of a certain community.
Geocultural border	any territorial border between different cultures.
Subsistence	a set of elements of material culture and practical skills to support the livelihoods of the local community through the use of certain natural resources.
Moscow-centricity	one of the essential features of Russian geocultural space.
Physical–geographical regionalization	a section of physical geography covering the whole complex of problems related to geographic systems at the over-landscape level.
River basin	a part of the earth's surface, which includes the river system and the territory feeding the river, limited by the watershed.

1 Introduction

Starting with pioneer diaries, in most geographical works, Siberia is understood as a territory that covers the northern part of Asia to the east from the Ural Mountains to the Pacific, or Great Ocean, and from the Arctic Ocean to the south to the border with China. The first researchers of Siberia, being broad-minded and knowledgeable, intuitively understood the inextricable link between nature and man in this vast and too harsh territory (by European standards). Therefore, their scientific and popular scientific notes contain a description of not only natural processes and phenomena, but also the material and spiritual aspects of human life (Gmelin 1770–1984; Pallas 1776; Ledebour 1829; Middendorf 1871).

The landscape concept, which appeared at the turn of the nineteenth and twentieth centuries (Hettner 1905; Passarge 1908, 1913; Berg 1915; Granö 1929), should have become a scientific basis integrating geographical representations of natural science and humanitarian disciplines. The landscape concept, which appeared at the turn of the nineteenth and twentieth centuries, was near to become a scientific basis,

integrating the geographical concepts of natural science and the humanities. However, with a certain degree of certainty, it can be argued that it was the predominance of virgin landscapes in the space of Russia and, first of all, Siberia that led to the fact that in the Russian tradition the landscape concept made a significant tilt towards physical geography, leaving many geographically out of sight. Human activity should be understood as an external factor that causes modification and transformation of natural landscapes. For example, for the Berkeley school in the US, unlike for the Russians, human beings and their activities were of primary concern in the study of landscapes (Sauer 1963). Finnish geographer Granö, who worked in Siberia until 1917, combined the approach of the landscape as a scientist and an artist without integrating both aspects (Jones 2003).

In addition, the mass consciousness in the twentieth century clearly showed a tendency to contrast the artificial (cultural) and natural. This fact is still often taken for granted and is firmly embedded in the geographical picture of the world. The opposition "nature–culture" is built as one of the most ancient and stable forms of public understanding of universal regularities of being.

During the last two centuries, the juxtaposition of cultural and natural space has been fueled by positivist traditions of science, Marxism, and the cowboy economics. The notion that nature is a natural prerequisite and the natural basis for people's livelihoods was realized in the form of a worldwide rampant expansion of the ideology of material consumption and total globalization. However, the evolutionary and historically prevailing heterogeneity of the space of Russia, reflected in the exceptional diversity of natural, socio-economic, national, and cultural conditions in different parts of the country, prevented the transformation of Siberia into a land of the total technogenic landscape. Despite the long history of Siberia development, human activity remains sparse.

As a result, nowadays, when the thesis about the existence of limits of human impact is actualized, and the ideal constructs, such as wilderness and urbanized landscapes modified by man (Bocharnikov 2016; Bocharnikov and Egidarev 2017a), are recognized as peculiar "points of reference", the territory of Siberia seems to be an excellent ground for retrospective and prospective reflection and application of geographical thought. "Wilderness" as an integrated indicator of the natural environment conservation (Bocharnikov and Egidarev 2017b), maintaining the ecological balance not only in Russia, but also in the biosphere as a whole, with the most extensive intact areas, is concentrated in Siberia.

At present, the landscape concept in Russia is beyond the scope of physical geography, and it becomes interdisciplinary (Kalutskov 2008). In recent decades, many of the Russian scientists in part or completely abandon the traditional understanding of the landscape as a purely natural phenomenon. The landscape is recognized as the territory, which for a long period of history served as the habitat of people bearing specific cultural values (Myagkov 2001). The landscape components involve the spiritual and intellectual values that are stored and passed on from one generation to another in the form of information (Vedenin and Kuleshova 2001; Kalutskov 2008). This interdisciplinarity has considerably enriched the Russian landscape tradition

(Current Trends 2019; Landscape Patterns 2020) and gave it great potential as a ground for Siberia conceptualization.

Today, many authors and scholars use a landscape paradigm in the investigation of Siberia. For example, a new technique for discriminating Siberian landscapes using satellite passive microwave data was designed (Melentyev and Matelenok 2014). Landscape indication of natural phenomena is a well-advanced scientific area (Friborg et al. 2003; Alekseev 2017). Siberian landscapes are seen as part of the traditional culture of the indigenous people (Vajda 2011). Siberian Environmental Change Network (SecNET) was established in 2016 for promoting knowledge of the human and natural environment of Siberia (Callaghan et al. 2019).

The first aim of this chapter is the submission of the current state of knowledge concerning the conceptualization of Siberian space within the landscape paradigm. The second aim is to consider the principal highlights of the Siberian environment in the context of perception by local and external people.

1.1 Heterogeneous Natural Space of Siberia as an Arena for Human Settlement and Development

The landscape is a continuum, but for practical reasons, it should be split into spatial analytical units (García-Llamas et al. 2018). An essential part of the geographical research is the identification of the place of the studied territorial object among others and the correlation with their qualitative properties (typology) and subordinate relations (hierarchy). Due to the reflection of the patterns that operate on a much larger space than the space represented by the object of study, it is possible to identify the qualitative certainty of the object and the specifics of its structure (Mikheev 2001). Such an approach to the identification of an object is traditionally regarded as a "top" view and is most consistently implemented in the concept of regionalization, which in the Russian tradition is closely related to the landscape concept.

In Russian geography, regionalization always had a special status, the status of one of the most challenging parts, the highest level of knowledge, and the crown of geographical study of the territory. According to Smirnyagin (2005), the Russian geographical school stands out against the world background not only for its close attention to regionalization and its problems, but also for its significant achievements in this field. Scientific regionalization, developed by geographers, was constantly used in Russia not only for research purposes and description, but also for national economic practice. Of course, hierarchically organized model of complex natural (physiographic, landscape) regionalization, developed with the participation of many Russian physical geographers, seems to be one of the most methodically sound and well-proven in solving various applied problems (Berg 1913, 1930; Semenov-Tyan-Shansky 1915; Physical–geographical 1968; Gvozdetsky 1979; Prokaev 1983; Mikhailov 1986; Isachenko 1991).

In western geography, Herbertson (1905) was the first to divide the earth into major natural regions. Lucien Gallois said: "I believe that it is necessary to find the beginning of all geographical division in nature itself" (Gallois 1908). However, later Vidal de la Blache has proposed the concept of "geographical region" to refer to those portions of the earth's surface, which have specific homogeneity characteristics, derived from the combination of elements of the natural environment and human action (Vidal de la Blache 1910, 1926). After that occurs the overrun in the region settings from the predominance of natural factors in its composition.

The territory of Siberia almost coincides with the North Asia subcontinent as understood by Sochava and Timofeev (1968). Following the approaches adopted in the physiographic regionalization, the division of the subcontinent is associated with its differentiation by morphotectonics into physiographic countries (lowlands and mountains), the climate into zonal areas, and then into provinces, okrugs, and districts. All developed regionalization schemes (Sochava and Timofeev 1968; Gvozdetsky and Mikhailov 1978; and others) are similar and include the next obligatory regions: West Siberian Plain, Central Siberia, mountain systems of Southern Siberia, North–East Siberia, and the Far East. Concerning the ordering of laws acting in nature, such a model seems to be quite logical, although it sometimes fails. However, when it comes to the influence of natural conditions on such phenomena as human settlement and the development of the territory, it is clearly not enough.

In this case, the nature of the hydrological network and the associated basin organization of geographic space are not less significant. River basins are an independent type of holistic natural systems that are integrated by water flow (Beven 2000; Dooge 2005; Sivapalan 2005). In contrast to the landscape approach proper, which focuses mainly on the causes of territory differentiation, the basin approach focuses on the study of the unification forces and interaction processes that occur through the flows of matter and energy. Basin systems, like landscape ones, are primary concerning socio-economic, political, and administrative systems and are more stable in time and space (Isachenko 2013).

River valleys often play a crucial role in the development of the territory, and basin boundaries, especially in the mountains, are often difficult-to-overcome barriers. Therefore, when dividing Siberia into regions that differ in the peculiarities of human interaction with the original natural landscape, it is advisable to take into account the basin organization of the territory along with the physiographic regionalization.

In this regard, the entire territory of Siberia can be divided into four macroregions that correspond to its basin organization: the Ob–Irtysh Siberia, Yenisei Siberia, Lensk-Kolyma Siberia, and Pacific Siberia (Far East). The importance of basin organization is dictated, for example, by the diversity of the economic structure, lifestyle, and the whole culture of the population of Siberia that is subordinated to it. So, it is noted that even in the early Neolithic, the Ob region was inhabited by semi-settled tribes, who lived not so much by hunting, but by fishing. On the Yenisei, they got into contact with forest hunters and fishermen of the Baikal region, in whose lives the hunting of forest animals had a decisive advantage. At that time, semi-settled hunters–fishermen lived along with the Lena, Vilyui, and Aldan (History of Siberia 1968).

It should be noted that, concerning Siberia, in many cases, basin and landscape organization do not contradict each other. So, for a considerable length of its length, the border between the Ob and Yenisei basins is asymmetrical and substantially close to the valley of the latter. As a result, the territory of the lowland and marshy West Siberian plain is almost entirely related to the Ob basin, and the high Central Siberian plateau to the Yenisei basin.

Throughout thousands of years, primitive tribes gradually mastered the vast Siberian expanses, moving along the valleys closer and closer to the Arctic Ocean. Later, Russian merchants and Cossacks moved in the opposite direction. The settlement of Siberia by the Russians went along rivers, the only convenient way for it. The first Russian settlements first appeared along the main rivers in the so-called front Siberia: the Tura, Tobol, Tavda, Irtysh, Ob, and then along their tributaries.

Inter-basin migrations were also determined to a certain extent by the nature of the hydrographic network. So, within the Baikal rift, which served as a huge corridor that leads from the depths of Central Asia to the north, including Yakutia, migration was favored by the fact that the sources of the Lena River and several of its tributaries were located close to the sources of the rivers of the Yenisei basin. Due to this, there has long been an exchange of population and cultural values. Southern steppe tribes penetrated north from the steppes of Mongolia. Forest hunters moved from the north to the south. Similarly, thanks to the favorable location of the Siberian rivers, which were close to each other tributaries, the Russian pioneers quickly penetrated from one basin to another, in particular from the Ob to the Yenisei basin. During the construction of the Ob–Yenisei canal in the late nineteenth century, many archaeological finds were made, indicating that people had previously used this way.

According to the nature of human interaction with the landscape, four Siberian macro-regions are surely divided according to the rule of the triad into second-order regions (Fig. 1). So, Ob–Irtysh Siberia, which although located within five physiographic countries, is quite clearly differentiated into three regions: the Altai (I-1), South–West Siberian desert-steppe (I-2), and North–West Siberian taiga–tundra (I-3).

The Altai region (I-1) occupies the upper reaches of the Ob and Irtysh. This is a peripheral and at the same time the highest part of the Altai-Sayan (according to other interpretations (Chernykh and Zolotov 2011)—the Altai-Khangay-Sayan) mountainous country, including the northern and western macroslopes of the Altai, Salair, and the western macroslope of the Kuznetsk Alatau.

The South–West Siberian desert-steppe region (I-2) is very complex in physical and geographical terms. The Black Irtysh and its left tributaries in the upper reaches are located within the western part of the territory of the Gobi-Dzhungarian country. Semi-desert complexes and desert communities of the Turo-Dzungarian type are developed in the closed intermountain basins. Within the Central Kazakhstan low-slope country, including the Kazakh low-hills, the Kokchetav elevation, and the Turgai plateau, the upper reaches of the Ishim and Tobol are located. In the west, the eastern macroslope of the Ural lowland country belongs to the basin. The largest part of the basin is located within the West Siberian lowland of the country. All

Fig. 1 Siberian macro-regions and second-order regions. *Source* The authors' methodology

these contrasting territories differ in landscape structure, but they all have a significant commonality due to the forestlessness of the area. Throughout the history of humankind, this entire treeless territory served as a vital corridor function.

On the other hand, an essential feature of Western Siberia is that here, in the absence of significant differences in relief, it passes the most crucial natural boundary separating arid and semiarid treeless territories, on the one hand, and humid forest and tundra on the other. This criterion, in our opinion, is the most important for understanding the nature of human interaction with the landscape. Therefore, the northern part of the West Siberian Plain and the westward slope of the Ural Mountains form the North–West Siberian taiga–tundra region (I-3).

The situation is different in Yenisei Siberia, to which it is advisable to refer to the Lake Baikal basin and the basins of the Khatanga, Anabar, and Olenek rivers, draining the territory of the North of Central Siberia. The internal differentiation of Yenisei Siberia has its peculiarities. In particular, in its flat-platform part, there is no pronounced steppe zone. The island steppes of the Kansk and Irkutsk-Cheremkhovo plains are rather secondary and zonally belong to the subtaiga zone. The forests of the Central Siberian Plateau are directly transferred to the forests of the Western and Eastern Sayans. The most striking difference between the Middle Siberian (II-3) and Sayan-Tuvinsky (II-2) regions is that the latter, along with the forest, presents steppe landscapes. Different steppes in the biotic filling are widely distributed in the Minusinsk and Tuvinian depressions. The entire population in the economic and cultural relations has traditionally been divided into two types: the taiga hunters and

the steppe herdsmen. This division was dictated by the specific natural conditions of the region, geographically representing a combination of extensive low-sloping, wilderness steppe areas, which were surrounded by high mountains covered with coniferous taiga.

A specific feature of the third, the Baikal-Selenginsky (II-3) region of Yenisei Siberia, is its relative hydrographic isolation and natural and cultural penchant for Central Asia. The Selenga basin, broken by a series of submeridional and sublatitudinal faults, is divided into several relatively isolated mid-altitude mountain structures separated by intermontane basins (Plains and mountains of Siberia 1975). In the vegetation of these basins, the Altai-Sayan, Central Asian, and Daurian features are found. It leads to the territory of the northern Baikal region (the Barguzin depression) not only the Central Asian steppes, but also the original nomadic livestock culture.

The Lena-Kolyma Siberia is also well differentiated into three contrasting and at the same time quite isolated regions—Vitimsko-Aldansky (III-1), Prilensky (III-2), and Verkhoyansk-Kolymsky (III-3). The first region is represented by the mountain structures of the Lena-Angara plateau, the Aldan highlands, and the Stanovoy range, which, replacing each other from west to east, delimit the plains of central Yakutia in the north and the plains and plateaus of the Transbaikalia and the Amur region in the south. Along with the general elevation, its characteristic feature is deep erosion dissection in areas adjacent to major rivers. The Prilensky region occupies mainly the eastern part of the Central Siberian Plateau and the Central Yakut Plain. This territory is characterized by excessive wetting and is strongly swamped due to the ubiquitous distribution of permafrost, despite the insignificant amount of precipitation. The main part of the permanent settlements of Yakutia is concentrated along the rivers. Moreover, the Verkhoyansk-Kolymsky region of the Lena-Kolyma Siberia is located mainly within the homogeneous folded region, which is characterized by mountainous terrain, replaced by coastal lowlands in the north. This is a too harsh region, which is the pole of the cold of the Northern Hemisphere.

The southern part of the Pacific Siberia is occupied by the Amursky Region (IV-1), which includes the Amur river basin. The Amur is the only major North Asian river, which runs not to the north, but to the east. Broad-leaved and coniferous–deciduous forests of the south of the Far East, formed in the zone of active influence of the Pacific, are unlike the Siberian taiga. The specific natural conditions affect the way of life of the inhabitants of the south of the Far East, beginning with the most ancient times. The earliest archaeological finds are difficult to compare with any of the famous Paleolithic cultures of Siberia. Many finds have more in common not with the Arctic cultures of the periglacial zone of Eurasia, but with the cultures of Southeast Asia (History of Siberia 1968).

The Kamchatka-Sakhalinsky (IV-2) region is characterized by a seaside position and reduced continental climate. However, its main feature is partial, as in the case of Kamchatka, or complete (Sakhalin, Kurils) isolation from the mainland. And finally, the North Pacific (IV-3) region, which stretches from the Dzhugdzhur range to Chukotka. Despite the near-the-ocean position, the severity of the climate determines the formation of landscapes that have much in common with Siberia. For example, V.B. Sochava, speaking on the environmental conditions on the Dzhugzhur Ridge,

believed that Eastern Siberia between the Udsky Bay and Gizhiginsky Bay stretches to the coast of the Sea of Okhotsk (Sochava 1962). At the same time, the North Pacific Ocean region is a part of Beringia, which formerly connected Asia and North America.

1.2 Climatic Rhythms and Relief as Complementary Factors of the Upper Paleolithic Settlement of Siberia

The geographical position of Siberia predetermines the formation of a cold and relatively dry climate with low longitudinal and latitudinal gradients of winter temperatures throughout its territory. Nevertheless, it is the northern foothills of Southern Siberia mountains that are characterized by a high density of Upper Paleolithic sites. The sites form three areas: Northern Altai (upper Ob), the western part of the Eastern Sayan (upper Yenisei), and the Baikal region (firstly Angara and upper Lena) (History of Siberia 1968). The settlement of the northern foothills of Southern Siberia in the Middle Paleolithic and the beginning of the Upper Paleolithic could have taken three paths—from the west, from the south–west (through the western Tien Shan and Western Altai), and from the south, through Mongolia (History of Siberia 1968, Derevyanko 2001). Three reasons explain a large number of upper-sites in this region: low-mountainous relief that is optimal for life, moderate climatic conditions, and availability of food resources (mostly large animals). The first factor is static. The second and third are dynamic, acting as cause and effect, but without an unambiguous correlation. In the cooling periods, low mounts play a focusing role or the role of refugees. This view is supported by the presence in the Altai-Sayan foothills of endemic subnemoral species of flora and fauna (Ermakov 1998; Dubatolov and Kosterin 2015). From the south, these areas are bounded by even colder and "hungry" mountains. Latitudinal migrations were possible but limited; migrations to the north were incredible. Karghinskii interstadial (relatively warming period between about 45–30 thousand years) forms a climate close to the modern one. Landscapes acquire a more complex structure, and the low mounts and lowlands populated by man begin to play a scattering role.

Any prolonged warming causes mass migration of animals. The Karginsky interstadial contributed to the increase in population, as evidenced by the high density of sites during this period. On the one hand, the increased intensity of hunting could be the leading cause of the depletion of food resources in the low mountains of southern Siberia. On the other hand, a change in the configuration of natural zones with the onset of Karginsky warming years indicates that the ranges of large herbivores began to shift to the north. Some communities that survived the last phase of the Zyryan glaciation (before Karginsky warming) did not see any particular inconvenience in the "pursuit" of the hunting objects moving to the north. The main way of their movement to the north was the Lena River. But what was the reason for moving there?

There were alternative directions, of course. The Ob, Yenisei, Angara, and their tributaries (as well as the route to the east along the Selenga River)—all these options were used to one degree or another. The Lena direction was quite successful, because it led people to the plains of Yakutia, where the type of vegetation, called tundra-steppe, prevailed, and where there was an excellent forage reserve for large herbivorous mammals. In their migrations, ancient men used the river valleys as the only possible corridors in the conditions of mountains. The primary migration season, most likely, was winter. The complexity of this method of movement is evident due to problems with habitation and fire. However, there were advantages—a more convenient way of movement and long-term preservation of food. The discovery in 2001 of the Yana site (70°N) dated to 30–27 thousand years (Pitulko et al. 2012; Pitulko 2011) can be called sensational, but not unexpected. Recently, information appeared about another Late Karginsky site (about 30 thousand years) in the north of the Yana-Indigirka lowland (Yana–polar site 2014).

It is interesting to trace the fate of the inhabitants of the Yana site after the completion of Karginsky warming. It is believed that the Sartan glaciation (Last Glacial Maximum) falls on a period of 24–10 thousand years (Arkhipov 1998; Stauch and Gualtieri 2008), although the lower and upper dates, of course, are not clearly defined in this region. The first signs of looming cooling came from the west, from the Verkhoyansk Range, which was covered with ice. The Novosibirsk Islands, which soon joined the mainland, also fell into the glaciation zone. Located to the south, the Chersky Range was also exposed to glaciation. According to other results in glaciation, during the Sartan stade have been limited to valleys within the Chersky and Verkhoyansk Ranges (Stauch and Gualtieri 2008). However, in place of high-latitude tundra-steppe cryoarid deserts began to form. There was only one way out of the created "trap"—to the east. And, the forced movement of man towards North America was rapid, synchronous with the migration of large herbivores. An alternative to the "flight to the east" existed (Kolyma Lowland), but it was very doubtful. The duration of the transition from the lower reaches of Yana to Beringia, most likely, was calculated "only" for hundreds of years. The path lay in the latitudinal corridor of 66°–72° N. in the tundra and depleted tundra-steppes, where it was impossible to linger for a long time due to the low number of hunting objects. If we admit that the Bering "bridge" was formed about 25 thousand years ago, and the maximum phase of the Sartan glaciation fell on a period of 23–18 thousand years, then the "Yana Man" had real opportunities to get into less cold Alaska already 25–23 thousand years ago. Recent findings by American archaeologists do not contradict this date and indicate the existence in North America of a culture preceding Clovis (that is, at least 14 thousand years) (Bourgeon et al. 2017; Hubbe et al. 2010). Of course, one cannot exclude the possibility of the return migration, up along the Lena, bypassing the Verkhoyansk Range. If this "reverse wave" took place, then at the meeting point of related cultures after several thousand years of life, interesting events could take place in the form of not only crowding out one culture by another, but also their synthesis. The northern foothills of the Altai and Sayans and, also, the Baikal region in Sartan time again began to play the role of certain foci in which the population of

the late Paleolithic was concentrated. It can be said that these areas were secondary centers of regional anthropogenesis.

The climate–geomorphological scheme of the Karginsky and Early-Sartan migrations of a part of the population of Southern Siberia to the northeast raises two questions. Was there a "reverse" migration wave up the Lena at the beginning of the glaciation, and if so, how did it affect the cultures of Southern Siberia? And the second: what is the position of Duktai culture (several sites near the Aldan River, the right tributary of the Lena) in this scheme?

Reverse or reversible migrations are common phenomena in nature. Whether there was a "Sartan wave" along the Lena to the south is impossible to say. The most ancient datings of the Duktai sites, inspiring confidence, do not exceed 18 thousand years; the primary cultural strata are 11–14 thousand years old (Archeology of the USSR, 1984). But where did such a group of settlements come from with a lower age limit of 18 thousand years, i.e. at the height of the Sartan cooling? It is appropriate here again to turn to geomorphology. If we assume that the migration upwards along with the Lena and its main tributaries nevertheless took place, then just in the area of the Duktai sites, the person again fell into a "geomorphological trap". The Aldan Plateau and the Stanovoy Range, located to the South, in Sartan time were occupied by depleted mountain tundra and cryo-desert with mountain–valley glaciers, both, and the eastern bank of Aldan. And the man locked in this "bag-trap" was forced to adapt to the harsh conditions of the tundra and tundra-steppe of Central Yakutia. It was such an extreme adaptation that should have led to the emergence of new technologies for stone processing, housing arrangement, etc., i.e. just in time for the formation of a subculture, called "Duktai". When the Sartan cooling began to decline (13–11 thousand years), the Aldan group of sites could become a new center of expansion to the north and northeast (Mochanov 2007).

*1.3 Key Role of Cryogenic Factors in the Mechanisms of Adaptation and Subsistence of the Peoples of Siberia and the Far East**

One of the key geographical features of Asian Russia is the prevalence of a cold climate, which in winter and part of the off-season is characterized by precipitation of snow and freezing of water bodies. About 65% of Russia's territory is located in the cryolithozone, with almost all of its area in the Urals, Siberia, and the Far East. Such conditions affected the peculiarities of the world view, traditional culture, and economic activities of the peoples living in Asian Russia.

For at least the last 100 thousand years, since the beginning of the Wurm glaciation, man and his direct ancestors existed in the conditions of the cryosphere. During this time (about 6000 generations), the cryosphere has had a significant influence on the formation of modern man, his genotype, phenotype, and culture. Human life in cold conditions was associated with the inevitable formation of several specific skills of

social behavior, as well as subsistence (the appearance of clothing, housing, food storage methods, etc.).

The first attempts to systematically study the role of cold in the universe can be clearly traced in ancient Greek natural philosophy. However, only in the eighteenth–nineteenth centuries, new directions of natural science research began to shape, based on the methodological principles of positivism that were formed at that time, which laid the foundation for such highly specialized scientific disciplines as glaciology and permafrost.

At the turn of the twentieth and twenty-first centuries, both the range of objects of research related to the cold world and the range of scientific disciplines needed for their study were extremely expanded. Many studies of cryogenic phenomena are inextricably linked not only with the traditional subject areas of geology and geography, but also with the problems of physics, chemistry, biology, medicine, anthropology, soil science, ecology, climatology, cosmology, etc. Meanwhile, the axiological paradigm of perception of cold has changed in the scientific consciousness. In the 1920s, P.I. Koloskov, in the preface to the book of M.I. Sumgin, characterized permafrost as "a phenomenon deeply negative from a practical point of view" (Sumgin 1927). Today, the cold has increasingly been viewed not as an element hostile to humans, but as a source of cryogenic resources, which role in the development of humankind is not yet fully understood (Melnikov 2012).

The desire to form a concrete image of the cryosphere was the impetus for the development of the concept of cryosophy, a philosophical system of ideas about the cold world, the main task of which is to learn the place and role of cold matter in the origin and evolution of material–energy interactions in the universe, and in the generation and maintenance of life (Melnikov and Gennadinik 2011). In its methodological foundations, cryosophy is largely based on the principles of post-non-classical science, which is characterized by interdisciplinarity, the desire to build a general scientific picture of the world based on the principles of universal evolutionism that unite the ideas of the systemic and evolutionary approaches, and the study of complex self-developing systems (Stepin 2006). Another important milestone in conceptual understanding of the meaning for a person of the cold world that surrounds him was the development of the concept of "cryodiversity" (Melnikov et al. 2013). It means the variety of cryogenic phenomena existing in nature, as well as the physicochemical properties of the cryosphere objects. Until now, this concept has been used only in natural sciences, but its heuristic potential for the humanities, including ethnology, is beyond doubt. The following example illustrates it well. The languages of many indigenous peoples of the North lack abstract concepts of "snow" and "ice". Instead, there are many words that describe certain aggregate states as well as types of natural and anthropogenic transformations of cryogenic resources. For example, in the Nenets and Chukchi languages, individual words can mean such specific concepts as "trampled snow", "a lump of snow from under the hooves of a deer", etc. (Melnikov et al. 2016).

The development of cryosophy is possible only with the formation of an adequate interdisciplinary methodological base. Ethno-ecology can play an essential role in it

(Melnikov and Fedorov 2018). One of the crucial concepts in ethno-ecology is subsistence, which means the reproduction of elements of material culture and practical skills directly aimed at supporting people's livelihoods (Arutyunov and Markaryan 1983; Krupnik 1989).

The most important, but at the same time least evident to most people, is the environmental value of cryogenic resources. The upper part of the permafrost zone (permafrost and massive ice) is a component of a territorial resource that ensures the stability of landscapes suitable for human activity. In the event of its melting, many of the northern territories explored by man would have gone under water or turned into swamps (Melnikov 2012). The degradation of the cryolithozone in Siberia and the Far East may entail the following range of destructive processes:

- reduction of land area for reindeer husbandry and other types of extensive economic activities of the indigenous peoples of the North;
- the disappearance of certain species of Arctic flora and fauna, as well as the traditional types of livelihoods associated with them and the commercial farming of local communities;
- reduction of the period of communication on winter roads and the difficulty of transport accessibility of small northern settlements during the off-season, which may increase their isolation from the outside world;
- the growth of infectious diseases in humans and animals, caused by the loss of the protective properties of the cryolithozone and the distribution of pathogens of some diseases to the North (Fedorov 2019).

In addition to the environment-forming value, natural cryogenic resources play a significant role in several components of traditional subsistence systems for the peoples of Siberia and the Far East. The use of ice and snow as a building material or an integral part of building structures is typical for regions with the coldest climate. One of the most famous examples of such buildings is the winter home of the Eskimos—the igloo. It is a dome-shaped building made of snow or ice. The igloo was widespread among the Eskimos living in Canada and Greenland. It was not characteristic for the Eskimos of Northeast Asia. However, the peoples of Siberia and the Far East used ice and snow as an auxiliary building material. For example, the Russian population of the North of Siberia widely used ice instead of window glasses until the end of the nineteenth century. Later, this technique was adopted by the Mansi and representatives of some other northern peoples. In the ethnographic descriptions of the life of the peoples of Siberia, one can find references to the use of snow and ice for the construction of seasonal supporting or windproof structures. Another traditional form of using snow and ice as a building material is the construction of temporary residential and economic shelters by indigenous peoples and Russian old-timers of Siberia and the Far East. Most often they were built in the taiga or tundra by hunters and fishermen. In the traditional culture of the Eastern Slavs, snow and ice structures were used for gaming entertainment. The most famous example is snow fortresses and towns that were built on Maslenitsa.

Over the millennia, various methods of using natural cryogenic resources for food storage have evolved in the traditional culture of different nations. These skills played

an essential role in the stability of the livelihood of local communities, allowing people to rationally distribute food stocks. The natural and climatic conditions in Siberia and the Far East contributed to the development of the skills of chilled food storage among all the people living here. In the summer time, most of the representatives of the indigenous peoples of the North stored the food in pits dug in the permafrost, which in the spring could be filled with snow or ice to achieve a greater cooling effect. In the traditional Russian estate, cellars were widespread, glaciers, in which ice and snow were preserved during the summer time, allowing to store many perishable goods. In general, it should be noted that a high degree of variability of locations, design solutions, and features of operation of underground facilities for the cooled storage of products have been developed in the traditional culture of different peoples of Siberia and the Far East. It is worth noting that in addition to the storage of products, the natural cold often also played an important role in the process of their preparation. An example of this is the widely used Stroganin, the Yakut dish tar, etc. (Suleymanov 2018).

In traditional subsistence systems for peoples living in the Arctic and Subarctic, as well as in high mountain areas, snow and ice play an important role as a source of drinking water. The Eastern Slavs introduced methods of snow reclamation to Siberia and the Far East, which allowed the effective use of snow precipitation to irrigate crops in spring and to protect them from freezing in winter.

The state of snow cover and traces on it from ancient times gave the inhabitants of the tundra information about the movement of animals and people. The experience of treating snow and ice as a source of environmental information in the traditional ecological knowledge of the peoples of the North can be interpreted in the recent research direction, cryotrassology, in which cryogenic objects are considered as carriers of biological, ecological, and archaeological information.

Natural cold was widely used as a folk hygiene product. Its main principle is that the effect of negative temperatures on the interior of a person's home or clothing was used to kill pests and parasites.

In addition to the important role of natural cryogenic resources in traditional subsistence systems, the Earth's cryosphere formed the basis of the people's worldview. In the traditional culture of the indigenous peoples of the North, nature was not identified with an external object, being a kind of cosmos integrated into human life. The philosopher Yu. M. Fedorov noted that "the North is not just a geographical part of the Earth, but a special 'transcendent zone' that shields both Cosmos and Man from Ratio's irrepressible inclination to pack natural life into dry logical formulas, representing the laws of the need for an inorganic state of the universe" (Fedorov 1995). Thus, the cryosphere can be considered not only as a natural resource. No less important is its comprehension as one of the key elements ensuring the maintenance of a harmonious balance between nature and man in the Asian part of Russia.

1.4 Siberia in the Russian Geographical Picture of the World

Although Siberia is situated on the periphery of the Russian geographical picture of the world, it plays an essential role in the cultural space of Russia. The authors emphasize that Russia is a great Eurasian Empire due to Siberia. Reflecting on the Russian space, a researcher and a literary critic writes that Russia without Siberia will remain itself (Shchukin 2009, p. 383). He forgot to look at the map. Russia can be Russia solely with its integral part—Siberia.

Siberia is surrounded by natural boundaries, i.e. Great Oceans, on the north and on the east. In the south, it is a political border, i.e. the Russian frontier. The western border of Siberia is conventional; it coincides with the one between Europe and Asia along the Urals. In the geocultural aspect, this border is pseudo-civilizational. Therefore, one can state that the western border of Siberia is the strangest one in Russia.

Cultural meanings of Siberia' western border. The pseudo-civilizational status of this border is related to the western perception of the real civilizational border of Europe in the East, which traditionally coincides with the western border of Russia in its various forms—as the Russian Empire or as the Soviet bloc of countries (Wolff 1994). S. Huntington made an effort to "correct" it through Orthodoxy spread along the western border, but it did not change the situation greatly (Khantington 2006). The region formed between two eastern borders of Western Europe was called Eastern Europe; for the West, it was always as a semi-barbaric part of Europe (Wolff 1994). A. Hettner did not spare feelings of the Russian Westernizers calling Russia semi-Asia, not semi-Europe (Hettner 1909, p.10).

In Russia, until the beginning of the eighteenth century, the problem of the border along the Urals was not topical. The situation was changed due to the new Imperial ideology of Russia and the transfer of its capital to St. Petersburg. The Western geopolitical vector of Russia orientation demanded from the huge country to become similar to other European countries with European space organization (a famous expression by Catherine the Great "Russia is the European Empire" is revealing). Thus, the country should be divided into a proper European central part and a remote "colonial-overseas" outskirts.

Based on the new ideology of "Peter's chicks", V. N. Tatishchev substantiated the new geopolitical Asia–Europe border of Russia. As a geographer and a historian, he understood Russia's specifics very well, which paraphrasing a famous saying could sound like "We would be glad to be in Europe, but the space does not permit." He tried to diminish the importance of huge Siberian spaces for Russia: "The Russian Empire in Europe is unquestioningly major; moreover, in Asia it has real property and lands…" (Tatishchev 1950, p. 114).

The Tatishchev predecessors developed two border projects, i.e. the Near and the Far ones. In the framework of the interim project (Herodotus–Lomonosov project), the border between Europe and Asia should run along rivers Don, Kama, and Pechora, following the ancient tradition of continents separation along negative land forms. According to the Far project, developed and supported by Gmelin I. and Reclus

E., the border should run along the Yenisei and emphasize a sharp natural border between West and East Siberia (Kalutskov 2013).

Tatishchev proposed his interim version, and the strength of his argument pursuing geopolitical goals relied primarily on natural factors, well known to every citizen of Russia from school. For example, oak and hazel grow only on western slopes of the Urals, while cedar, on the east, "red fish" and crayfish are found only in European rivers, and "white fish" (taimen, nelma, and muksun) solely in Siberia (Tatishchev 1950, p. 51).

The proposed option of the Ural border was supported by P. S. Pallas, who rejected all other variants after expeditions to Russia in 1768–1774 (Magidovich and Magidovich 1984). As soon as Pallas approved the Tatishchev concept, it was adopted in Europe and due to the educational system therewith taken in by the Russian society. Indeed, "The Ural ridge separates Asia from Europe", we are so accustomed to this expression that there is no need to express ourselves in any other way, more precisely (Klyuchevsky 1987–1990, p. 63). According to the Russian Westerners, this event made it possible for Russia to receive all the attributes of the European Empire—the metropolis as European Russia and the colonial "appendage" in the form of Siberia (Bassin 2005).

Ideologically and geographically, such a decision suited many people, especially Europeans; it, finally, helped to avoid formal uncertainties related to the eastern borders of Europe. For Russia, it marked the western borders of Siberia.

The attitude of representatives of the Russian and Western societies to the border was always different, i.e. the mentally respectful attitude of Western travelers to the border along the Urals and rather calm of researchers and ordinary people. N. Ya. Danilevsky, D. I. Mendeleev, P. N. Savitsky, and A. Gettner (Kalutskov 2013) were against such a concept related to natural and cultural aspects.

The most consistent opponent of defragmentation of the common cultural space was P. N. Savitsky, a known geographer and Eurasia specialist. In his opinion, the idea of the historical and natural integrity of Russia–Eurasia is best reflected by geoconcepts of Cis-Ural Russia and TRANS-Ural Russia, as they point to the position of the historical cradle of the Russian people and the unifying center of the country. "Change in terms is useless. No, it is a wrong belief. The preservation of terms 'European' and 'Asian' Russia is not consistent with the understanding of Russia (together with adjacent countries) as a specific and integral geographical world" (Savitsky 1997, p. 279).

It is noteworthy that none of the major Soviet and post-Soviet geographers (from D. N. Anuchin and L. S. Berg to A. A. Chibilev), who dealt with the problem of the Ural border, did not pay attention to its cultural and civilizational meaning laid down by V. N. Tatishchev. It is not surprising that their works devoted to a new version of the border were mainly of physical and geographical nature (see, for example, Chibilev 2011). Obviously, this is due to a different concept of the Soviet and post-Soviet state and the transfer of its capital to Moscow. Nevertheless, cultural assessment with regard to the higher status of Europe sometimes manifests itself. For example, in 1958, the Russian Geographical Society decided to make all the Ural residents…the Europeans. It suggested drawing a border between Europe and

Asia along the eastern slope of the Urals. However, the reaction of people to such an "aristocratic" proposal was negative. People got used to this border; numerous memorable signs appeared here and many places were ritually mastered for 200 years of its existence. In Yekaterinburg, for example, the memorial sign "Europe–Asia Border" is a mandatory element of the wedding cultural landscape (Chibilev 2011).

A famous writer Valentin Kataev expressed the most striking attitude of the Russian society to the Ural border: "When crossing the Urals, we pass an obelisk 'Europe–Asia'. Absolutely meaningless thing! (!—V.K.). Does it really mean that as soon as you pass it you are immediately found yourself in Asia? Funny (!!—V. K)" (Kataev 2013, p. 167). Colonial ideas were always alien to the Russian society. That is why the border in the Urals was never perceived as a cultural one. Nobody seriously believed that the inhabitants of Russia who lived in the west are the Europeans, and in the east the Asians.

Thus, the "strangeness" of the western border of Siberia is related to the fact that 1) it is a pseudo-civilizational border (the real civilizational border runs much to the West), and 2) it is a pseudo-colonial border because Siberia has never been a colony. Following N. Ya. Danilevsky, the border along the Urals is a relic geographical product of Russian Europeanism, i.e. the desire at all costs to be like Europe, in which giant Russia did not fit and does not fit today.

Despite some attempts made by the Russian Westerners to divide Russia into parts with different cultural statuses, the Russian cultural space is integral, and Siberia remains the most important cultural province of Russia.

With regard to Siberia, we can specify such geoconcepts as the Tartary (developed almost exclusively within the European picture of the world), and actual Russian geoconcepts, the Mangazeya, the Belovodiya, and the Far North, emerged in the Soviet time.

"Minus Siberia". In some authors' works focused on the integrity of the Russian geocultural space, Siberia "disappears" becoming an integral part of Great Russia.

This approach is based on the works by N. Ya. Danilevsky, who considered the East European Plain and the West Siberian Lowland as an integral natural geographical region and called Russia as "the civilization from the Great Plain" (Danilevsky 2008). The above-mentioned Gmelin's project on the border between Europe and Asia along the Yenisei supports this idea. In physical geography, it emphasizes the significant contrast of natural conditions on both sides of the border. West Siberia is often called Low Siberia, and East Siberia—High Siberia. The importance and complexity of these geographical boundaries were noted by I. M. Maergoiz. Treyvish A. I. contributed to the border conceptualization by separating Western and Eastern Russia along the Yenisei (Treyvish and Litvinenko 2014).

The Russian Tartary. Like Atlantis, the mythological Tartary is a product of the European picture of the world. The Tartary myth appeared as a result of Genghis Khan's invasion to Europe. Medieval Christian consciousness interpreted this fact as the punishment of the Europeans for their sins. In Europe, the country which generated "wild hordes" and was situated in Asia depths was called Tartar (literally, the country of the Underworld, hell), and its people—the Tartars. A Tatar researcher M. Z. Zakiyev wrote that Tartars were "people of Hell" for the Europeans (Zakiev

2002). In the sixteenth–eighteenth centuries, European researchers compiled dozens of maps of the country, which … never existed (Kalutskov 2018a).

In the context of the Tartar myth, the works of the Europeans, the experts of Russia, are of particular interest. For instance, it is a beautifully illustrated edition by N. Witsen, a Dutch researcher and a friend of Peter the Great, who served in Russia (and Siberia) for many years (Vitsen 2010). However, in the works published in 1692, he mentioned about "Northern and Eastern Tartary, including areas located in the northern and eastern parts of Europe and Asia." Witsen felt that for the European readers of the late seventeenth century, "Tartar" as the name of Russia in the book title was quite appropriate and adequate. Interestingly, he referred Nogais, Mordvins, and Khanty to the Tartars. On the map, he marked the Arctic seas located to the east from Novaya Zemlya as the Tartar Sea.

One more example is the Russian Academic Atlas of 1737. Its compilers were German scientists, who worked in Russia at that time (Postnikov 1996, p. 48). The Atlas entitled as "Atlas for the benefit and use of young people and all readers of news and historical books" was an educational edition. Having acquainted with the Atlas, the Siberian youth of Russia would be surprised to learn that they live in the Russian Tatar, while the Cossack youth from the south of Russia are Small Tatar citizens.

The myth of Tartary has never been rooted in Russia. This is due to the geographical position of the country "between Europe and Asia", and long-term strong contacts with the Russian TRANS-Ural peoples; Novgorod dwellers went to the Urals for furs since the fourteenth century. The first Russian Tsar, who was given the "Siberian" title (Grand Prince of Yugra, Prince Kondinsky, and Obdorsky) was Ivan III. Thus, on the eastern edge of Russia, not mythological Tartary, but real Siberia was gradually formed.

Note that existing images of Siberia as a place of exile and imprisonment did not generate a negative (like the Tartary) toponym concept in the Russian picture of the world.

Mangazeya and Belovodiya. These positive geoconcepts played an important role in the movement of Russian society to Siberia. The first geoconcept is related to the real "country", "golden-boiling Mangazeya", whereas the second refers to the mythological country. Though both occupied small space, for some representatives of the Russian society, they were associated with significant Siberia images.

The Mangazeya geoconcept, relevant in sixteenth–seventeenth in the northern part of West Siberia, reminds us that Russia "came" to Siberia from the Arctic North with the Pomors. Mangazeya sable with unusual in color and length fir attracted manufactuters. The first route between Arkhangelsk and Siberia (the Mangazeya marine course) was in operation from the late fifteenth to the early seventeenth century. No wonder that the Kara Sea site between the Yamal and Gydansky Peninsula was called in Tsar's decrees and mapped as the Mangazeya Sea at that time (Bulatov 1998).

The Belovodiya geoconcept, referred to the eighteenth–nineteenth centuries, is associated with a violent migration. Some "schismatics" sought for Belovodiya, in

other words, paradise, first in the northern and southern Altai, and later, beyond the country, i.e. in Japan and even in Alaska (Chistov 1986).

Both geoconcepts created a positive image of Siberia: Mangazeya—as the region of immense natural resources, and Belovodiya—as a country of spiritual freedom.

The Far North. The Far North geoconcept is a socio-cultural product of the Soviet era. In spatial terms, it covers both almost the entire TRANS-Ural Russia and the regions of the Russian (European) North because of similarity in their spatial, natural, and social features.

"Severity of nature" and "distance from the center" are major concept components. Distance seems to be dominant. Look closely at the map of the Far North. Strange enough, the regions located to the east of Moscow are larger in area; therefore, this region should be called the Far East, in fact.

Siberia in the Moscow-centric picture of the world. For six centuries, the Russian geographical picture of the world has been steadily Moscow-centric. Thus, Moscow-centric state is an essential characteristic of the Russian cultural space (Kalutskov 2018b). This geographical imperative is manifested through historically developed spatial concepts, clearly indicating the center of the nomination related to the cultural and historical core of Russia. Such geoconcepts include: the Cis—Ural region—the Urals—the TRANS Urals, the Baikal—TRANS Baikal region, the Ciscaucasus—the Caucasus—the Transcaucasia. This also includes such geoconcepts as the Russian North and the Far East…

The Russian cultural space has been formed through the age-old mechanisms of cultural frontiers—northern, southern, and eastern (Siberian). Moving from the historical center to the periphery, the frontiers played a huge role in the communication of different cultures of Russia, in their mutual influence. Each of the frontiers gave birth to corresponding regions. Thus, the northern frontier appeared due to the difference between the cultural potentials of the Russian and Finno-Ugric peoples, creating the Russian North region. The southern frontier formed as a result of the interaction of the Russian and mainly Turkic peoples is responsible for the regions of the Russian South and the Volga region, whereas the eastern one for the Near (Western) and Far (Eastern) Siberia, and the Far East (Fig. 2).

The Russian cultural space was developed spatially and with the involvement of new regions that was accompanied by a qualitative change in the entire system. After Siberia's entry to Russia and due to the eastern "frontier", the development of Siberia depends on the Russian factors. On the other hand, Russia itself changes and acquires Siberian properties.

The Moscow-centric model of cultural and geographical space of the country corresponds to the historical logic of the Russian space development and the existing spatial organization of Russia.

Fig. 2 Siberia in the cultural and geographical space of Russia. *Source* The authors' methodology

1.5 Russia and Siberia: Conceptualization Within Theoretical Geography

Concerning Siberia, there is an illusion of evidence, simplicity, clarity, fame, and knowledge. The judgments about remoteness, inaccessibility, wildness, poverty, wealth of resources, and Siberia's fate-relatedness for Russian Empire/USSR/Russian Federation. Siberia's unity is obvious: commonality as a physical–geographical macro-region and geographical location, "natural" borders, institutional integration, (some) unity as an essential part of the Russian state, unity of fate, image, and, probably, mythology. However, this standard representation will be problematic through theoretical geography.

Russian theoretical geography is a general geographical conceptual research direction, which was developed by K. Ritter, I. von Tyunen, V. P. Semenov-Tyan-Shansky, and B. B. Rodoman. The main concepts are place, landscape, district, geographical location, scale, form, positional principle, function, and position (Kagansky 2009). Theoretical geography treats the cultural landscape as a continuation of the natural, focusing on spatial forms, and meanings. One of the critical logical judgments is the generalized principle of conformity: the geographical location of a place, its spatial structure, the function of place, meaning, and concept. In practical terms, this judgment forms, particularly, the basis of geographical expertise, the foundations of which on Siberia's material were laid by K. P. Kosmachev.

The landscape of any particular place should be presented as follows:

– natural and cultural complex;
– a system of territories (regionalization) and an especial place;
– a complex of meaningful spatial forms;
– the source, carrier, and result of images, myths, and symbols;

– the source of concepts; and
– a part and position for the accommodating landscape.

Let us specify what was said for a place like "a country"—a large geographically connected, self-consistent, sane space with a consensus of elites. The designated concept describes the whole of the country as a regular system of parts and as a natural system of positions associated with these parts. The country as a real complex whole is a complex of positions as well. One of the main reasons why the public, including the scientific community, in the Russian "outback" rejects many of Russia's studies, carried out in Moscow, is the universalization in them of a single, Moscow-central imperial position. However, Russia's scientifically and culturally responsible picture will be incomplete without Moscow, St. Petersburg, Novgorod, Tobolsk, etc., without the East European Plain, the Urals, and Siberia. For more than half a century, the complex physical geography in Russia is represented by three regional schools, corresponding to the parts–positions: Moscow, St. Petersburg, and Siberian (Irkutsk); in economic geography, studies of TPK (territorial production complexes) are known, the American equivalent of which is the Tennessee River Complex. It is characteristic that the geographical study of Siberia both from the Center of the Russian Federation and in Siberia itself is focused primarily on the resource aspect of the landscape—provisioning ecosystem service according to MEA (2005) and TEEB (2010).

A single point of view on any object in space means ignoring its fragmentation and the very presence of parts. This means that it contains a fundamental premise that an object is devoid of significant differentiation and qualitative size. Such a representation makes specific places non-existent in terms of the content they introduce into the concept of the whole. An object for which one single position is sufficient for understanding, and which is devoid of parts, i.e. it "consists" of a single part, is devoid of significant differentiation. This is not contradicted by the idea of a kind of "Brownian motion" of parts, which is then described by macroscopic parameters, for example, all sorts of averages. In this case, consideration of Russia (in general, any individuality, and Siberia, particularly) from one point of view means the non-existence of its parts/variants of the whole. Mono-positionality is the declaration of the symbolic non-existence of parts. Mono-positionality as "Moscow-centrism" means ignoring places.

The well-known notion of logic is an "essential feature". It correlates with the concept of "essential part", i.e. such a part, without which this individuality will not be such. Siberia is undoubtedly a significant part of Russia, from which there are several consequences: (1) Russia and Siberia are related by self-similar symmetry (a "part-whole" symmetry) and should show significant similarity (the difference is noticeable), (2) the completeness of Russia is impossible without taking Siberia both as a part and as a position, and the concept of the whole of Russia should undoubtedly take into account Siberia, (3) existing ideas about Russian Siberia, that is, Siberia from the position of Russia should be supplemented with the concept of Russia from the position of Siberia—Siberian Russia and Siberia from different positions, and

(4) Siberia must rely on Russia's option (both the Russian landscape and the Russian culture).

The specificity of Siberia lies in the concentration of features of the periphery (Kagansky 2001). The periphery is a culturally sparse type of landscape, sparsely populated (or culturally poor, "undeveloped," even if densely populated), possessing resources that the local population cannot control (of course, from the position of the center). Natives are treated as a component of the territory and its resource. The periphery is remote and difficult to access and, therefore, poorly developed or undeveloped. The periphery itself is not given; it is given only in the center's optics. It seems to be a kind of bestowed blessing, and the Center can, must, and has the right to own and dispose of it. Modalities are not distinguished in principle. The periphery is dependent, no matter how it treats its dependence, and it is independent and untenable. The periphery is not a substance, but an accident. This is a subordinate body, a passive material, and the shapeless landscape, in which external centers solve their problems, particularly, "develop" this helpless zone by imposing a form on it. However, usually, it is the destruction of landscape forms and local communities. The "development" of the periphery as the mastering of its resources occurs due to its deformation. Empowering a place with the status of a periphery (peripheralization) precedes the periphery and creates it.

According to this position, the development of the periphery in the USSR was compelling. Siberia acted as a pure periphery, distant, and external in everything—landscape, resources, technology, and culture. Siberia is precisely the periphery because it is far from "everything", both geographically and culturally and meaningfully. This is an appendage, the continuation of Russia to the east. The Soviet experience of "developing" Siberia was practically and conceptually transferred to the USSR to the rest of the territory, which acquired the character and periphery's status (the Soviet space). The paradox is that it was the "metropolis" that was being developed according to the type of colony. Examples are the numerous concepts of Soviet economic geography and the regional economy, or modern Russian geopolitical and geo-economic projects to exploit the Siberia's transit position ("Siberia for …").

Being a geographically significant part of Russia and its essential position, Siberia is still not a full-fledged part of the country (not to be confused with the state). Full-fledged parts of the country are mature landscape and cultural provinces. However, the periphery in modern Russia is dominant in area type of landscape; together with the Inner Periphery, it occupies 9/10 of the territory. Russia's culture as a whole and its cultural elite did not and does not depend on Siberia. In this sense, Siberia is an insignificant part of the country. The decisive argument to refute the thesis is evidence of a full-fledged Siberian version of Russian culture, comparable to the Moscow and St. Petersburg ones. However, a negative answer may mean a different cultural self-determination of Siberia (compare with Canada).

Regarding the Russian Federation and its nationalized economy, the situation is almost mirror: the periphery of Siberia is the resource and currency center of the Russian Federation. Moreover, if, according to the standard view and the reasoning of the "experts," Siberia is an appendage of Russia, then for the resource-state

economy, the Russian Federation itself is only an appendage of Siberia. There is a sharp antithesis: "Russian Siberia–Siberian Russia". The present-day Russian Federation is a largely resource-budgetary, external-dependent part of Siberia. This is an example of a "center–periphery" inversion.

In a widespread, and perhaps even dominant, view, Siberia is considered only in conjunction with Russia, reduced to the Russian Federation's Center. Siberia, then, is Russia's far outer periphery. Russia decides the fate of Siberia, Siberia "develops" from Russia. In this optics, there is no rest of the world, and it is reduced to the consumer of Siberian resources. However, the Earth's surface is the surface of a sphere, which is connected, closed, and all its points are equal, which means equal positions. In principle, there is nothing external in this space; there are only locally external fragments only within isolated territories. The most exciting and little-known of these landscapes is the Inner Periphery (Kagansky 2012). Having all the landscape, economic, and functional features of the Periphery, it is distinguished by its place within the developed territories. An example of the classic Inner Periphery is the inter-urban space of Central European Russia. Periphery is the periphery outside the Center and the Inner Periphery is the periphery inside the Center!

The actualization of the Earth's sphericity and cheapening of transport mean that the usual former Far/Outer periphery as a phenomenon is a leaving nature and is possible only locally. Globally, Siberia is surrounded by powerful centers and developed/active territories; they are more connected with each other, rather than through Russia. These are North America, Western Europe, Middle East, Middle East, and Far East. Siberia, together with the Arctic, is the global inner periphery of the Northern Hemisphere. Great Siberia is far from the small Center of the Russian Federation, but close to the world centers and is surrounded by a global linear center. This century will show how adequate this idealization is. Russia as a global inner periphery is an extension of Siberia, and it is the Siberian features that are essential for Russia.

It turns out that the judgment of Siberia as the most characteristic part of Russia is essentially equivalent to the judgment that Russia itself in comparison, for example, with Western Europe, turns out to be Siberia. Thus, within European Russia, there is a northeastern sector that was historically and geographically the base for Siberia's development, and so to speak, the first Russian Siberia. The mythologemes of the Third Rome and New Israel for Russia (regardless of their relevance) are formulated and updated absolutely irrespective of Siberia. Thus, Siberia already concentrates on Russian's characteristic geographical features in the global horizon and can be called its most characteristic part. This mental coalescence and in essence the indistinguishability of Russia and Siberia as types should be supplemented by the concept of Siberia outside this context. The problem is not to bring Siberia into the concept of Russia. As mentioned above, many of Russia's concepts are already (alas unconsciously) Siberia-centric (low population density, the prevalence of periphery). It is necessary to identify Russia and Siberia as a deep periphery conceptually. Then there are "Great Siberia" several missions:

1. The inexhaustible "store", stock of strength, and the guarantee of stability of Russia's "extensive development".
2. Geopolitical, geostrategic, and geo-economic "staple" of the Russian Federation.
3. The zone of common interests of a considerable part of the Oecumene, a nontrivial bundle, an integrator, not so much of Russia itself, as of Russia and the (rest) world.
4. Strategic resources—a vast variety of "virgin" landscapes. Siberia is the foremost global supplier of ecosystem services (Tishkov 2005) and the base of the country's global environmental specialization (Rodoman 2006). The unique planetary Baikal is obvious.
5. Finally, how not to recall the judgment (illusion? prophecy?) of the O. Spengler concerning the emerging Russian–Siberian civilization.

2 Conclusion

In the present, many authors and scholars use a landscape paradigm for the investigation of Siberia. The interdisciplinarity has considerably enriched the Russian landscape tradition and gave it great potential to conceptualize Siberia conceptualization.

When dividing Siberia into regions that differ in peculiarities of human interaction with the original natural landscape, it was concluded that it is advisable to consider the basin organization of the territory along with the physiographic regionalization. River valleys often play a vital role in the region developing, and basin boundaries, especially in the mountains, are often difficult-to-overcome barriers. The entire territory of Siberia can be divided into four macro-regions that correspond to its basin organization: Ob–Irtysh Siberia, Yenisei Siberia, Lensk-Kolyma Siberia, and Pacific Siberia (Far East).

One of the vital geographical features of Siberia is the prevalence of a cold climate. Most of the Siberian area is located in the cryolithozone. Such conditions could not but affect the peculiarities of the world view, traditional culture, and economic activities of the peoples living in Siberia. The desire to form a concrete image of the cryosphere was the impetus for developing cryosophy. Cryosophy, a system of ideas about the cold world and its role in the origin and evolution of material–energy interactions, the birth and maintenance of life, developing based on the created system of knowledge about the universe and forming the guidelines for multidisciplinary research of living and inert matter of the universe, was formed on the material of Siberia.

The specificity of Siberia lies in the concentration of features of the periphery. The periphery is remote and difficult to access and, therefore, poorly developed or undeveloped. We can specify such traditional geoconcepts concerning Siberia as the Tartary, the Mangazeya, the Belovodiya, and the Far North.

In contrast to traditional judgments about Siberia, periphery ideas are being developed about Siberia centricity, where the region is regarded as a zone of common interests of a considerable part of the Ecumene: (1) the inexhaustible "store", (2) a huge variety of "virgin" landscapes, (3) the main global supplier of ecosystem services, and (4) the base of the country's global environmental specialization.

Acknowledgements This Study section 1.1. is supported by government assignment (Research Program № 0306- 2021-0007), section 1.3. is supported by government assignment (Research Program IX.135.2.2), section 1.5. is supported by government assignment (Research Program № FMGE-2019-0007 - AAAA-A19-119021990093-8)

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Geographical Tools of Sacred Navigation in the Historical Development of Siberia

Alina N. Paranina, Leonid S. Marsadolov, and Alexey A. Grigoriev

Abstract The long-term experience of interdisciplinary research of the prehistoric cultural heritage allowed the authors to consider the navigation functions of objects located in Siberia and confirm the continuous and complete spatial development of this vast territory consistent with the development of other regions of the planet. The study's methodological basis is the concept of geo-cultural space, formed by the geography of culture—the science of the above-biological adaptation forms. The analysis of the rational content of traditional cultures allowed the authors to determine the objective criteria for the selection of sacred landscapes; to test the primary navigation functions of objects of different ages based on astronomical orientation technologies; to present new examples of rational semantic interpretation of signs and images of art; to develop the reconstruction of the main stages of cultural genesis. This study presents a specification of stages of formation of Siberia's geo-cultural space, based on the reconstruction of the evolution of navigation technologies in the Late Pleistocene and Holocene. Representative objects, located mainly in the south of this region, showed that astronomical tools were not only the basis of orientation in space and time, economic success, and intercultural communications, but also an essential source of the formation of indigenous non-material culture (toponyms, sculpture and graphics, and mythological pictures of the world).

Keywords Siberia · Navigation · Information · Adaptation

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V. N. Bocharnikov and A. N. Steblyanskaya (eds.), *Humans in the Siberian Landscapes*,
Springer Geography, https://doi.org/10.1007/978-3-030-90061-8_2

Glossary

Direct sighting	fixing the intersection points of the horizon line objects.
Back-sighting	fixing the length and direction (diagram) of the shadow.
Gnomon	a subject casting a shadow, the main element of a sundial calendar clock.
Azimuth	an angle between the directions to the north and the object being observed.
Geo-cultural space	a form of existence and a way of connecting natural, natural–man-made, and artificial objects in the geographic space of the Earth.
Geographic space	a form of existence and a way of connecting natural objects within the geographical envelope of the Earth.
Geographical envelope of the Earth	a set of interacting and interrelated geospheres; atmosphere, hydrosphere, lithosphere, and biosphere; geographical system of global level.

1 Introduction

Scientists from Russia and other countries have studied Siberia's cultural and archaeological *heritage for more than 300 years.* Close attention was paid to the population and culture in the very first comprehensive projects for the exploration of Siberia, which was organized by Peter the Great (the Great Northern expeditions along the Arctic seas reached the shores of Japan, Alaska, and California; some detachments marched along the south of Siberia to the shores of the Pacific Ocean). Impressive archaeological research began in the Tsarist times with small expeditions and during the Soviet period grew to the most considerable comprehensive research in the world in the areas of building robust hydroelectric power plants (such as the Krasnoyarsk hydroelectric station) and the Baikal–Amur Railway (History of Siberia 1968–1969; Historical Encyclopedia of Siberia 2009–2010).

The unexpectedly high density and impressive age of the ancient monuments of material culture (camps, settlements, hillforts, and dwellings) and the diversity of spiritual culture (places of worship, shrines, mounds, temples, cave paintings, stone statues, and folk epics) showed an effective and continuous development of a vast territory since the ancient Stone Age—for tens and hundreds of thousands of years (The yearbook "Problems of Archeology, Ethnography, Anthropology of Siberia and Neighboring Territories" is regularly published by the Institute of Archeology and Ethnography of the SB RAS since 1995). The two essential factors contributed to

such an active development of Siberia's territory in ancient times: higher landscape productivity (mammoth fauna) and harsh continental climate, in which cover glaciation cannot form (unlike Europe, which, over the past 2.5 million years, has been repeatedly covered with an ice shell up to 3 km high and freed from it 10–12 thousand years ago—this model of the evolution of nature is offered by the currently popular hypothesis of the Quaternary cover glaciations, or "glacial theory").

Archaeological finds show that the domestic and commercial culture of the people of Siberia 25,000 years ago were practically no different from the modern one (fishing hooks, combs, and sewing needles are identical in size, but more elegant and made of stone and organic materials: horns or bones). Besides, a variety of archaeological materials are the evidence of the deepening of astronomical knowledge, navigational skills in geographic space–time, and the presence of cultural relations with other stable regions. This is indicated by such facts as, for example, the similarity of technologies and decoration of Siberian finds with the art of the regions of Eurasia; materials and objects far removed from their places of origin; calendars and sundials for everyday use.

In recent decades, ancient astronomical knowledge and the development of navigation technologies have become the subject of comprehensive scientific research involving professional astronomers and geographers. On the territory of Siberia, objects of different ages and technological levels were considered: *for the era of stone*—in the studies of Frolov (1992) and Larichev (1999); for the *era of bronze*—Kyzlasov (1989), Y. Esin (2010), Kubarev (2010), Okladnikova (2011), and Paranina (2012a); and for the *era of iron*—Marsadolov (2001, 2007–2014); *ancient megalithic objects of Siberia and natural human-made sculptures* were considered mainly in the studies of the authors of this chapter (2005, 2007b, 2008, 2010, 2011, 2014).

Centrographic calculations of L. S. Marsadolov showed that by the end of the Bronze Age, the construction of the largest objects of sacred significance secured centers of macro-regional scale: in the Center of Eurasia—the largest megalithic complex Seleutas, in the ancient Center of Asia—the large mound-temple Arzhan-1 in Tuva (eighth century BC), in the Center of Khakassia—the megalithic mound-temple Salbyk (seventh century BC), and in the Center of Altai—the large mound Bashadar-2 (sixth century BC). At the same time, the legendary Gordion (eighth–seventh centuries BC) was built at the Center of Anatolia (Marsadolov 2011). The centers of other regions of the planet that consolidate historical communities' cultural space and territories stand out similarly.

The basis for the integrity and orderliness of any system is the internal and external relations. The horizontal structure of the geo-cultural space of Siberia reflects latitudinal and meridional communication flows: along the marginal seas of the Arctic Ocean (which at the time of the climatic optimum, about 7000 years ago, did not freeze); along the tundra—the "wide road" mastered by reindeer breeders; along with the system of water-ways of the multi-water taiga zone (the most powerful are along the rivers Lena, Amur, Ob, and Yenisei); and along the steppe, which in the era of climate humidification becomes incredibly well traveled ("steppe"—*step*, land transport: a chariot or a horse-drawn cart). Sustainable external relations of the Siberian region were facilitated by the development of all these types of navigation.

Due to the north of the continent, which is part of the circumpolar (arctic) region, Siberia has become a sacred element in the spatial models of the Eurasian world of many neighboring peoples.

The results presented in the chapter are new. Their methodological basis is *the navigation concept of the world's information modeling*, developed on an interdisciplinary basis by one of the authors of the chapter (Paranina and Paranin 2016) (*navigation* is a combination of the form of movement and orientation). The concept develops the notion of "geo-cultural space", recognized as the main subject of cultural geography—the direction of Russian geography, akin to the cultural geography of Karl Sauer (Streletsky 2008, 2014). The primary purpose of this direction of Russian geography is to explore and study all forms of human suprabiological adaptation. Regional features of this branch of world geography rely on the fundamental laws of animate and inanimate nature. This was understood by Russian natural scientists and philosophers—cosmists of the nineteenth–twentieth centuries (V. V. Dokuchaev, K. A. Timiryazev, and V. I. Vernadsky). The navigation concept is consistent with the modern natural science world view and reflects the modern achievements of the natural sciences: geography and mathematical geography, regional physical geography and landscape science, biology, ecology and geo-ecology, geology, and biogeochemistry (L. S. Berg, A. A. Grigoriev, S. V. Kalesnik, B. B. Polynov, A. I. Perelman, and N. S. Kasimov). To the greatest extent, the structure of the concept has been influenced by the theoretical propositions mentioned using the system approach in geography: the doctrine of geosystems of V. B. Sochava; definition of structure as a spatio-temporal organization of a system according to A. G. Isachenko; "the flow organizes the space"—according to A. S. Viktorov; thesis on the constructive role of a supersystem for a subsystem—according to K. N. Dyakonov; doctrine of rhythms in nature by E. V. Maximov; provisions on the territorial networks of B. B. Rodoman; principles of organization and toponymic marking of territorial systems based on navigation by the Sun of Paranin (1990, 1998); and the astronomical nature of the sign, based on a comparison of the structure of ancient objects and geometric signs with the shadow graphs of the gnomon of a sundial calendar in different geographical conditions (in space—depending on geographic latitude and relief; in time—depending on the inclination of the earth's axis during long-period cycles of planets and precessions of the equinoxes) (Paranina and Paranin 2016). The definition of information played a special role in the formation and development of the concept by A. V. Glushkov "information is any variety in the distribution of matter and energy in space and time" and the studies of Yu. G. Puzachenko on the application of mathematical methods in environmental and geographical research.

The information model, built on a navigation basis, represents geographical space–time priorities in the formation of humans and the evolution of culture, as a product of collective adaptation to conditions on the planet Earth (Fig. 1). The figure shows that the foundation and the basis of the information system that describes the world in its qualitative differences and quantitative characteristics is the measurement system, which first appeared and was actively developed in navigation. The navigation basis (specific graphs; measurement scales) is replicated and transformed: into *a symbol*—an abstract graphic sign, *a word* (language)—its phonetic equivalent, and

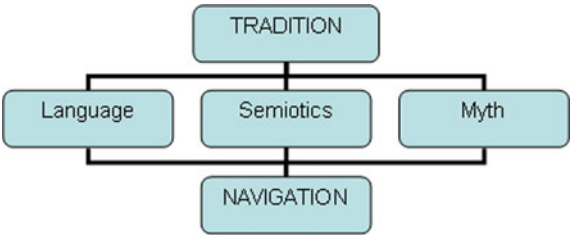

Fig. 1 The structure of the information model of the world (Paranina and Paranin 2016)

a myth—as a figurative and narrative description of a complex natural process (the "allegory language" is suitable for describing natural processes in conditions of the absence of formalized languages of the natural sciences).

The top of the model is tradition—technology and theoretical models, a system of metrological and moral standards that have passed the test of time and have proven their effectiveness. This cumulative experience of many generations ("past in the present") may be the primary response of humankind to the new time's challenges.

The navigation concept of information modeling of the world helps overcome the limitations of the world's classical mythopoetic models and develops them on a geographical basis. This applies to the classical breakdown of signs by C. Pierce and the Frege semantic triangle (Paranina, Biosemiotics). These are Pierce's index signs, not frequently used in the research yet, that correspond to the scales of ancient calendars that linked time and space, abstract thinking and human predictive activity (planning), adequate to the environment's dynamics. Adding the element of "a real natural environment that requires adequate action" helps to overcome the boundaries of the Frege semantic triangle, which closes the world of meanings and signs on itself. The inclusion of real geographic space–time in humanitarian theoretical models helps to understand better and more effectively use the big data accumulated in the process of archaeological, ethnographic, and semiotic research.

The navigation concept has been formed and tested in Europe, Siberia, and the Mediterranean region.

In Siberia, astroarchaeological, geo-archaeological, and navigational studies were carried out by the Sayano-Altai expedition of the State Hermitage Museum under the direction of L. S. Marsadolov, together with the employees of the Pulkovo Observatory of the Russian Academy of Sciences and the Herzen State Pedagogical University. More than 25 archaeological–astronomical objects were identified, including: objects in Tuva—Arzhan-1 and Ulug-Khorum; in Khakassia—the Big Salbyk mound; in Altai—a complex of objects in the valley of the river Yustyd, the sanctuary of Turu-Alta, the megalithic complex of Tarhat, Kalbak-Tash petroglyphs; and objects in Semisart, Adyr-Kan, Pazyryk, Biyka, Ak-Baur, Seleutas, etc.

A wide range of methods was used in the research: astronomical, astroarchaeological, aerospace, geodesic, topographic, cartographic, landscape, toponymic, metrological, ethnographic, and other objects. To study ancient navigation systems, an algorithm for complex interdisciplinary research was developed (Marsadolov and Paranina 2011).

The comparison of Siberia's and Europe's objects showed that objects of the same age are similar in form, function, and technology (Marsadolov et al. 2013). For example, starting from the Bronze Age, most of the stone sculptures and several vertically installed slabs in Siberia and England had a beveled upper edge, a high eastern and low western face, because the sun rises in the east and sets in the west. It is necessary to briefly note the proximity in form and, probably, in the navigation and sacred functions of some high megalithic steles of the Bronze Age from England and Siberia. On the Isle of Mainland in Scotland, in the "Ring of Brodgar", which has the shape of a circle with a diameter of 104 m, the height of individual steles reached 5 m (Figs. 1 and 2).

On several mounds near the village of Safronovo in Khakassia, in the southeastern corner of the fence, there are large stone steles (with different times), about 6 m high (Fig. 2).

Huge slabs from monuments of the Bronze Age were also partially used for the construction of the largest megalithic complex in Siberia—the Great Salbyk mound in the center of Khakassia, excavated in 1954–1956 by the expedition of S. V. Kiselev and relating to the Tagar culture, to the seventh century BC (Marsadolov 2010).

The stone fence of the Greater Salbyk mound, measuring 71 × 71 m, was built of 90 large slabs, vertically and horizontally placed, which weight reached 100 tons (Figs. 2 and 4). By the monumentality of the stone structure and the volume of labor expended, the Great Salbyk mound in Khakassia can be put in one row with the famous Stonehenge in England (Figs. 2 and 3).

Salbyk and Stonehenge are located at approximately the same latitude, on small hills in the middle of vast plains. Long-term astronomical observations and measurements were made at these monuments, and huge stone slabs for their designs were delivered from afar, from special quarries (Hawkins and White 1965; Marsadolov 2010).

So far, astroarchaeological research has been carried out on many ancient objects of the world, including Machu Picchu and Egyptian pyramids. Some of these objects received the status of UNESCO World Heritage Sites, most of them are recognized as a "wonder of the world" in their historical field, and almost every object known to science remains revered by the people. Serious work on the synthesis and popularization of astroarchaeological knowledge (scientific facts and reconstructions) is carried out by European researchers from England (Prof. G. Hawkins, G. Wood, and Paul Devereaux), France (independent researcher Chantal Zheges Volkevich), Italy (Lorenzis and Orofino 2015), Bulgaria (International Symposium Megalithic Monuments and Cult Practices, the chairman Prof. Dr. Sc. Vassil Markov), and Germany (Prof. K. Schmidt). However, studies on the navigation by the Sun (Prof. M. Tadich; Prof. B. Mitrovich), which are more in demand in the everyday life of every person and take the first place in folk culture, are very rare. In general, the evidence obtained in world science and practice is consistent with the facts we consider for facilities located in Siberia and other regions of Russia.

The difference in the results received by various researchers is largely related to the possibilities of the applied practical methods and the choice of the fundamental basis for the interpretation of the obtained factual material. Based on space geography,

Fig. 2 Comparison of megalithic objects of England and Siberia: 1—a stele from the Ring of Brodgar in Scotland (height—up to 5 m); 2—a stele in the southeast corner of the fence of the Safronovo burial mound in Khakassia, South Siberia (height—about 6 m), 3—a fragment of the stone structure of Stonehenge in England (plates weighing up to 30 tons), and 4—a large stone slab in the southeast corner of the Great Salbyk mound in Khakassia (height—5 m; weight—about 100 tons)

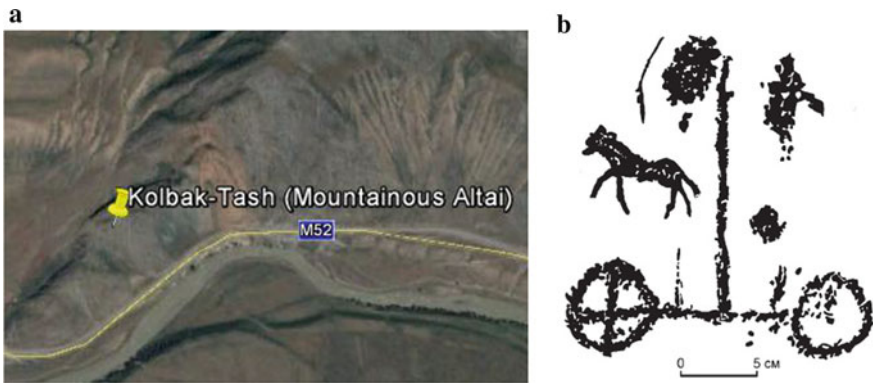

Fig. 3 Rock with petroglyphs Yalbak-Tash (Kalbak-Tash): **a** Satellite image; **b** image of the chariot (Kubarev 2010)

mathematical geography, and trigonometry, the authors of the article developed new quantitative methods (calculating the sizes and directions of the functional parts of objects, a comparative analysis of rose diagrams of linear landscape elements and planigraphy of artificial objects, comparing graphic and subject drawings with shadow graphs of sundial calendars, and others). An expanded set of practical tools made it possible to consider the technological layering of monuments, which until now have not been given much attention. As a result, in each complex, not only megalithic astronomical tools (which mainly reflect the technology of near-horizon observations) were reflected in the study, but also the landscape structures (created by lusus naturae and serving as an information resource for the first person) and the subsequent tools of a higher technological level, fixing the movement of a shadow or ray of light.

In theoretical terms, the main specific feature of the studies done by the team of authors of this chapter is to consider each specific cultural object as part of the holistic geo-cultural space of the Earth—a global system that is steadily developing only thanks to material–energy and information flow: internal connections and openness to space. Due to modern means of navigation and communication, the possibility of such a broad understanding is open to everyone today.

2 Human and Geospace: Stages of Development and Tools

It is a well-known fact that the main factor in the survival and development of life on the Earth is navigation—movement and orientation in geographic space and time. The orientation reflex is the first in a series of biological adaptations. Geo- and heliotropism, photoperiodism, biological clocks, seasonal migrations, and near and far migrations of animals and plants are described in this chapter. Unlike other species, a human during his life constantly creates, uses, and improves tools.

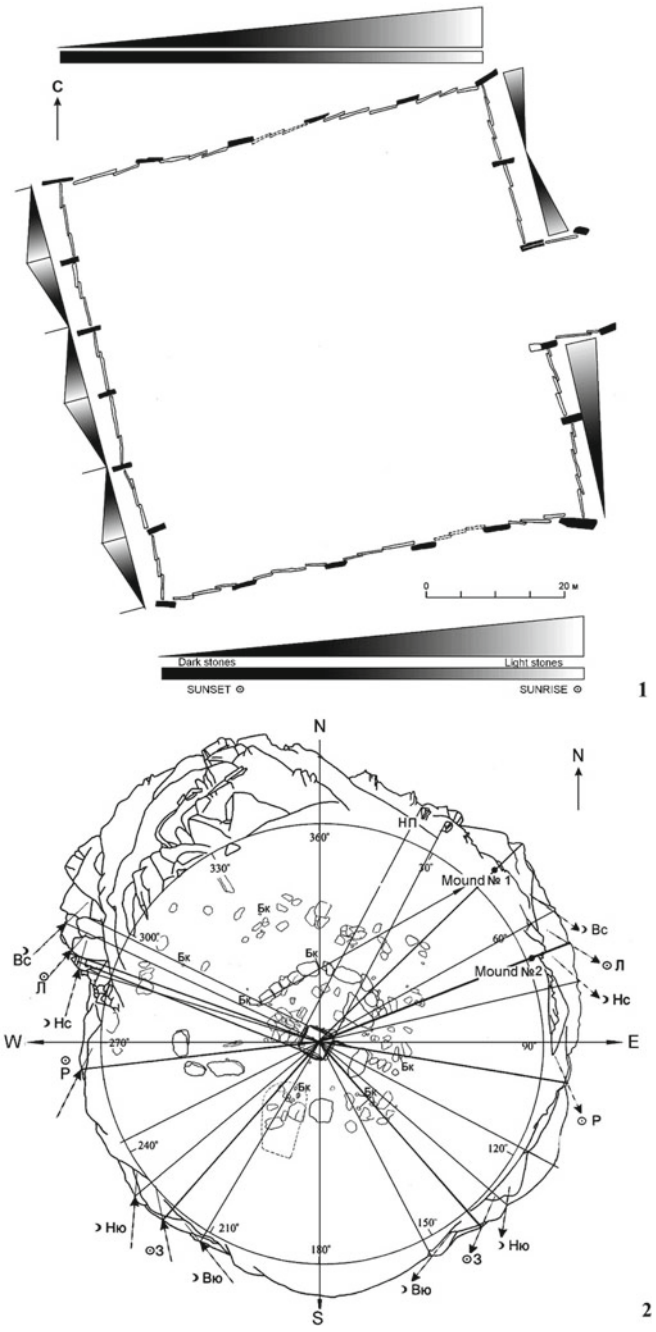

Fig. 4 Archaeological sites of Siberia, seventh century BC: 1—Khakassia, Bolshoy Salbyk Mound; 2—Altai, Semismart, Mound No. 4, a circular landscape panorama from the center of the mound with marked astronomical directions. According to the materials of archaeological expeditions of L. S. Marsadolov

The most reliable landmarks are the objects of outer space (*space—order*), since the landscape is very dynamic (on the Earth *everything flows, everything changes*). The most crucial cosmic reference point is *the Sun—the primary source of energy and information*: it maintains 99% of all processes on the Earth's surface, including the productivity of landscapes, and gives the brightest light signal on the Earth, whose rhythms are replicated in all geospheres.

Throughout the anthropogenic (2.5 million years), according to archaeological and anthropological data, several variants of stone and metal cultures have changed. But at the same time, navigation technologies were developing, which allowed a human to master the planet successfully. The analysis of the spatial characteristics of the cultural heritage sites of the Eurasian and world space allows for reconstructing the following *stages in the development of navigation technologies*: landscape and megalithic (direct sighting and creating local networks); post-megalytic (back-sighting and creating regional networks); the historical stage of abstract modeling (developing rational and creating irrational Symbols); and the current stage of new technologies of navigation, communication, and modeling (Paranina 2016; Paranina and Paranin 2017a). The forgotten tools of exploring the space of Siberia well successfully called "tools of sacred navigation".

Before describing the tools for developing the space and time of Siberia, let us recall some facts: during the excavations of the Malta site on the Angara, calendars of more than 20 thousand years old were found, which were carved in the form of spirals on a fragment of bone (Frolov 1992); to determine the beginning of the reference time on the calendar, it is necessary to conduct astronomical observations; the creation of a calendar entry should precede a long period of accumulation of knowledge based on the observation of cycles of space objects.

3 Unique Natural Objects of Siberia as the First Navigation Tools

The most ancient navigational tools are landscape markers of geographical space–time. Kinks of the horizon, large tectonic forms, and rocks resistant to destruction were the first tools for fixing the cyclic time (daily, monthly, and annual). It is easy to "link" the movements of the Sun, the Moon, planets, and constellations to the "time scale" created by nature.

The choice of landscape tools in essence represents the identification and the usage of *information resources of nature* (landscape, geographical, and outer space). The information function of such marker objects assumes a special status, a sparing nature management regime, and the selection of boundaries that ensure the sustainability of the natural complex as a whole.

The aims of *direct sighting* are achieved by a near-horizon observatory, which provides the alignment of three points on one line: a certain point on the horizon, and a near and far sight. In the simplest case, an accurate definition of one day of the

year is enough. Most often, the new year is the boundary of astronomical seasons, determined by the climax of the Sun (spring and autumn equinoxes; summer and winter solstices). These days correspond to six points—three sunrises and three sunsets. The path of the Sun is also related to the position of the constellations, since during the year it goes back in all sectors of the zodiacal circle. Observations of the Moon are carried out in phases of the monthly cycles and in the course of 19-year cycles.

The ancient astronomical observatories of Siberia were discovered among the first in Russia. Studies of the Sunduk mountain range near the Kuznetsk Alatau for more than 20 years were conducted under the guidance of Doctor of Historical Sciences Larichev (1999). Calculations and observations have shown that the chain of cuesta crowned with the remnants of red sandstone is very convenient for direct sighting of the calendar astronomical points of the Sun, the Moon, and the stars. In the summer of 2011, the Sunduki Museum and reserve was opened.

Our studies have shown that in the sacred landscapes of Siberia, natural processes create and maintain forms, the direction of which coincides with astronomically significant azimuths. For example, in the Salbyk valley (Khakassia), the direction of the erosional forms of the foothill zone coincides with the azimuths of the solstices; in the valley of the Chuya and Yustyd (Gorny Altai) rivers, the directions of erosion terraces coincide with the azimuths of the equinoxes. Similar correspondences were identified based on satellite images and maps in all regions of the planet. On this basis, a new criterion for determining the sacred landscape was proposed—the preservation and transmission of vital information about the order of space–time, and the landscape stage of technology development was highlighted.

The forms and density of human-made additions into the sacred landscape reflect the development of orientation technologies and features of mentality, regional specificity, in particular, the security of human activity with energy, raw materials, and information resources, and the demand for navigation information. For example, in the mountainous and arctic regions, the winter/summer border is most relevant; therefore, many objects are located on the East–West line, which allows determining the equinox days. On the Chui highway, such a tool could be the Kalbak-Tash rock (Yalbak-Tash), highlighted by petroglyphs (Paranina and Paranin 2017a). The satellite image (Fig. 3a) shows that the Chuya River Valley itself has a latitudinal strike, along which the ancient road passes, connecting the Altai Mountains with the regions of Siberia and Central Asia.

Like all ancient objects of culture, the monument is multi-layered. Petroglyphs are dated from 1 to 5 thousand years and we can distinguish the stages of their creation. The basis of many figurative images is geometric shapes. For example, bulls are embossed over the grids (Okladnikova 2011).

The survey of the complex with a compass conducted in 2012 together with R. V. Paranin showed that not only the relief of the rock, but also the drawings on it are well oriented, and this allows us to use them as a scale of a sundial calendar. Besides, the plots of the drawings show that objects such as a staff or a chariot can be used to navigate around the Sun (Fig. 3b). So, the ancient images are transformed into an informational and educational resource of their time, and for the modern

researcher, they become an essential source of knowledge about the diversity of simple navigation technologies.

Frequently, natural formations, erosion forms and remnants of weathering, are associated with various forms of living beings. Determining the share of creative human participation in the formation of the zoo and anthropomorphic stone sculpture is quite simple; a comparison with neighboring geological and geomorphological complexes of similar genesis shows that the principle of the ancient architects was to "remove the excess". This principle developed from the most ancient taboo on the number of strokes made on the stone to the striving for complete coincidence with the living prototype (in classical sculpture). The wisdom of ancient technology, limiting the degree of change of the natural substrate, is based on the understanding that an increase in rock fracturing and a violation of the surface shape leads to a change in the direction of water and air flow—those natural processes that were and will be the main sculptors of the planet. As one of the stages in the development of this tradition, we can consider the later, artificially established megalithic objects (Paranina 2010).

Among the natural–man-made megaliths of Siberia, the most common are menhirs, dolmens, cromlechs, and seids—stones in an unstable position (falling, balancing, and hanging), anthropomorphic and zoomorphic sculptures. These marker objects are similar in navigation function and status to the forms in other regions of the world. Examples of the unity of forms and technologies are the mountains Kisilyakh in Yakutia, the stone idols of the Urals, the divas of Don Belogoriye, and others (Grigoriev 2014). In the complexes of the venerable Alkhanay mountain in Transbaikalia and the Aiguille mountains in France, the instrumental (sight) purpose of a stone arch sculpture is equally manifested (Grigoryev and Paranina 2017). Below there is a list of the brightest stone objects of Siberia, and the nodal position in the communications system practically determines their functions as beacons in the navigation system (see Table 1).

Spatial characteristics of these objects, which provide astronomical orientation, are easily determined on satellite images (Marsadolov 2005, 2007a, c, 2008, 2014; Genov 2018). Primary astronomical use of *natural and natural–man-made sculpture* often finds additional confirmation in traditions and legends: dialogue with the sky; birth from the gods—the stars, the Moon, and the Sun; and the creation of the world by two brothers who have the characteristics of *solar energy and information*—knowledge gained through astronomical tools (Paranina and Paranin 2017a).

4 The Near-Horizon Observatories as Witnesses to a Deep Calendar Tradition

The second stage in the development of navigation and the information function of the location of the sacral complex, the megalithic, is characterized by the use of *extensive human-made tools of direct sight*. The sign points of the horizon are fixed

Table 1 The largest or most known accumulations of megaliths in Siberia (Grigoriev 2014)

No	Geographical position	Coordinates	Types of megaliths
1	Mount Pidan (Livadiyskaya) Ridge Sihote-Alin	43°04′ N 132°41′ E	The largest megalithic center
2	Pyramids in the vicinity of Nakhodka in Primorye	42°51′ N 133°15′ E	Pyramids Brother and Sister
3	Primorye on the coast of the river Ussuri at river Podhorenok 40 km from the town ofVyazemsky	47°37′ N 135°11′ E	Traces of megalithic structures, including underground
4	Amur pillars on the river Amur, Mount Shaman	51°27′ N 139°54′ E	Stone pillars with handmade images
5	The neighborhood of Magadan	59°39′ N 150°30′ E	Stone structures, wall
6	Omsumchany hills in theFar East	62°39′ N 155°19′ E	“String” of 12 clusters of megaliths
7	Kiseli Plateau. Yakutia. To the east of village Elgetsk on the river Yana Batagai pillars	67°24′ N 134°54′ E	Stone pillars with unclearly pronounced anthropo- and zoomorphic images
8	Sinsky pillars on the river. Sinyaya	67°13′ N 127°36′ E	Stone pillars with obscure images
9	Anabar Upland	70°11′ N 106°32′ E	Different megaliths
10	Putorana Plateau		Different megaliths
11	Island Popova-Chukhchina west of theTaimyr Peninsula	74°51′ N 86°30′ E	The accumulation of menhirs
12	Krasnoyarskand surroundings: the pyramids and the Krasnoyarsk pillars	55°53 ′N 92°46′ E	Pyramids, Krasnoyarsk pillars on the riverYenisei
13	Sayan. Mountain Shoria	58° 38′ N 88°15′ E approx	Huge megalithic complex
14	Sayan Mountains, Khakassia, Salbyk Valley	53°52 N 90°52 E	Megalithic complex, mostly menhirs
15	Sayan. Ergaki	52°50′ N 93°21′ E	Megalithic complex. Anthropomorphic. sculptures, seids
16	Small Baschelak, NW Altai	51°30′ N 83°45′ E	Geometrically regular boulders randomly scattered
17	Sayany, Lake Itkul area Khakassia Sayans, ridges Sunduki	54°28′ N 90°05′ E 54°33′ N 90°26′ E	Different megaliths Astronomical observatory

(continued)

Table 1 (continued)

No	Geographical position	Coordinates	Types of megaliths
18	Lenapillars. Yakutia. RiverLena	61°12′ N 128°10 E	Stone pillars with unclearly pronounced anthropo- and zoomorphic images
19	Western Altai. lakes Dubygalinskoe,	50°03′ N 81°47′ E	Various megaliths (slabs, processed rocks, seids)
20	Medvezhi Islands. East-Siberian Sea	70°52′ N 161°28′ E	Kigilyaki—Stone pillars with obscure images
21	Island B. Lyakhovsky (Cape Kigilyak). Laptev Sea–East Siberian Sea	73°26′ N 141°48′ E	Kigilyaki—stone pillars with obscure images
22	Right bank of the Indigirka near the mouth of its tributary Nera	64°36′ N 143°21′ E	Kigilyaki—stone pillars with obscure images
23	The ridge of Ualahan–Sousse–Suor–Uyyaty Ridge–Ridge Kiselyah–Tas. Yang plateau. Yakutia	69°40′ N 155°03′ E	Stone pillars with unclear anthropo- and zoomorphic images

with the help of objects resistant to destruction and displacement, often on linear elements of the relief in landscapes suitable for astronomical observations.

The requirements of this technology meet massive objects, placed (or fixed in the ground) at a distance of several hundred meters. The near-horizon observatories can be located both on high, visually connected terrain points, and in a valley, a lowering that visually approximates the horizon line, which makes the polygon compact and relatively independent of the surrounding landscape. Examples of such tools are objects studied by the Sayano-Altai archaeological expeditions of the State Hermitage, under the direction of L. S. Marsadolov.

For many decades, megalithic complexes of Tarkhat, Semisart, Bolshoy Salbyk Kurgan, and many others (Marsadolov 2001) have been studied in detail. For example, topographic and geodetic works were carried out to clarify the paleoastronomical data about objects in the Salbyk Valley. From the centers of the three largest mounds with an accuracy of 1 degree, circular panoramas of the surrounding landscape were drawn (Fig. 4), and then on the basis of the astronomical software package, V. L. Gorshkov, an employee of the Main Astronomical Observatory of the Russian Academy of Sciences in Pulkovo, determined the azimuths of sunrises and sunsets with the height of the physical horizon at the time of creation (Marsadolov et al. 2006; Marsadolov 2007b, 2010). In 2010, the authors of the article carried out comprehensive field research in the space of a mound field (Marsadolov and Paranina 2011). It was confirmed that when choosing a place for the construction of large mounds in Salbyk, the directions to the sunrises and sunsets on the astronomically significant days were also considered.

The megalithic stage in the Salbyk valley left behind not only the mounds of the Tagar time, but also more ancient objects—the same type of remote steles (from the

western side of the most enormous mounds) and unique: the stele "Izvayanie", the venerated complex "Two stones" ("Gates"), and the Fertility stone in the gates of the Bolshoy Salbyk mound are reused objects from a monument of an earlier time (Figs. 4 and 5). In size, shape, quality, and degree of surface erosion, these stones are very different from the material used for the construction of the Tagar burial mounds. Among the revered stones in Sayano-Altai, as in other regions of Russia, objects in the form of a chair or a throne are often found. In the spurs of the Batenevsky Ridge, a chair with cup-shaped depressions was preserved, surrounded by a group of "cups", and two platforms paved in the shape of an arrow and a sector of a circle. The form of the throne also has a "female stone" of the megalithic complex of Tarkhat in the Chuya steppe (Marsadolov 2007b, 2014). Judging by the location, the throne records the point from which the near-horizon observation was conducted.

Fig. 5 The most revered stone of the gate of the Bolshoy Salbyk kurgan—the fertility stone. Photo Marsadolov (2010)

The earliest objects of megalithic time are created with simple stone tools, and they are heavily destroyed and only slightly differ from the natural elements of the landscape. However, the position, shape, size, and degree of processing of objects may indicate their functions and connections in the complex. At the same time, even if the material of the megalithic complex was not subjected to significant movements and processing, it should be considered as a *natural–human-made*, if knowledge and additional energy of a person are embedded in the process of creating an astronomical instrument. One of the barely noticeable, but clear signs of the artificiality of a stone (or the criterion of its choice), are dimensions that are multiples of units of the ancient system of measures—feet, elbows, and fathoms. However, the main criterion is the ability to perform the information function, which is based on the correlation of the complex planigraphy and astronomically significant directions.

If, at the landscape stage, the preservation of these astronomical directions provided the use of natural rock massifs as sights, which are the most resistant to tectonic movements and displacements under the action of exogenous geomorphological processes (for example, slope or cryogenic), then at the megalithic stage, the stability of sights to destruction and displacement provided their weight. However, *during the first two stages of astronomical observations, a person was able to verify that near-horizon observatories inevitably lose accuracy over time,* not because their structures or underlying rocks are unstable, but because the azimuths of astronomical culminations of all celestial landmarks gradually change, i.e. Space itself is dynamic. Based on the knowledge accumulated during this period, the first calendar entries were created, and it became possible to calculate long-period cycles and switch to more economical, compact, and accurate reverse sighting technologies, where human himself can be a tool.

5 Navigation by the Sun and Creation of Regional Networks

The third stage of mastering the space of Siberia and the world is associated with the use of *back-sighting technologies*—fixing the movement of a light source along the trajectory of an object's shadow or a focused beam. Observing the shadow of an object throughout the day gives a person much more information than observations of astronomical objects near the horizon line. Gnomon sundial calendar (gnomon—a subject that gives shade), the first angle indicator, which allowed to distinguish parts of the day—hours, determine the noon and position of the midday line—meridian, calculate the geographical latitude of the place, and form an adequate planetary model: the Earth is a rotating ball, a gnomon tilted on the Polar Star is a projection of the Earth axis. This model is the basis of the celestial sphere and the coordinates of all objects of the Universe.

Binding to the planetary coordinate system allows us to link the local astronomic–geodesic networks (observation points and observatories) into a single *regional system.*

The transition to the mono-tool, the gnomon, occurred through several intermediate variants. Preserved complexes in which the shadow of one object falls on another object at sunrise/sunset on certain days of the year (The sundial 1985; Stafeev and Tomilin 2006; Marsadolov 2007b, 2011, 2014; Marsadolov and Paranina 2011; Marsadolov et al 2013). Together, they form functional integrity—the local astronomic–geodesic *network*.

The steppe landscape in the south and the arctic in the north of Siberia do not withstand the intense economic load; they are inclined to nomadic development and the creation of a network of landmarks. The development of the infrastructure of the ancient trade routes was facilitated by the intersection of latitudinal and meridional trade flows. The influence of the structure of ethno-political formations—the location of development vectors, "center–periphery" zones, and nodal elements can be added to this.

Labyrinths and petroglyphs, stone kerexurs, stele-sculptures, deer stones, and menhirs (Paranin and Paranina 2009; Paranina 2010, 2011, 2012a, b; Paranina and Paranin 2016) can be considered as tools for navigation by the shadow.

Sculptures of Okunev culture date back to 3 thousand BC and are found mainly in the Minusinsk Basin (Esin 2010; Marsadolov 1994). In archaeology, their connection with mythology, religious rituals, and land surveying is considered, but navigation functions significantly expand the possibilities of understanding. For example, let us compare the graph of the shadow of a solar gnomon with images embossed on steles (Fig. 6a, b). Researchers identify in them a three-part, characteristic of the shaman tambourines, where the model of the Universe consists of the heavenly, earthly, and underground worlds. The statue itself is associated with the central axis of the Universe—the embodiment of the World Mountain or with the sacrificial pillar—the ritual equivalent of the World Pillar.

The face is considered to be the anthropomorphic image of the Primordial Being and the spatial system: the eyes, nose, and mouth are considered as its three tiers, and the ears are the directions of the world (Esin 2010). If the sundial is used to interpret the mask (Fig. 6a), then the horns are the sunrise/sunset, since when the Sun is in a low position, the shadow goes to infinity (the daily shadow chart also has the shape of a fork), and the annual shadow chart decodes the image completely (Paranina 2012a).

The middle (third) horn (sometimes the eye) is the marker of the midday climax of the Sun, the middle of the day and its third dimension, which has become the reference point of time and space for all times. The drawing of the bridle ("three worlds") coincides with the position of the lines on the graph of annual shadows (Fig. 6b): the horizontal line is the equinoxes, the arc facing upwards is winter, and the arc facing downwards is summer.

The figure on the Solar Stele (Fig. 6b, c) is also consistent with the annual diagram of the shadow if you combine the mouth of the groove with the position of the gnomon: the vertical mark on the forehead facilitates the determination of the noon;

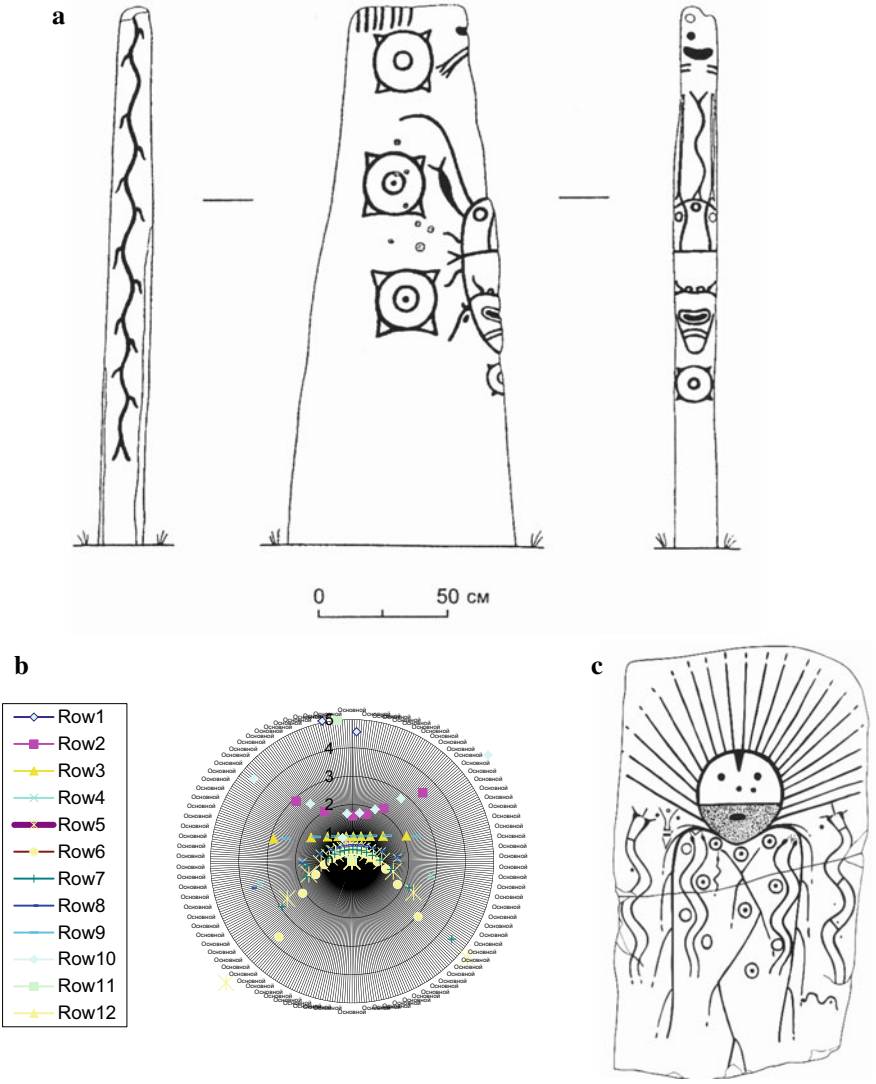

Fig. 6 **a** A sculpture with round solar signs, "solar horns", and "third eye" (Esin 2010); **b** a graph of the annual dynamics of the shadows of the gnomon in the labyrinth has the shape of Labris, a bilateral two-horned ax of the god of light (Paranina 2010), where the position of the vertical gnomon is a triangle in the center, and the individual arcs "sun horns" are directed: in the winter—upwards, in the summer—downwards, in the equinoxes—a straight horizontal line; **c** the solar stela (Esin 2010), the image can serve as a scale of the sundial calendar, if you add "tongue"—an object that gives a shadow (Paranina 2012a)

rays radiating from a disk are convenient as hour marks; two lines going down—sunrises and approaches (nighttime is between them; therefore, snakes are passive). Consequently, the image is functional and, if necessary, it turns into a tool. Similarly, the technology of the gnomon explains the ancient solar sign of Khakassia (Fig. 6a): three circles allow determining the boundaries of astronomical seasons along the length of the midday shadow, and a slanting cross—the days of the solstices by the azimuths of sunrises/sunsets.

Deer stones date back to the end of the Bronze Age—the beginning of the Iron Age (ninth–sixth centuries BC). The beveled upper edge, which faces apex to the East, makes the stone an indication of the directions, and its shadow is the hand of the clock. The image of deer with branched horns perhaps reminiscent of the tradition of counting time by the number of annual increments or citing a deer as an example of successful long-distance migrations. Stones of this type mark transcontinental highways connecting the remote steppe corners of the Eurasian continent. In the description of a deer stone from river Orioles (Bronze Age, Transbaikalia), A. P. Okladnikov emphasizes the similarity of the culture of the creators (representatives of the steppe tribes of Southern Siberia) with the culture of the countries of Eastern Europe, the Scythian tribes of the Black Sea region, and the traditions of ancient China (Okladnikov 1954).

In the early Iron Age (from the sixth–fifth centuries BC), the tradition of worshiping these stones was lost and their reuse began, as a building material, associated with destruction, transportation, etc. Nevertheless, the technologists of the gnomon were not forgotten. In China, at that time, essays on gnomonics were written, and ordinary people, following the most ancient tradition, used the shadow of staff or their figure for navigation, measuring it with their foot or elbow.

6 Sacralization of Astronomical Navigation: A Retrospective Analysis (from the Stone Age to the Present day)

Numerous examples of neighborhoods of different age objects and a modern geodetic network point to the stability and continuity of the navigation function of cultural heritage: in Khakassia, the “external stele of the mound (ancient)—mound (later)—geodetic point of the triangulation network”. The sequence of “pagan objects—Christian (as an option: Buddhist, Islamic) shrines” is also very characteristic, for example, 1. stones, rocks, blessed by the church, and springs with the assignment of a new Christian legend to them; 2. the construction of temples on the site of ancient temples; and 3. the inclusion of revered stones in the architectural and planning structure of religious complexes (walls, floors, steps, and altars). In general, *the tradition of inheritance of a place* emphasizes the absolute significance of a position in geographic space.

Folk tradition has been playing a unique role in preserving the ancient navigational knowledge:

1. Massive use associated with the factors of everyday necessity and accessibility (people are still guided by the Sun, getting into unfamiliar terrain);
2. Variety of forms of expression in material and spiritual culture (ornaments, myths, and rituals);
3. A conscious combination of tradition and creativity (for example, the canonicity is rigidly maintained in the technique of folk embroidery, but all the objects created are unique).

The people of Siberia have preserved the tradition of honoring mountain peaks and passes, rivers and lakes, and trees. In modern archaeology and ethnography, such objects are united by the concept of "sacral landscape", and the criterion of its boundaries is considered as the "soul of the earth" and "the soul of a human". The results of the research conducted by the authors of this study give a new, rational, understanding of the primary reason for the sacralization of nature and culture: ***objects that provide the ability to preserve and reproduce information about the order of space–time have acquired sacral status.***

The astronomical navigation was accompanied by the creation of signs ("measurement—designation") and life-affirming solar symbolism. At the beginning of anthropogenesis, the development of direct sighting technologies could contribute to the development of speech and language, and later the shadow of the gnomon, which can transmit information almost continuously (during a polar day), became a productive source of graphic signs. According to V. B. Frolov, a combined astronomical and mathematical knowledge formed the basis of primitive graphics in the ancient Stone Age (Frolov 1992). According to V. I. Paranin, navigation by the Sun became the basis of the color toponymic marking of territorial systems (Paranin 1990). The archaic color marking of the space is confirmed in the toponyms and hydronyms of Siberia (Grigoriev 2014; Marsadolov 2010). Possibly, geographical names—the sides of the horizon—began the formation of a single parent language of humanity—the Nostratic basis that eludes the comparative and statistical methods of comparative linguistic studies (Paranina 2017; Paranina and Paranin 2017b, c).

The transition to back-sighting navigation technologies is described in many cosmogonic myths as the birth of peoples from the Cosmic Gods and the creation of the World from Chaos (Paranina 2010). In this case, as a rule, the myth unites in one object (omphalos) the definition of the center of the world—the earth axis (the "navel" of the Earth, Mount Meru, points of convergence of the meridians) and the concept of the center of a regional astronomic–geodetic network. This will not be perceived as a contradiction, given that the gnomon is a projection of the earth's axis at a given point in space. It should be noted that the location of the largest archaeological monuments in the south of Siberia very closely coincides with the results of the centrographic calculations for Eurasia (Marsadolov 2011).

A retrospective review shows that in the first three stages of the development of navigation (landscape, megalithic, and regional networks), the progress of technology

was expressed in improving the quality, saving money and space, and information about space–time was inherited, compressed in form and developed in content.

The fourth stage of space exploration—the historical stage of abstract modeling—is characterized by the improvement of the navigation infrastructure of the geo-cultural space, the differentiation of instrument functions (magnetic compass, water, and sandglass), and the development of the theory (Paranina 2013).

The practice of astronomical navigation continued to develop mainly in marine navigation, since on the open water surface, the only "road map" is the sky. It is known that at the end of the sixteenth century *Russian seamen* who traveled around the North Seas used "compass"—a kind of sundial with a wooden-framed compass divided along the outer edge into 32 rumba. A similar clock was found during the excavations of Mangazeya and in Taimyr. In cloudy weather, seamen used solar stone, a quartz crystal, which enabled to determine the position of the solar disk due to the polarization of light. Among the peoples of Siberia, the Polar Star Kolo is the most venerated, which is used to determine the sides of the horizon in any part of the northern hemisphere, and in conditions of a long and polar night becomes the main landmark.

The development of abstract modeling all over the world was accompanied by the creation of rational signs—reflecting real natural processes and irrational signs—reflecting speculative constructions in the cultural space separated from nature. The creation of various kinds of boundaries in historical time has continuously increased; rupture of territorial ties—in setting political boundaries, weakening ties with the natural and ethno-cultural environment—in cities, growing misunderstanding between branches of knowledge—as the system of sciences deepens. The models of adaptation to the environment have been replaced by models of management and social adaptation. The listed processes developed more actively outside Siberia, allowing indigenous peoples to preserve ancient customs, and the territories to perform the role of an ethnographic "paradise" and a "reserve" of traditional culture. Subsequently, the construction of roads (Chuysky Trakt, Transsib), the Northern Sea Route, the growth of cities, and the flow of immigrants substantially pressed it.

According to ethnographic data, the arctic small peoples had a system of holidays that conveyed ideas about the stages of the development of the Universe and Man, reflecting the annual movement of stars, the Moon, and the Sun. The main holiday of the year was the summer solstice, which was celebrated in different ways, for example, from June 21 for 4 days coastal Chukchi had "Sun Festival", and the Yakuts had Ysyakh on June 21 or earlier. Every nation singled out in the holiday elements of the natural–economic cycle, but the astronomical basis remained common. For example, Ysyakh, like the holidays of Tuvinians and Altaians, divides the year into two halves, being the border between the old and the new, the past and the future. Profound astronomical contents have economic traditions (for example, orientation of a house) and holidays of Khakassia.

The fifth stage of space exploration is a modern stage of modern technologies, methods of navigation are being developed, based on the achievements of space and

computer equipment, development of remote sensing systems, and means of communication. This expands the capabilities of interdisciplinary research (Streletsky 2014).

However, the mass media are strenuously replicating the unsubstantiated mystical interpretations of the objects of heritage. In the era of the market and mass culture of consumption, the sources of culture are forgotten, and heritage sites become a resource for recreational (tourism) and innovative commercial activities (a wide range of health and magical practices).

Since the first human paths have followed in the footsteps of nursing populations and led to the best development sites of their food supply (bioindication effect in the selection of geospace nodal points), the concept of navigational megaliths is quite consistent with their location in geoactive health friendly zones. Without denying the positive physiological effects of the physical and chemical properties of minerals and rocks, we still note that the main reason for the search for healing power in megaliths was a decrease in the level of health in an artificial urban environment. With the help of physical devices, attempts are also made to find power lines, power units, and information bases like power stations, computers, and flash drives in megalithic complexes—this is similar to the mechanical transfer of modern achievements to the past.

The successes of astroarchaeological and paleo-astronomical research (for example, the results of research on the tracts of Sunduki, Salbyk) are considered only in the context of local activities of a cult nature. In ethnography, there is still no idea of the staff as a gnomon, while the images of the rods are known from the Paleolithic; in the twentieth century, the scientists from Pulkovo Observatory published materials on the calendar traditions of the peoples of the USSR; in the twenty-first century, fundamental studies on the history of optics for the period of 5 thousand years were written.

Retrospective analysis shows that rational knowledge is developing, old technologies are being forgotten, and the form of objects can be preserved for centuries, filled with new content, far from the original meanings. However, today there is an opportunity to consider objects in the system and harmony (Thurley 2005; Tadić 2012; Tadićand Kovačić 2016). For Siberia and the whole world, it is important that in the wake of climate warming and industrial development, resources of valuable information on the development of nature and culture, as well as time-tested ancient traditions important for the civilization of the future, would not be lost.

7 Conclusions

The maritime heritage of the ancient peoples of Siberia is pervasive and has many aspects of its practical application. Siberian heritage objects help to better understand the roots of modern culture, the origins of such ancient veneration in this region, and other peoples of the world. Based on the difference in Siberia's time objects, it

is possible to make sure that any navigational tools are astronomical in terms of technology and are sacred in terms of status (revered, blessed).

The navigational concept adds a new element to humanitarian models, a dynamic geographical space, adaptation to which requires an adequate assessment of the geographical coordinates and rhythms of the passage of time. Such an addition is an essential step towards understanding the mechanisms of functioning of the "human–nature" system and opens new possibilities for reconstructions and forecasts.

The continuity of the information function of sacred objects allows the authors of the chapter to argue that the information function is the primary, and the main one. And this did not prevent us from using prehistoric navigation objects in very different qualities—as time indicators and track marks in a communication network; as centers, and later, as borders of territorial systems; as places of collective holidays and ceremonies associated with the observation of the cosmic order; and as symbols of veneration of wise ancestors; as well as symbols of popular faith, state religion, and power and instruments of international politics and tourism commercial resources at present.

The vast space and harsh climate increase the importance of astronomical orientation skills, their multifaceted reflection in the festive calendar, and everyday life. Therefore, knowledge of navigation technologies' tools and evolution is necessary for a correct understanding of the traditional culture and mentality of the peoples of Siberia, who have a deep connection with space, geographical space, and time.

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Humans and Nature in Siberia: From the Palaeolithic to the Middle Ages

Yaroslav V. Kuzmin, Nikolay I. Bykov, and Evgeny P. Krupochkin

Abstract The main patterns of human–environment interaction in Siberia and the Russian Far East in antiquity (Palaeolithic–Middle Ages) have been established, based on geoarchaeology and GIS. The permanent settling of the whole of Siberia occurred approximately 30,000 years ago. Throughout the Palaeolithic, hunting, fishing, and gathering were the main economic activities. The movement of humans in Siberia and the Russian Far East, mainly from south to north, occurred in the Upper Palaeolithic nearly 50,000 years ago. Throughout the Holocene (the last 11,500 years), there was extensive migration of human populations, in both south-to-north and east-to-west directions. In Mesolithic–Neolithic times, ca. 12,000–5000 years ago, hunting, fishing, and gathering were the main kinds of subsistence. In the Bronze and Early Iron Ages (ca. 5000–1500 years ago), new types of the economy appeared—animal husbandry (initially with dogs and pigs as domesticated species, and later also with sheep, cattle, and domestic horses) and agriculture (millets in far eastern Russia; and wheat, barley, and rye in southern Siberia). Case studies of human–environment interaction in the past in Siberia and the Russian Far East are presented for the Amur River basin, Baraba forest steppe, and the Altai Region.

Keywords Human–environment interaction · Geoarchaeology · GIS · Prehistory · Palaeoenvironment · Palaeoeconomy · Spatial distribution of archaeological sites

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V. N. Bocharnikov and A. N. Steblyanskaya (eds.), *Humans in the Siberian Landscapes*, Springer Geography, https://doi.org/10.1007/978-3-030-90061-8_3

1 Introduction

In this chapter, we applied geoarchaeological and historical–geographical approaches to understand the main patterns of human–environment interaction in Siberia and the Russian Far East throughout prehistory and ancient history, from the Palaeolithic to the Middle Ages. The study is based on the application of natural sciences and Geographic Information System (GIS) in archaeology. Upon general characterisation of the methods employed, we pay particular attention to well-studied territories, including the Amur River basin (southern Russian Far East), the Baraba forest steppe (central West Siberian Plain), and the Altai Region in southern Siberia (plains and mountains) (Fig. 1).

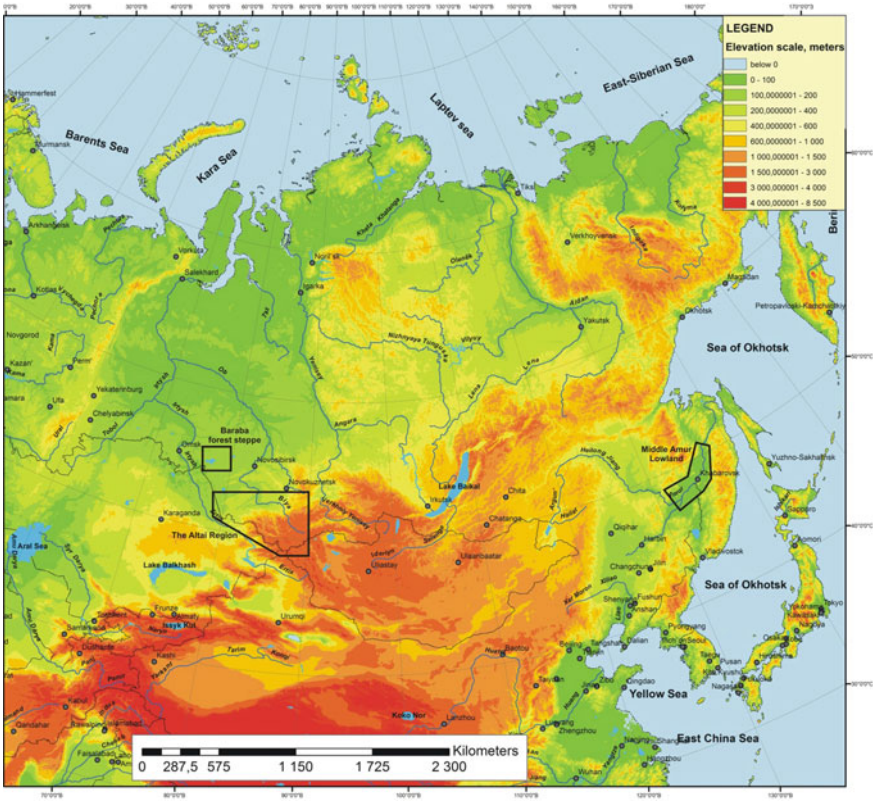

Fig. 1 General map of Siberia and the Russian Far East, with the location of key regions (map from open sources)

1.1 Definition of Geoarchaeology

The relationship between the natural environment and ancient humans is the subject of study by a scientific field called "geoarchaeology". The first fundamental sources on geoarchaeology appeared in the 1860s (e.g., Lyell 1863). At the end of the nineteenth–the first half of the twentieth century, geoarchaeology continued to develop, and during the 1950s–1960s a factual methodological basis emerged (e.g., Brothwell and Higgs 1969). Renfrew (1976) noted that "… since archaeology, or at least prehistoric archaeology, recovers almost all its basic data by excavation, every archaeological problem starts as a problem in geoarchaeology" (Renfrew 1976: 2).

Today, there are two main approaches in the discipline at the interface of the natural sciences and archaeology. The first of them, called "archaeological geology", has as its primary goal the application to the archaeology of various geological methods (e.g., Herz and Garrison 1998; Garrison 2016). The second approach, called "geoarchaeology" sensu stricto, is the application of the methods used by different natural sciences (e.g., Butzer 1982; Waters 1992; Dincauze 2000; Brothwell and Pollard 2001; Rapp and Hill 2006). Therefore, geoarchaeology is understood in a broader sense compared to archaeological geology. Geoarchaeological techniques used in current archaeology are summarised by Renfrew and Bahn (2016: 131–176, 233–316, 365–390, 433–476).

The modern definition of the term "geoarchaeology" is: "An approach to the study of archaeological issues using the methods and concepts of earth sciences. Attention is focused on the physical context of archaeological remains, especially in relation to geomorphological processes, site formation, post-depositional transformations; and the relationship between cultural and natural processes." (Darvill 2002: 156). Another term close to the concept of geoarchaeology is "environmental archaeology". It means " … *'the study of the environment and its relationship with people through time'*" (Branch et al. 2005: 8, italics is original). Here, special attention is given to the reconstruction of the environment (primarily vegetation) around ancient settlements, as well as strategies for the use of natural resources (plants, animals, and stone and clay raw materials) in the past. There is also a relatively new direction in studies of the human–environment interaction, called "landscape archaeology". It is based on data drawn from archaeology, historical geography, ecology, and anthropology (Darvill 2002: 221); the most common approach is the mapping of archaeological sites that existed at approximately the same time. Besides, data are being interpreted to reconstruct systems of the use of space by ancient communities.

In our understanding, geoarchaeology is an interdisciplinary scientific field combining the natural sciences and archaeology, with the aim to reconstruct the climatic conditions of existence of ancient humans, its geological age, palaeoeconomy (food and raw materials), interaction with the natural environment, human impact on landscapes, as well as the study of the life of ancient people, which is impossible to obtain by using purely archaeological methods.

The first and most important aim of geoarchaeology is to establish the position of archaeological sites in a temporal context, by applying the principles of

stratigraphy and dating (e.g., Waters 1992). The second aim is to understand the patterns of formation of archaeological sites (i.e., spatial context) (e.g., Schiffer 1983). The third aim is the reconstruction of the human landscape (i.e., the natural environment). Within geoarchaeology, several sub-disciplines can be distinguished: (1) archaeometry (mainly dating and chemical composition of artefacts) (e.g., Walker 2005; Pollard et al. 2007; Malainey 2011); (2) zooarchaeology (e.g., Reitz and Wing 2008) and palaeoethnobotany (e.g., Pearsall 2000) (biological methods to study the remains of fauna and flora used by ancient humans); and 3) bioarchaeology (e.g., Brothwell 1981) (the study of human remains).

The idea of geoarchaeology as an interdisciplinary field was developed by Butzer (1982). His approach, called "human ecology", is devoted to the study of the human ecosystem, with the integration of physical, biological, and social sciences. The contextual approach consists of a four-dimensional space–time frame, which includes cultural and natural environments. The main components of geoarchaeological studies, according to Butzer (1982), are (1) landscape context (geomorphology; Quaternary sediments; and the natural environment—mainly animals and plants); (2) stratigraphic context (including dating); (3) the process of formation of the cultural layer; (4) modification of archaeological sites caused by exposure to environmental and anthropogenic forces; and (5) transformation of human landscapes.

1.2 Basic Principles for the Study of Human–Environment Interaction in the Past

In geographical science, since the first half of the nineteenth century the understanding of studying the natural conditions along with the life of humans on a given territory has appeared. By the middle of the twentieth century, the basic principle of the study of nature and humans in their unity and interaction was widely applied. The study of interactions between humans and the environment was termed "evolutionary geography" (Velichko 1985, 1995). It should be noted that ethnographers and archaeologists regularly highlight the need to consider geographical data when studying ancient communities and modern ethnic groups. For example, Clark (1952) indicated that the economy of a society at any time is a product of a steady relationship between culture and the natural environment, in which it exists. Natural landscapes, according to Andrianov (2016), are the specific habitats of society.

There are several sub-disciplines that study the human–environment interaction (e.g., Smyntyna 2005; Zusman 2005). The most important of them for our purpose is historical geography (e.g., Zhekulin 1989; see also Alexander 2005; Mayhew 2009: 236). "Historical geography is a science about the relationship between society and the environment in the historical past. It shows how the modern world system is formed; and examines the landscape changes during the Quaternary under the impact of human economic activity." (Zhekulin 1989: 28–30). The research combining geography and ethnography is conducted within the framework of ethnic ecology

(ethnoecology) (e.g., Krupnik 1993); it includes the features of traditional (aboriginal) subsistence systems and the use of the natural environment by native people. Human ecology is an interdisciplinary science that studies the patterns of interaction between the human environment, and issues related to the changes in human populations and preservation and development of public health (Shvarts 1976; see also Mayhew 2009: 240).

In our research, it is essential to distinguish the stages of the human–environment interaction depending on the degree of human impact on the environment. The main criterion for this task is the economic activity of ancient humans as the dominant force, which transforms natural landscapes (e.g., Alekseev 1993). By determining the chronological boundaries of these stages, we should take into account the emergence and development of agriculture and animal husbandry, in order to separate two major types of geosystems: 1) with the predominant role of the natural environment; and 2) with the dominance of the human economic activities. Applying this approach to the eastern Russian regions, three principal stages in the Stone and Palaeometal epochs (Palaeolithic, Neolithic, and Bronze and Early Iron Ages) can be established (Kuzmin 1995, 2005):

(1) a fully non-productive type of economy;
(2) the emergence of the productive economy (hoe-farming and primitive animal husbandry);
(3) an advanced productive type (plough farming and intensive animal husbandry).

1.3 Short Review of Relevant Research in Siberia

Comprehensive studies of the spatial distribution of archaeological sites concerning human ecology were carried out in Western Europe in the 1970s and 1980s (e.g., Berglund 1986, 1988; Berglund et al. 1991; Larsson 1986), and continued afterwards. In Siberia and neighbouring regions of Asia, this kind of research is still rare (Gheyle et al. 2004; Goossens et al. 2006; Plets et al. 2012; Bourgeois et al. 2014, 2017; Vergauwe et al. 2018; Nikulina 2019; Mantellini and Berdimuradov 2019; Zolnikov et al. 2020; Sharapov 2020). These studies are based on the application of GIS methods in order to detect changes in the position of sites in relation to cultural chronology, palaeoeconomy, and palaeoecology. Some of them cover vast areas of several thousand square kilometres (Nikulina 2019; Zolnikov et al. 2020), and some are restricted to medium- and small-scale landscape features like river valleys (e.g., Gheyle et al. 2004; Goossens et al. 2006; Bourgeois et al. 2014, 2017; Vergauwe et al. 2018). The application of spatiotemporal analysis to archaeological sites allowed a better understanding of the main patterns of human ecology and adaptation to environmental changes in the Holocene.

1.4 Material and Methods

In this study, the general approach of GIS in archaeology is used (e.g., Connolly and Lake 2006). The spatial position of sites was detected with the help of GPS equipment (for the Baraba Lowland and Altai Region), and also by using topographic maps of 1:25,000 (for the Amur River basin). Only sites with a known age—including archaeological epoch, period, and culture—were selected for analysis. For each site, the geomorphological position was established during the fieldwork. We created geomorphological maps of the territories under analysis. The SRTM digital elevation (DEM) terrain model was used as a basis (http://srtm.csi.cgiar.org/). To identify the main features of the relief, we analysed the geological maps of 1:500,000 and 1: 200,000 scales. As a result of the auto-recognition of patterns, using an approach developed by Choupina (2014) and based on morphometric analysis, the contours of landforms and main relief types were obtained.

For geoarchaeological analysis, we employed data on the development of the natural environment in the given regions which were obtained by palaeogeographers and Quaternary geologists (e.g., Hantemirov and Shiyatov 2002; Klimin et al. 2004; Zakh and Ryabogina 2005). All available information on natural resources recovered from archaeological sites—plants and animals—was used in order to establish the main types of economic activities and their possible impact on the environment (e.g., Kuzmin 1995, 1997, 2005, 2006, 2013a; Kuzmin and Rakov 2011). After that, the main stages in the human–environment interaction for each region under analysis were established by taking into account the approaches developed by Zhekulin (1989) and Alekseev (1993) (see also Kuzmin 1995, 2005).

2 Natural Environment of Prehistoric Populations in Siberia and the Russian Far East

2.1 The Earliest Evidence of Human–Environment Interaction (Palaeolithic Times)

The initial peopling of Siberia took place around 800,000 years ago and perhaps even earlier, although solid data from the southern part of this region testifies the first traces of ancient people at ca. 600,000–800,000 years ago (e.g., Kuzmin and Kazansky 2015; Velichko et al. 2017). At that time, sites were concentrated mainly in the southern territories, like the Altai Mountains, headwaters of the Yenisei River basin, and around Lake Baikal (Kuzmin 2000). Since the beginning of the Upper Palaeolithic, ca. 50,000 years ago, people settled in regions located in the more northern latitudes, including the middle part of the Yenisei River basin, Lena River basin, West Siberian Plain, far eastern Russia, and the Arctic (Kuzmin 2004, 2007; Lbova 2014; Pitul'ko and Pavlova 2016; Velichko et al. 2017). At the beginning of

the Holocene, ca. 11,500 years ago, almost all of Siberia was occupied by prehistoric populations (Kuzmin 2015; Pitul'ko and Pavlova 2016).

Throughout the Palaeolithic, hunting, fishing, and gathering were the main economic activities of ancient people, although less evidence exists about the latter two kinds. Hunting of large and medium-size ungulates was the main kind of subsistence; the most common prey in the Upper Palaeolithic were reindeer (*Rangifer tarandus*), horse (*Equus caballus*), red deer (*Cervus elaphus*), and bison (*Bison priscus*) (Vasil'ev 2003). Hunting the largest animal, woolly mammoth (*Mammuthus primigenius*), was practised extremely rarely; people mainly scavenged subfossil bones and tusks. The hunting of woolly rhinoceros (*Coelodonta antiquitatis*) was of limited scale due to the fierce behaviour of this animal. As for smaller mammals, hares (*Lepus* sp.) were the common prey of Palaeolithic hunters. The main purpose of hunting carnivores—grey wolf (*Canis lupus*), red and polar foxes (*Vulpes vulpes* and *Alopex lagopus*, respectively), and wolverine (*Gulo gulo*)—was to obtain fur for making clothes.

The upper part of the Yenisei River basin contains numerous Upper Palaeolithic sites with animal bones (Kuzmin 2011), and can be considered as a key region to characterise hunting strategies at ca. 37,000–14,000 years ago. The main objects of hunting were reindeer and bison (both are found in 79% of faunal assemblages), wild horse (68%), red deer and hares (both 62%), and wild sheep (*Ovis ammon*) (53%). Several campsites served as reindeer mass kills at the fords (Kuzmin 2011: 223). Various ungulates, such as wild ass (*Equus hemionus*), aurochs (*Bos primigenius*), elk (*Alces alces*), ibex (*Capra sibirica*), roe deer (*Capreolus capreolus*), and saiga antelope (*Saiga tatarica*), were procured in smaller numbers (12–38% of assemblages). The woolly mammoth was identified in 41% of the assemblages, and no woolly rhinoceros bones were found.

2.2 Human Migrations in Siberia and the Russian Far East in the Holocene

The movement of ancient humans in Siberia and the Russian Far East, mainly from south to north, occurred since the Middle Palaeolithic, ca. 125,000 years ago (Kuzmin 2000), and continued in the Upper Palaeolithic, since ca. 50,000 years ago (Pitul'ko and Pavlova 2016; Velichko et al. 2017). Throughout the Holocene (the last 11,500 years), human populations in Siberia and the Russian Far East migrated extensively, in both south-to-north and east-to-west directions (Fig. 2; see review: Kuzmin 2015).

In the Mesolithic (ca. 12,000–7000 years ago), one of the major migration events was the spread of the Sumnagin cultural complex of Yakutia. The bearers of the Sumnagin complex moved rapidly from the Aldan River core region to the north, northeast, and northwest, and settled in the Chukotka Peninsula ca. 10,000 years ago, and the remote Zhokhov Island (76° N) ca. 9000 years ago. The Taymyr Peninsula,

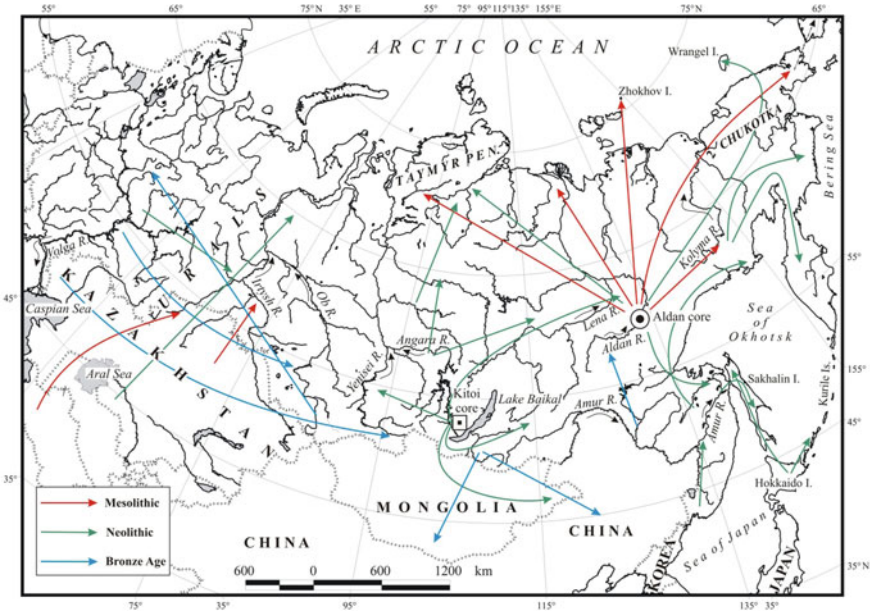

Fig. 2 Main human migrations in Siberia and the Russian Far East in the Holocene (after Kuzmin 2015; modified)

the northernmost region of Eurasia, was occupied at ca. 7000 years ago. The Trans-Urals and West Siberia were influenced by the migration of people from northern Kazakhstan and the Caspian Sea–Aral Sea region since ca. 10,000 years ago.

In the Neolithic (ca. 9000–4500 years ago), migrations were established in different parts of Siberia. In central Western Siberia and the Trans-Urals, movements from the west across the Ural Mountains occurred approximately 8000 years ago, and from the south (Aral–Caspian region) around 7000 years ago. The area around Lake Baikal was the source of populations belonging to the Kitoi cultural complex (ca. 9000–7000 years ago), which ca. 7500 years ago spread north into Yakutia, east to Transbaikal, and west to the Yenisei River. The dispersal of the Serovo complex from the Lake Baikal region towards Yakutia in the Late Neolithic/Bronze Age followed this trend ca. 5000–4000 years ago. Migrations from the Angara River basin to the north and northeast also occurred approximately 6000–4500 years ago. The progenitors of the Late Neolithic Afanasievo culture (ca. 5000–4500 years ago) migrated from the steppe and forest steppe regions of Eastern Europe via Kazakhstan towards the Lake Baikal region. The bearers of the Ymyyakhtakh culture (Late Neolithic) and the Ust-Mil culture (Bronze Age), dated back to ca. 2500–4500 years ago, migrated from central Yakutia towards Chukotka. The Ymyyakhtakh culture also spread to the north, reaching the Taymyr Peninsula ca. 4500 years ago, and the remote Wrangel Island ca. 3600 years ago. In Northeast Siberia, Neolithic populations from the headwaters of the Kolyma River moved into the Kamchatka Peninsula

nearly 8500–4500 years ago, and ca. 3500 years ago they appeared at the Bering Sea coast.

In the Russian Far East, data on obsidian provenance shows that human contacts between Primorye Province and the Amur River basin started approximately 14,000 years ago (Kuzmin 2017a). Intensive contacts between people of Hokkaido Island of Japan and neighbouring Sakhalin Island are established with the help of obsidian sourcing from pre-Holocene times, and they continued ca. 12,000 years ago. Since ca. 8000 years ago, populations from Hokkaido Island migrated to the southern Kurile Islands located nearby (Kuzmin 2016). From the Amur River basin, pottery-bearing people moved ca. 4500–3500 years ago to the north, towards the Okhotsk Sea coast; from the same core area in the lower course of the Amur River, the northern and central parts of Sakhalin Island were settled ca. 5500 years ago. Also, in the region near the mouth of the Amur River, the bearers of the Belkachi complex (central Yakutia) appeared approximately 5500 years ago.

In the Bronze Age (ca. 4500–3500 years ago), Siberia witnessed intensive movements of people, especially after the development of horse riding in Central Asia ca. 5500 years ago. During the Middle–Late Bronze Age (second millennium BC), some populations moved from the Transbaikal to the south and east into Mongolia and China, and to the north. In southern Siberia and neighbouring parts of Central Asia, two opposite waves of human migrations can be established. People moved into Western Siberia from Eastern Europe and the southern Urals. The Seima-Turbino cultural complex spread from Western Siberia into the Volga River basin and went even further to the west. Migration from the Trans-Urals region to the north is documented for the Early–Middle Bronze Age.

2.3 Human–Environment Interaction in the Holocene (Mesolithic–Early Iron Age Times)

In Mesolithic–Neolithic times, ca. 12,000–5000 years ago, medium and small-size mammals were the main prey in Siberia and the Russian Far East (Kuzmin 1997, 2013a), dominated by ungulates, such as elk, red deer, roe deer, reindeer, and musk deer (*Moschus moschiferus*). Wild boar (*Sus scrofa*), beaver (*Castor fiber*), different rodents (including marmots), brown bear (*Ursus arctos*), and grey wolf were also common prey. Many more bird bones are found at these sites compared to the Palaeolithic ones. The importance of fishing increased significantly during these times; exploitation of anadromous salmonids at ca. 12,000 years ago is detected on Kamchatka (Kuzmin 2009). The gathering of plants became common practice in the Mesolithic–Neolithic. These trends continued into the Bronze Age and the Early Iron Age, ca. 5000–1500 years ago.

In the Bronze and Early Iron Ages, new kinds of economy appeared in Siberia and the Russian Far East—animal husbandry and agriculture (e.g., Kuzmin 1997, 2013b; Molodin and Polos'mak 2014). The first domestic animals were dog (*Canis*

familiaris) and pig (*Sus scrofa domesticus*); later, sheep, cattle, and domestic horse were added in southern Siberia. The earliest cultivated crops in far eastern Russia were millets (Kuzmin 2013c), and in southern Siberia wheat, barley, and rye (Ryabogina and Ivanov 2011); later, millet was introduced in the Minusinsk Depression (Svyatko et al. 2013).

3 Two Case Studies of Human–Environment Interaction in Siberia and the Russian Far East

3.1 Spatiotemporal Distribution of Archaeological Sites in the Lower Amur River Basin (Russian Far East)

The lower course of the Amur River, the largest in far eastern Russia (Suslov 1961: 325–363), is one of the best-studied parts of the region. In order to understand human–environment interaction, we built a database using the GIS approach (Kuzmin et al. 2005). As a result, ca. 340 sites were positioned on the background of the geomorphology of the lower Amur River basin.

This region belongs to the Middle Amur Lowland stretches from the Bureya Range in the west to the city of Komsomolsk-on-Amur in the east (Fig. 3). The bottom part of the lowland is the floodplain and terraces of the Amur River, and the alluvial–lacustrine plains, with an elevation up to ca. 50–100 m above sea level (a.s.l.). In the south, the low-range mountains and volcanic plateaus of the Sikhote-Alin Range, and in the north the middle-range mountains of the Bureya and Badzhal ranges (with elevations up to ca. 1000–1500 m a.s.l.) are the boundaries of the lowland. Near the valley of the Amur River, several lakes exist, of which Lake Bolon is the largest one (Fig. 3). The climate of this region is of monsoon type, with cold and dry winters and warm and wet summers (Suslov 1961: 333–337; Serebryanny 2002). The vegetation consists of meadows (club rush, reed, cereal, and sedge grasses) and wetlands (sphagnum mosses and sedge) in the lowlands, and mixed coniferous–deciduous forests in the mountains (Korean pine, fir, spruce, birch, Manchurian walnut, Amur maple, Mongolian oak, and Amur lime). The biodiversity of far eastern Russian forests is very high, with ca. 40 species of trees and shrubs (Serebryanny 2002). The ecosystems of this region are also quite rich in terms of animal and fish resources; for example, the number of fish species in the Amur River is close to 100, and some of the most important are Siberian, humpback and silver salmons (Suslov 1961: 339).

Archaeological sites of the Middle Amur Lowland can be divided into three main periods. The earliest is the Neolithic, dated to ca. 16,000–3500 years ago (e.g., Kuzmin 2001, 2006). The following Early Iron Age (the Bronze Age is practically unknown in the Russian Far East) is dated to ca. 3000–2200 years ago. The latest period—the Middle Ages—is dated to ca. 2000–800 years ago. The main economic activities in the Neolithic were hunting, fishing, and gathering; in the Early Iron Age,

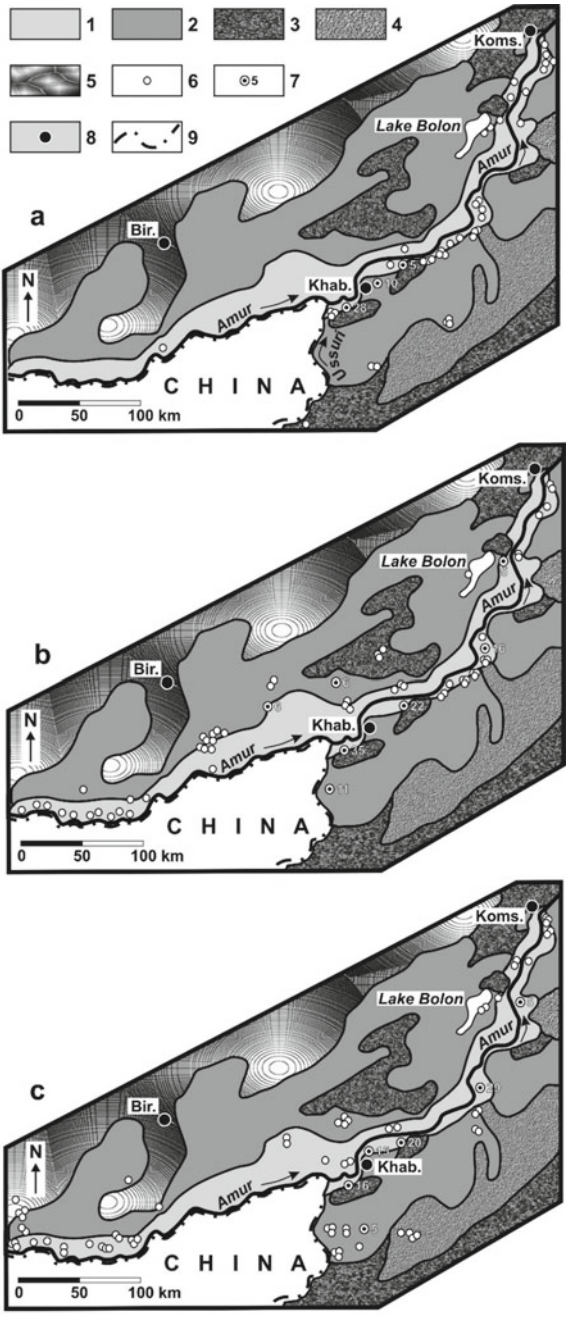

Fig. 3 The distribution of archaeological sites in the middle Amur Lowland (after Kuzmin et al. 2005; modified): **a**—Neolithic; **b**—Early Iron Age; **c**—Middle Ages. Relief types: 1—floodplain and terraces of the Amur River; 2—alluvial–lacustrine plains; 3—low-range mountains; 4—volcanic plateaus; 5—middle-range mountains; 6—archaeological site; 7—cluster of sites (number is the amount of individual sites); 8—modern cities (Khab.—Khabarovsk; Koms.—Komsomolsk-on-Amur; Bir.—Birobidzhan); 9—state boundary

agriculture and animal husbandry appeared, with hunting, fishing, and gathering still practised. In the Middle Ages, plough agriculture and stock breeding became the dominant types of the economy.

The Neolithic cultural complexes of the Middle Amur Lowland existed in a changing environment, from the cool climate and birch-shrub vegetation (ca. 16,000–11,500 years ago) to warmer conditions and birch-alder forests with broadleaved elements (ca. 11,500–8000 years ago), and to the warmest conditions and mixed coniferous–deciduous forests (ca. 8000–5000 years ago). After that, the climate became slightly cooler ca. 5000–3500 years ago (Klimin et al. 2004; Kuzmin 2017c). After ca. 3500–3000 years ago, climate and vegetation were similar to the modern ones.

There are 82 Neolithic sites in the GIS-based data list (Fig. 3a). They are located mainly near the channels of the Amur River and only some in the valleys of its tributaries south of the Amur. The main concentration of sites is around the city of Khabarovsk (ca. 50% of all sites), also, between the villages of Malyshevo and Elabuga (19.5%), NE of the main cluster. It is noteworthy that the oldest Neolithic sites are situated well above the river level (15–35 m), while the later sites are found on both higher ground and on the floodplain (6–8 m above the water level).

There are about 150 Early Iron Age sites in the area under investigation (Fig. 3b). The number of sites increased 1.85 times compared to the Neolithic period. Besides areas settled in the Neolithic, people also occupied parts of the Amur River valley located away from the channels, and also the valleys of the tributaries of the Amur and Ussuri rivers—Bidzhan, Kur, Tunguska, Kiya, and Khor. The largest concentration of the Early Iron Age sites is detected between the mouth of the Ussuri River and the city of Khabarovsk (23% of the total amount); also, between the villages of Malyshevo and Elabuga (14.5%), in the western part of the lowland south of the city of Birobidzhan (15.1%), and in the lower part of the Kiya River valley (7.2%).

The number of Mediaeval sites (ca. 150) is similar to the Early Iron Age. However, the amount of site clusters decreased, and sites were spread more equally throughout the terrain than previously (Fig. 3c). As before, the largest concentration of sites is between the mouth of the Ussuri River and Khabarovsk (33.3%); also, between the villages of Naikhin and Dubovy Mys (19%), and between the villages of Malyshevo and Elabuga (13.1%). The number of sites in the valleys of the Bira, In, Urmi, Kur, and Tunguska rivers, and in the western part of the lowland increased significantly compared to the Neolithic and the Early Iron Age.

Overall, the right bank of the Amur River valley, from the mouth of the Ussuri River to the mouth of the Anuy River was the most heavily settled throughout prehistory and early history. The constant presence of humans near the main water artery—Amur River—testifies in favour of its importance for subsistence based on fishing (including anadromous salmonids), hunting, and gathering, and for communications along the river using watercraft. In the Early Iron Age and Middle Ages, the significance of the Amur floodplain decreased, and valleys of smaller rivers became more important due to the appearance of agriculture.

As for the human impact on the environment in the Russian Far East, including the Middle Amur Lowland, the first traces of it can be detected in the Early Iron Age.

It increased in the Middle Ages (Kuzmin and Chernuk 1995; Kuzmin and Rakov 2011). There are two main stages in human–environment interaction in the Amur River basin: (1) with the passive role of humans in the modification of landscapes, ca. 16,000–3000 years ago; and (2) with the increasing role of plough agriculture and stock breeding, ca. 3000–800 years ago (e.g., Kuzmin 2005).

3.2 Spatiotemporal Distribution of Sites in the Baraba Forest Steppe (Western Siberia)

This key region is located in the central part of the West Siberian Plain, on the Ob–Irtysh interfluve, and it is called the Baraba Lowland (Fig. 1). It is quite flat, with the main elevation above sea level at ca. 90–110 m a.s.l.; the relative elevation of ridges above the plain is only up to 4–5 m. There are two types of landforms in the central Baraba region, river valleys and watersheds. The former consists of floodplains and first terraces (no other, higher terraces, are found); the latter is a combination of flat surfaces and gently rolling hills, ridges, palaeo-lake depressions, and modern lakes (Fig. 4). There are numerous lakes in the Baraba Lowland, and Lake Chany is the largest one. The climate is of the continental type, with cold winters and warm summers, and the amount of precipitation does not allow forest formations to grow freely. The Baraba Lowland is covered by forest steppe vegetation, with groves of birch and Quaking aspen, and vast meadows with feather, blue, and reed grasses, and sedge bogs (Suslov 1961: 42–52).

The area occupied by forest steppe in Novosibirsk Province is ca. 100,000–120,000 km^2, and the central part of it covers a territory of ca. 45,000 km^2 (Fig. 4). We used ca. 170 archaeological sites with known cultural affiliations to study the human–environment interaction. They can be divided into two main categories: (1) habitation sites; and (2) burial sites (both *kurgans* with mounds, and ground burials without mounds) (Fig. 5). The main attention was given to the former category because it depends on the environmental situation (availability of water, pastures, and hunting grounds) much more than burials.

All archaeological sites in the central Baraba forest steppe can be sub-divided into four periods: (1) Neolithic and Aeneolithic; (2) Bronze Age; (3) Early Iron Age; and (4) Middle Ages (Molodin and Polos'mak 2014). The Neolithic sites are dated to ca. 8000–5000 years ago, and their number is very small due to a lack of stone raw material in the entire Baraba Lowland. The Aeneolithic sites existed ca. 6000–5000 years ago. The Bronze Age can be dated to ca. 5000–3000 years ago, and the Early Iron Age cultural complexes to ca. 2600–1500 years ago. Sites belonging to the Middle Ages existed ca. 1500–400 years ago (e.g., Nikulina 2019: 304).

As for the palaeoeconomy of the central Baraba region, during the Neolithic–Aeneolithic hunting, fishing, and gathering were the main kinds of activity. During the Early–Middle Bronze Age, elements of animal husbandry appeared (Molodin and Polos'mak 2014). This mixed economy continued to exist in the later Bronze

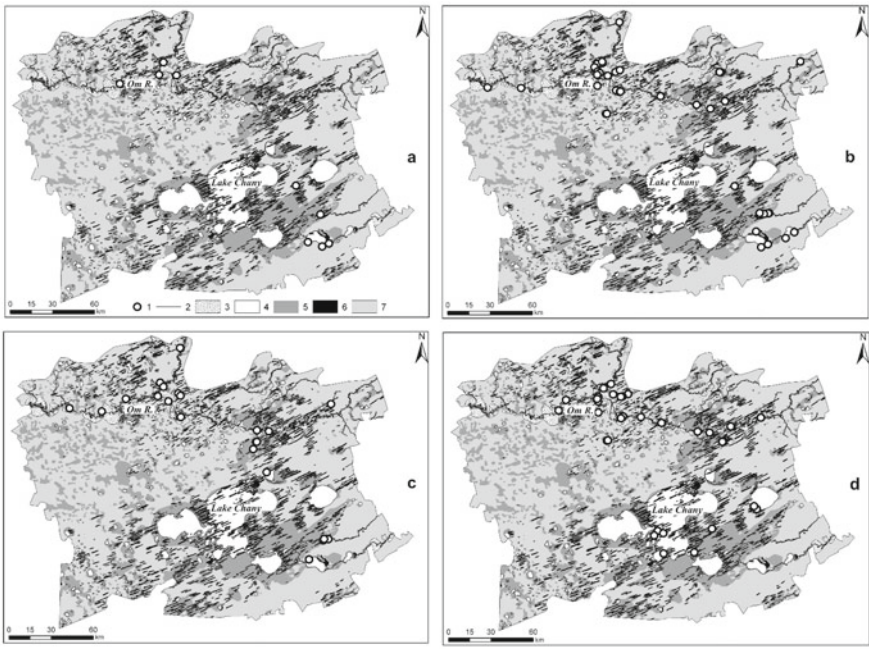

Fig. 4 The distribution of archaeological sites in the central Baraba forest steppe (after Kuzmin et al. 2013; Nikulina 2019; Nikulina et al. 2018; modified): **a**—Neolithic; **b**—Aeneolithic–Bronze Ages; **c**—Early Iron Age; **d**—Middle Ages. Sites, relief types, and forms: 1—archaeological sites; 2—river channels; 3—river valleys; 4—lakes; 5—palaeo-lake depressions; 6—ridges; 7—flat and gently rolling plain

Age and in the Early Iron Age, with horse, sheep, and cattle as the main domesticated species; animal husbandry was the dominant type of economic activity. Agriculture was never important in the Baraba forest steppe until the later Middle Ages (e.g., Ryabogina and Ivanov 2011).

Throughout the human occupation of the central Baraba forest steppe during the Middle–Late Holocene, the climate fluctuated from warm and dry ca. 7000–5000 years ago, and it became cooler and more humid ca. 5000–2500 years ago. At ca. 2200–1900 years ago, the humidity rose again. For the last ca. 2000 years, the climate was similar to the modern one (e.g., Nikulina 2019: 305).

The distribution of archaeological sites in relation to the relief of the central Baraba forest steppe is quite uneven (Table 1). Almost 98% of sites are located on the watersheds (Fig. 5: 1–3), and only ca. 2.5% are in the river valleys (Fig. 5: 4). The typical localisation of sites is on the high edge of the watershed surface near a river valley (Fig. 5: 2); ca. 39% of all sites occupy this position in the landscape. Other common locations are on the flat watershed surface (ca. 27% of sites) and on ridges (ca. 26% of sites). Some sites, especially fortresses of the Bronze and Early Iron Ages, and the Middle Ages are situated on the elevated remnants of watershed

Fig. 5 Typical archaeological sites of the Baraba Lowland (photos by Y.V. Kuzmin). 1—Voznesenka (Tontur) fortress (indicated by arrows) on the remnant of watershed surface in the Om River valley; 2—Stary Tartas 2 site (indicated by arrow) on the edge of watershed surface near the Om River valley; 3—Yashkino 1 kurgan on the watershed ridge; 4—Stary Tartas 1 site (indicated by arrow) on the floodplain of the Om River

Table 1 Distribution of archaeological sites in the central Baraba forest steppe by type, form, and element of the relief (number in brackets is the percentage of the total amount of sites) (after Kuzmin 2017b; modified)

Archaeological period	Valleys	Watershed surfaces			
		Edge	Flat watershed	Ridge	Remnant in valley
Neolithic (9)*	1 (0.6)	3 (1.8)	4 (2.4)	1 (0.6)	–
Bronze Age (60)*	3 (1.8)	18 (10.9)	26 (15.8)	10 (6.0)	3 (1.8)
Early Iron Age (52)*	–	24 (14.6)	7 (4.2)	17 (10.3)	4 (2.4)
The Middle Ages (45)*	–	19 (11.4)	8 (4.6)	15 (9.0)	3 (1.8)
Sub-total	4 (2.4)	64 (38.7)	45 (27.0)	43 (25.9)	10 (6.0)
Total	4 (2.4)	162 (97.6)			

* Total number of sites belonging to this period

surfaces eroded by rivers (Fig. 5: 1); they constitute ca. 6% of the total number of sites.

Concerning the spatiotemporal distribution of 126 habitation sites in the region (Fig. 4), several patterns can be established (Kuzmin et al. 2013; Nikulina 2019; Nikulina et al. 2018). For this analysis, we used available data for 12 Neolithic, 48 Aeneolithic and Bronze Age sites, 24 Early Iron Age sites, and 42 Mediaeval sites. During the Neolithic–Aeneolithic and Early Bronze Age, sites were located either in river valleys or near them (Fig. 4a); these landscapes constitute a significant amount of space in a zone within a 5 km radius around these sites. The Middle–Late Bronze Age sites occupied more elevated positions, higher up and further from the rivers compared to the previous periods (Fig. 4b). This trend continued into the Early Iron Age and the early Middle Ages (Fig. 4c–d). In the later Middle Ages, sites are situated again closer to the water sources (rivers and lakes).

These peculiarities, established for the first time with the help of GIS technologies, allowed us to understand better the environmental conditions for prehistoric and early historic cultural complexes of the central Baraba region. The driest climate existed in the Neolithic, Aeneolithic, and Early Bronze Ages when people settled near water sources. In the following Middle–Late Bronze Age and the Early Iron Age, the climate became wetter, and river valleys were often over-flooded, and the level of lakes on the watersheds rose; people were forced to move to higher ground. The wettest climate is detected for the early Mediaeval period, and in the later Middle Ages the climate became drier (Nikulina 2019).

The human impact on the environment in the Baraba Lowland in prehistory and early history, before the introduction of plough agriculture in the middle of the nineteenth century AD, was of moderate scale, without even partial destruction of the natural vegetation which was of forest steppe type during the Middle–Late Holocene (e.g., Nikulina 2019: 305).

4 Humans and Landscapes of the Altai Region of Siberia up to Ethnographic Times

The Altai as a historical–geographical region (Fig. 6) includes not only highlands, namely the Altai Mountains proper and the Salair Ridge, but also the adjacent lowlands and plains—Kulunda Lowland, the Cis-Altai Plain (piedmonts of the Altai Mountains), Ob Plateau, and Biya-Chumysh Upland (Suslov 1961; Shahgedanova et al. 2002). The Altai Region covers the upper course of the Ob River (up to Kamenna-Obi town) and drainage basins of rivers, the largest of which are the Kulunda, Burla, and Kuchuk, all on the Irtysh–Ob interfluve.

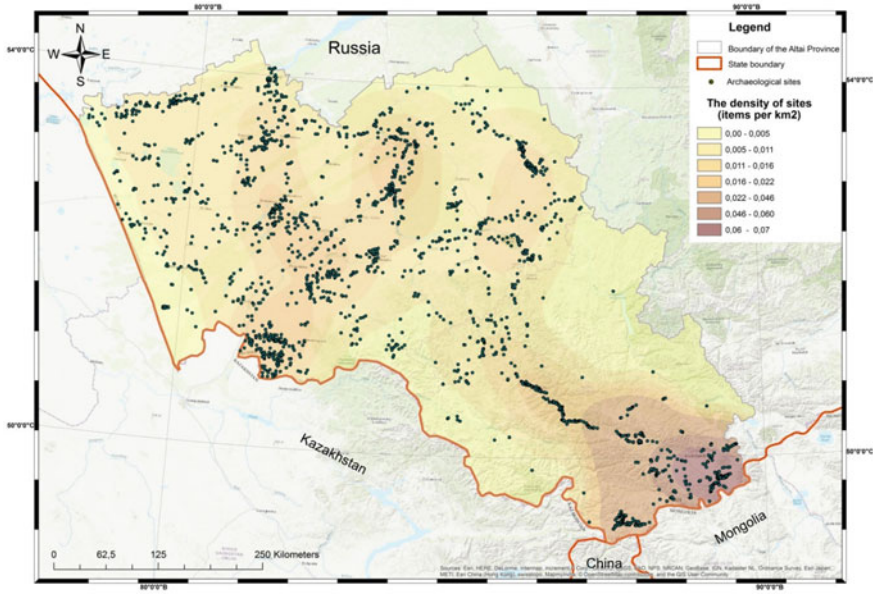

Fig. 6 Archaeological sites of the Altai Region and their density. *Source* The authors' figure

4.1 The Palaeolithic, Mesolithic and Neolithic Periods

Humans settled in the Altai Region from the Lower Palaeolithic onwards. The most ancient Palaeolithic tools were found in the Altai Mountains at the Karama site, in sediments dated to ca. 600–800 thousand years ago (Shunkov 2014). The presence of humans during the Middle and Upper Palaeolithic (120–10 thousand years ago) is known for the Mountainous [Gorny] Altai at Denisova, Strashnaya, Chagyrskaya, and Okladnikov caves, and several open-air sites (Shunkov 2014; Lbova 2014). The economy of the Palaeolithic populations was based on the ungulate hunting (bison, horse, red deer, reindeer, roe deer, argali (wild sheep), and Siberian ibex), carnivore hunting (mainly bear), and small mammal hunting (hare, badger, ground squirrel, and marmot). The raw materials for the manufacture of stone tools were flint, hornfels, jasper, quartzite sandstone, diorite, siltstone, and siliceous slate, and, less often, rock crystal and chalcedony.

The Mesolithic period of the Altai is dated to the tenth–the middle of fourth millennia BC. At the early stage of the Mesolithic, there was a rapid climatic warming and change of landscapes. The main difference between the Mesolithic stone industry and the Palaeolithic one in the Altai is the appearance of microliths in the former period (Kungurov 2007). The transition from group pursuit of animals to individual hunting with a bow led to the increased mobility of hunters, enlarged hunting grounds, a rise in the number of temporary camps, and the spread of portable dwellings. A

characteristic feature of the Mesolithic economy in the Altai was the emergence of fishing and a semi-sedentary lifestyle.

The first phase of the Neolithic in the Altai (sixth millennium BC) coincides with the beginning of the Holocene Climatic Optimum, which probably caused desertification processes in neighbouring Central Asia and led to the migration of people to more favourable hunting grounds, including the Altai Region. The main type of economy at that time was hunting; fishing was of a supplementary nature (Schmidt 2008). The absence of permanent dwellings indicates that the population maintained semi-nomadic and nomadic ways of life. In the Altai, evidence of both plant cultivation and livestock keeping in the Neolithic is unknown; this is the pattern of the entire Neolithic in northern Asia (see Kuzmin 2013b, 2014).

4.2 The Aeneolithic (Middle-to-Late Fourth–Early Second Millennia BC)

In the Middle Holocene, warming reached its maximum (Climatic Optimum). This led to the restructuring of landscapes towards aridisation and contributed to a change in the settlement patterns and economy of the Altai Region. In the forest steppe zone, the Aeneolithic sites were clustered in large river valleys at the confluence with tributaries, usually on the raised promontories. Bearers of the Aeneolithic culture created summer camps in the steppe and forest steppe zones of the Altai, and permanent settlements (winter type) along river valleys in the northern part of the Altai Mountains (Kiryushin 2002; Borodovsky and Borodovskaya 2013).

The main type of the Aeneolithic economy was hunting; fishing and gathering were supplementary activities. The prey consisted of meat-rich species (elk, red deer, roe deer, and wild boar) and fur animals (bear, badger, fox, beaver, marmot, hare, and sable). This was supplemented by the hunting of forest birds and waterfowl. In addition, animal husbandry appeared for the first time in the Altai Region in the Aeneolithic; in the composition of herds, horse, sheep, and cow prevailed. Metal processing was also known (mainly copper; there is evidence of an acquaintance with gold and silver), but stone artefacts were still an important part of the tool assemblages.

4.3 The Bronze Age (Middle of the Third–Late Second Millennia BC)

The Bronze Age sites in the Altai Region are numerous in both plains and mountains (Tishkin 2019). The climate at that time was quite warm (similar to the modern one), and there were favourable conditions for year-round keeping of livestock in the forest steppe and steppe landscapes under open sky. On the plains of the Altai Region,

covered with steppe vegetation, animal husbandry finally emerged, with horse, cow, and sheep as the main domesticated species. Other kinds of the economy—hunting and fishing—played a supporting role. On the right bank of the Ob River in the forest steppe and forest zones, an economy traditional for the Stone Age and based on hunting and fishing continued to exist even in the Bronze Age. The main hunting species were elk, roe deer, wild boar, wolf, bear, hare, and birds. In the piedmont areas, people also hunted the Asiatic wild ass, the Siberian ibex, and argali. Farming in the Altai Region in the early and middle Bronze Age has not yet been confirmed by the discovery of cultigen seeds (Molodin and Polos'mak 2014). Only at the end of the Bronze Age (eleventh–ninth centuries BC), cereal cultivation is known (Sidorov 1989).

The population of the Altai Region in the Bronze Age had a sufficiently developed metallurgy. Different ores, predominantly copper, copper–lead–zinc, and copper–zinc and copper–lead were mined from deposits in the western part of the Altai Mountains. The most numerous metal items (tools and weapons) were made of bronze.

At the end of the Bronze Age, people created settlements and, more rarely, forts and fortresses. More than 100 settlements are known in the upper part of the Ob River basin. Most of them, stretching from the confluence of the Biya and the Katun Rivers (the beginning of the Ob River) to the mouth of the Tom River, are located along the banks of the Ob River (Matveev 1993). The density of settlements decreases from south to north. The permanent settlements and short-term occupation sites of the Irmen Culture are usually situated in clusters, with distances between them ranging from 10–15 to 30 km (Tikhonov 1994). The population density in the warm–dry periods was 0.1–0.26 people/km^2, and in the warm–humid period 0.13–0.34 people/km^2 (Sokolov 2005).

4.4 Transition from the Bronze Age to the Iron Age and the Early Iron Age (Eighth–Second Centuries BC)

The end of the Bronze Age was marked by broad cultural changes that swept through the steppe belt of Eurasia. In the steppe and forest steppe zones, a process of transition towards a nomadic lifestyle occurred. This coincided with the introduction of iron as a new metal and was accompanied by an increase in human migrations (Kuzmin 2015). In the Altai Region, many archaeological sites of this period are known.

About 50 sites dated to the eighth–sixth centuries BC are known on the plains of the Altai (Tishkin 2019). They are represented mostly by non-fortified settlements located on the terraces of the Ob River (mainly on its right bank) and its tributaries. The productive economy was diversified, with a predominance of cattle breeding supplemented by agriculture; hunting and fishing were also practised. No traces of ore smelting were found. In the mountainous part of the Altai, humans maintained mountain-and-valley animal husbandry based on seasonal migrations of livestock

(Tishkin 2003). The population of the Mountainous Altai also mined ores, smelted metals, and manufactured metal products.

The beginning of the Early Iron Age was preceded by a sharp, albeit short-lived, climate cooling in the middle of the sixth century BC (Bykova and Bykov 2014). These changes were of a sub-continental nature, as they also appeared in other regions such as the Yamal Peninsula in the Siberian Arctic (Hantemirov and Shiyatov 2002). In the fifth century BC air temperatures also rose rapidly, but towards the end of the third century BC new cooling occurred. In general, the first stage of the Early Iron Age was colder and more humid than today. In the Altai Mountains during the sixth–third centuries BC, the economy was based on animal husbandry, with vertical migrations of livestock and dominance of horses and small ruminants (Bykov and Bykova 2003; Bykov et al. 2004, 2005). Ore mining and smelting were also practised at that time. Year-round open-air grazing was carried out in steppe, semi-desert, and tundra-steppe landscapes, and in steppe meadows and the lower part of the mountain forest belt. The geography of pastures determined the settlement structure of the Pazyryk Culture. The population density increased from north to south, reaching a maximum in the intra-mountain depressions of the southern Altai Mountains. This period was characterised by a settlement system with a predominance of temporary sites located near water sources, in a zone with a radius of up to 500 m from the water.

At this time, human activities became a significant factor in the transformation of the mountain forest belt, first of all on the lower boundary of the tree-growing zone. Forests, in addition to hunting and grazing, were used to procure wood which served as a source of fuel (for households) and charcoal (for smelting), and as a construction material for making various everyday items and adornments (Bykov et al. 2004). In the south-eastern Altai Mountains, timber was harvested all year-round; the distance from the place of wood procurement to the exploitation sites could be up to 20–30 km.

The late phase of the beginning of the Early Iron Age coincides with a sharp short-term cooling in the late third century BC, to which the change of cultural complexes was probably related. A significant cold spell led to a sharp reduction in winter pastures suitable for year-round keeping of livestock, the death of domestic animals, and the depopulation of the Mountainous Altai due to the following famine.

In the forest steppe zone of the Altai Region during the fifth–second centuries BC, populations occupied the Kulunda Lowland, the western part of the forest steppe zone, and the north-western part of the Biya–Chumysh Upland. More than 100 archaeological sites here belong to this period. As for the localisation of settlements, people chose the high terraces of the Ob River or areas near the mouths of the Ob River tributaries, and rarely the non-flooded parts of the floodplain. The economy was of a complex type, with a predominance of animal husbandry (Abdulganeev 1996) and the subordinate role of farming (Troitskaya and Borodovsky 1994). Metallurgy was represented only by the processing of copper and lightly alloyed bronze. Iron production on the plains of the Altai Region appeared at the beginning of the fourth century BC; in the third century BC, iron tools supplanted bronze artefacts (Troitskaya and Borodovsky 1994).

4.5 The Transition from the Early Iron Age to the Middle Ages (First Century BC–Fifth Century AD)

Almost throughout the entire second century BC, intensive radial growth of trees took place in the Altai Region, which was probably associated with climate warming. The same phenomenon was observed for the basin of the Ishim River where the process of aridisation in the second century BC caused the massive migration of the Sarmatians to the north and west (Zakh and Ryabogina 2005). Also, during the second–first centuries BC and in the first century AD, warming was noted in the Yamal Peninsula (Hantemirov and Shiyatov 2002).

At that time, the population of the Altai Mountains lived mainly in the Katun River basin (on river terraces) and in the intra-mountain depressions. The main type of the economy was animal husbandry, supplemented by hunting and gathering. Ferrous and non-ferrous metallurgy was maintained, and bone, leather, and wood were also processed (Soenov 2003). On the plains of the Altai Region, during the first century BC–mid-fifth century AD people lived mainly in the area of the middle course of the Biya River, in the lower reaches of the Katun River, on the western slope of the Salair Ridge, and on the Cis-Altai Plain (Kungurova and Abdulganeev 2019). The main types of economy were cattle breeding and hoe farming. The forest steppe part of the Altai Region was occupied by a population of northern origin—probably, the ancestors of the modern Samoyedic people—who migrated south from the taiga zone (Tishkin et al. 2011). This could be due to a cooling in the early Middle Ages which was reflected in an increase of moisture in the forest steppe zone. The economy was of a complex type, based on cattle breeding, hunting, fishing and, presumably, agriculture. Metalworking was also present, but no traces of iron production were found.

During the fourth–eighth centuries AD in the forest steppe plains of the Altai Region, human occupation resulted in a system of settlements and burial grounds. Settlements were concentrated near the forests, rivers, and lakes, and were often fortified. The main kind of economy was semi-nomadic animal husbandry along with farming (Kazakov 2014).

4.6 The Early Middle Ages (Fifth–Eleventh Centuries AD) and the Developed Middle Ages (Twelfth–Fourteenth Centuries AD)

In the early Middle Ages, the maximum density of sites in the Altai Mountains is detected in the basins of the Chuya, Kurai, and Ursul rivers, as well as in the middle part of the Katun River valley (Tishkin 2019) (Fig. 6). This is due to the fact that the economy of the ancient Turks who occupied this region was based on cattle breeding with year-round maintenance of livestock (horses and sheep) under the open sky, and with vertical movements of herds. The availability of winter pastures was the limiting

factor for the number of livestock and humans that could be kept. Hunting was less important, and fishing and agriculture were practised on a very limited scale. The most valuable commodities for the exchange with neighbouring populations were the products of metallurgy and metalworking. The period of existence of the Turk Culture coincides with the Mediaeval Climatic Optimum. The increased moisture allowed the nomads from the south to occupy the forest steppe zone and subjugate the local tribes of northern origin.

On the plains of the Altai Region (forest steppes and steppes), sites of the early Middle Ages are found in the piedmonts of the Altai Mountains, on the Cis-Altai Plain, Biya–Chumysh Upland, the Ob Plateau, and Kulunda Lowland. They are represented by settlements and burial grounds. Settlements were located on the first floodplain terraces or on the high riverbanks, and burial grounds were situated on the promontories with a good overview of the landscape. The basis of the economy was semi-nomadic animal husbandry, with a predominance of horse breeding; smaller ruminants and cattle were also kept. The second most important branch was hunting; fishing was also practised.

In the developed Middle Ages, the mountainous part of the Altai Region was conquered by the Mongol-speaking tribes (Tishkin 2019). Communities in the forest steppe zone of the Altai in the first half of the eighth century–fourteenth centuries AD were influenced by the Turks (Tishkin 2009). The economy was dominated by nomadic animal breeding (horse and small cattle species). Political and, probably, climatic events (the Little Ice Age) contributed to a low population density in the entire Altai Region during the twelfth–fourteenth centuries AD and afterwards.

5 Conclusion: Main Peculiarities in Human–Environment Interaction in Prehistoric Siberia

In Siberia, hunting, fishing, and gathering of wild plants were the main types of economy in the Stone Age, including the Palaeolithic and Neolithic. In contrast to Europe, no agriculture or animal husbandry was practised until the Bronze Age, and the human impact on the environment was on a very small scale (Kuzmin 1995, 2005; Kuzmin and Chernuk 1995). The increased pressure on natural ecosystems can be detected since the middle-to-late Bronze Age, when full-blown animal breeding and agriculture have existed in large parts of southern Siberia and the Russian Far East. These patterns of human–environment interaction can be demonstrated using the Altai Region as one of the best-studied parts of Siberia in terms of archaeology and physical geography (see Suslov 1961; Shahgedanova et al. 2002; Tishkin 2019).

The analysis of the settlement features of ancient humans in the Altai revealed that areas with the most favourable climate, shelters for long-term stay (caves), and abundant raw materials for the stone industry—namely the northern part of the Altai Mountains—were originally settled in the Lower Palaeolithic. During the

Mesolithic–Neolithic, people began to penetrate the surrounding plains, and this was associated with a change in the production of stone tools and hunting strategies.

Starting from the Aeneolithic period (roughly the third millennium BC), animal husbandry was developed in the Altai. Initially, it was combined with hunting, fishing, and gathering, and later with agriculture in the plains and lowlands. The role of animal breeding increased gradually—to a greater extent in the mountains, and to a lesser extent on the plains. Since keeping livestock was the dominant type of the prehistoric economy in the Altai Region for several thousand years, this caused a high density of archaeological sites in areas with favourable pasture conditions: in the steppe and forest steppe zones, and in the mountain steppe and tundra-steppe landscapes including the intra-mountain depressions. Another feature of the settlement pattern is the concentration of sites near the major rivers—Ob, Katun, Chumysh, Alei, and Burla. This is connected not only to the availability of potable water but also to the landscape diversity, which provided numerous ecological niches for the acquisition of natural resources: fishing grounds; fertile floodplain soils suitable for hoe farming; floodplain meadows as pastures for livestock; and adjacent forests for hunting, gathering, and wood procurement. High river terraces and promontories were convenient locations for creating fortified settlements.

In other parts of Siberia and the Russian Far East, the main patterns of human–environment interaction can also be established. In the Baraba Lowland of Western Siberia, during the Neolithic–Aeneolithic and Early Bronze Age people tended to occupy the river valleys or landscapes near them. During the Middle–Late Bronze Age, humans moved to more elevated terrain, away from the river valleys. A similar trend can be observed for the Early Iron Age and the early Middle Ages (Fig. 4c, d), but in the later Middle Ages people moved again towards rivers and lakes. These changes in the spatial position of archaeological sites are closely related to climatic fluctuations that occurred during the Middle–Late Holocene. The human impact on the environment in the Baraba Lowland in prehistory and early history was minor because of the absence of large-scale agriculture until the nineteenth century AD.

In the lower course of the Amur River (Middle Amur Lowland) as part of the Russian Far East, the number of archaeological sites increased from the Neolithic to the Early Iron Age almost twofold. People expanded their occupied landscapes, including valleys of the smaller rivers. A similar number of sites are detected for the following Middle Ages, although the number of site clusters decreased, and people occupied the terrain more equally compared to the Early Iron Age. More Mediaeval sites are found west of the main concentration of settlements between the modern cities of Khabarovsk and Komsomolsk-on-Amur. The main area of human activities throughout prehistory of the Amur River basin was near the channels of the Amur, with a spread of later populations (Early Iron Age and the Middle Ages) towards the valleys of smaller rivers—tributaries of the Amur and Ussuri. The first significant traces of human impact on the environment in the Middle Amur Lowland can be detected in the Early Iron Age. Human modification of the natural environment intensified in the Middle Ages.

Acknowledgements This study was conducted on the State Assignment of the Sobolev Institute of Geology and Mineralogy, Siberian Branch of the Russian Academy of Sciences (Novosibirsk, Russia), with funding provided by the Ministry of Science and Higher Education of the Russian Federation. Work by E. P. Krupochkin was supported by the Russian Foundation for Basic Science, grant No. 18-05-00864; and research by N. I. Bykov was funded by the State Assignment (0306-2021-0007) of the Institute of Water and Environmental Problems, Siberian Branch of the Russian Academy of Sciences.

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Ancient Cultures and Migrations in Northeastern Siberia

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Abstract This chapter presents a brief overview of archeological research into Northeastern Siberia in the Stone and Paleometal Ages. Based on the previous studies and recent discoveries, we offer a comprehensive view of the main problems of the genesis of ancient cultures and migrations in Northeastern Siberia. Special attention is given to the genomic perspective on the Late Pleistocene and Holocene population history of Northeast Asia. Active exploration of the Siberian Arctic by tribes of hunters of large mammals took place in the Early Upper Paleolithic; evidence of their culture appears among the materials of the Yana group of sites. In the period 15,000–10,000 cal. BP, two traditions of the Upper Paleolithic coexisted in the region: the non-microblade tradition and the Beringian microblade tradition. The Beringian tradition's wide distribution was likely associated with the Ancient Paleosiberian population, who were gradually replaced by genetically different groups of Neosiberian population between 10,000 and 3,000 cal. BP. The spread of the Neosiberian population, distinguished by genetics, may have been associated with the Early and

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Late Holocene Stone Age sequence in Northeastern Siberia – Sumnagin, Syalakh, Belkachi and Ymyyakhtakh cultures. The available evidence makes it possible to distinguish at least two large waves of a back migration from North America to Northeastern Siberia. The migration of the Paleoeskimo and related groups starting from ca. 3,500 cal. BP was manifested in the emergence of the Paleoeskimo tradition in Chukotka and the Tokarev culture on the Northern Priokhotye. Starting from ca. 2,200 cal. BP, we can observe the beginning of the Eskoaleut migration to the Bering, strait, which was manifested in the emergence of the Neoeskimo tradition.

Keywords Northeastern Siberia · Northeast Asia · Archeological cultures · Ethnogenesis · Beringian tradition · Sumnagin culture · Belkachi culture · Ymyyakhtakh culture · Tokarev culture · Paleoeskimo tradition · Neoeskimo cultures · DNA haplogroups

1 Introduction

Various names have been traditionally applied to the region in archeological studies, including "Northeastern Asia", the "Northeast of Asia", "Extreme Northeastern Asia", and "Northeastern Siberia" (Mochanov 2009; Dikov 2004). These names never fully corresponded to the geography, since some regions could be included or excluded from the research scope based on the concept and views of the authors. The notion of "Northeastern Asia" was proposed in the 1930s by the historian Kerner (1939). It included the territory of the Mongolian Plateau, Manchurian Plain, Korean Peninsula, and the Far East of Russia from the Lena Valley in the west to the Bering Sea in the east, and from the coasts of the Arctic Ocean to the Sea of Okhotsk, including the Kamchatka Peninsula in the south. There is no universally settled meaning of this term; it is used concerning different territories depending on knowledge and research interests (Narangoa and Cribb 2014: 2–4).

Extreme Northeastern Asia is usually understood as the territories in the North of the Far East of Russia, roughly corresponding to the present-day Republic of Sakha (Yakutia), Magadan Region, Chukotka Autonomous Okrug, and Kamchatka Krai. In the paleogeographic reconstructions of the Final Pleistocene, this region is viewed as Western Beringia. In this chapter, following the historiographic tradition, the **Northeastern Siberia** territories will be understood as the territories mentioned above of Extreme Northeastern Asia.

This region's climate corresponds to its geographical location on the northeastern margin of Eurasia in the zone of influence of two oceans with a complex atmospheric circulation that differs significantly in warm and cold seasons. Climatic conditions are characterized by severity expressed in its considerable length and low temperatures during the cold season, the prevalence of windy weather with hurricanes and blizzards in the winter, a long period without sunlight in the northern regions, and large values of weather severity during the cold season (Antropoekologiya Severo-Vostochnoi Azii 2008).

The efforts of **A. P. Okladnikov, N. N. Dikov, S. A. Fedoseeva, Y. A. Mochanov, and L. P. Khlobystin laid the foundation for a scientific program of archeological research in Northeast Asia.** The result of their research, the activities of their disciples and followers from the scientific centres of Yakutsk, Magadan, Novosibirsk, Irkutsk, St. Petersburg and Moscow was to obtain an impressive corpus of archeological sources, the discovery of hundreds of sites, the identification of ancient archeological cultures and the construction of the first periodizations of the region prehistory. All this has made it possible to consider this vast region—Northeastern Siberia—as a single cultural and historical area, and has created a solid foundation for further research.

Key problems

Despite the advances in the accumulation of knowledge about archeological cultures of Northeastern Siberia, there are still some gaps in cultural and historical research into the region, including the following problems: low informative value and diverse nature of a large number of sites, chronology of sites and cultural traditions of the Stone Age, genesis and identification of local variants of ancient cultures, origin and time when maritime adaptations began, ethnic identification of ancient cultures, relationship between the variability of ancient cultures and the dynamics of the natural environment, and changing models of life support, and mobility of the ancient population (Pitulko and Pavlova 2016).

Due to the work format, we will not attempt to consider and solve these problems in great detail. However, we will address several aspects of the above problems in this chapter. Based on the previous studies and recent findings, we will offer a comprehensive view of the main problems of the genesis of ancient cultures and migrations in Northeastern Siberia. Special attention is given to the **genomic view** of the Late Pleistocene and Holocene Population History of Northeast Asia.

2 Peopling of Northeastern Siberia Through the Late Pleistocene

2.1 Initial Human Settlement in Northeastern Asia

The problem of the initial human settlement in Northeastern Asia is one of the most intriguing and controversial in the Paleolithic Studies of today. During the 1960–1970s, N. N. Dikov, Y. A. Mochanov, and S. A. Fedoseeva discovered and studied the first evidence testifying the presence of Upper Paleolithic human populations in Kamchatka, Chukotka, and the Aldan and Indigirka regions (Mochanov 2009; Dikov, 2003, 2004). The discovery of the **Diring-Yuryakh site** with an archaic lithic assemblage in the Middle Lena (61°N) in 1982 posed the question of the possibility of human settlement in Extreme Northeastern Asia in the Lower Paleolithic era (Mochanov and Fedoseeva 2002). A series of sites with archaic

"Acheulean-Mousterian" assemblages have been identified on this territory, united by Yu. A. Mochanov and S. A. Fedoseyeva to the Alalay and Kyzylsyr cultures: Mungkharyma I, II and Timirdyakh-Khaya in Lower Vilyui, Alalayka, Krasny Yar VIII, Chingalakh, and Sosnovy Bor in the Middle Lena (Mochanov and Fedoseeva 2013a, b; Sharaborin 2015). The Mungkharyma I, II, and Timirdyakh-Khaya sites are stratified and contain redeposited archeological material, represented by the cores of archaic forms, flakes, choppers, and scrapers. Today, the chronology and cultural interpretation of these sites remain unclear. The pre-Upper Paleolithic peopling problems are not sufficiently well studied (Kuzmin and Krivonogov 1999; Waters et al. 1997).

In recent decades, the discoveries provided reliable evidence of human settlement in Extreme Northeastern Asia during the MIS 3 (Pitulko et al. 2004, 2017). Perhaps the earliest anatomically modern human colonization episode occurred at the **Bunge-Toll** (lower Yana River Basin, 71°N) and **Sopochnaya Karga sites** (Western Taimyr, 71°N), where unique faunal remains with reliable traces of anthropological impact have been discovered. The age of these sites is 47,000–45,000 uncal BP. In the Upper Vilyuy, Y. A. Mochanov and S. A. Fedoseyeva identified the Ust-Chirkuo site with redeposited complex, probably dated 50,000–35,000 uncal BP (Mochanov and Fedoseeva 2013b). This assemblage is based on massive blade production. However, the absolute age and the main characteristics of this complex remain undefined. The lack of archeological context and paleoanthropological finds does not make it possible to answer the question of the cultural identity of these sites. Early evidence of the human groups' presence in the Siberian Arctic is chronologically close to the archeological complexes correlated with the cultural phenomenon of the **Southern Siberian–Central Asian Initial Upper Paleolithic (IUP)** (Rybin 2014; Belousova et al. 2019). These Southern Siberian and Central Asian assemblages are reliably dated to the chronological range of 50,000–35,000 uncal BP and belong to the earliest complexes of the Upper Paleolithic in Eurasia.

The archeological complexes of the **Initial Upper Paleolithic** in Northern and Central Asia are concentrated mainly in the mountainous part of this vast territory, including the Altai Mountains, Eastern Kazakhstan, Dzungaria, Xinjiang, Tibet, Mongolia, as well as the Angara, Middle Yenisei, and Transbaikal regions (Rybin 2014; Slavinsky et al. 2017; Zhang et al. 2018; Belousova et al. 2019). This population possessed an exceptionally high level of adaptation to extreme natural conditions of the Eurasian mountain belt, as evidenced by the IUP assemblages from the Nwya Devu site in the Tibetan Plateau, located at the altitude of 4,600 m above sea level (Zhang et al. 2018). The IUP archeological complexes are characterized by a uniform set of cultural features, including specific treatment strategies of stone raw material (dominance of technologies for producing large blades and bladelets), tool kit (prevalence of the Upper Paleolithic types), bone tools, and personal ornaments (Slavinsky et al. 2017; Belousova et al. 2020).

It has been suggested that the representatives of the IUP cultural community of Southern Siberia and Central Asia belonged to one of the migration waves of the anatomically modern humans (Fu et al. 2014). The discovery of a human femur in **Ust-Ishim** in the Irtysh River valley (57°N) dated to 41,400 uncal BP/ 45,000 cal

BP is essential for understanding the paths into Northern Eurasia for the *Homo sapiens'* first populations. Anthropological evidence from the **Tianyuan Cave** in Northern China dated to 34,400 uncal BP/ 40,000 cal BP testifies to the early spread of anthropologically modern humans in Eastern Asia (Fu et al. 2013). The geographical location and age of this anthropological finds suggest that the initial peopling of North eastern Asia by the anatomically modern humans could have happened both from West to East and from South to North.

2.2 Yana Complex

In the Early Upper Paleolithic, tribes of hunters of large mammals actively settled in Extreme Northeastern Asia. Their culture is represented by the **Yana** site (lower reaches of the Yana River, 70°N) (Pitulko and Pavlova 2016). A representative series of dates established the age 28,500–27,000 uncal BP/ 33,000–31,000 cal. BP. To produce the flakes, inhabitants of Yana site use discoid, orthogonal, pyramidal, and edge-faced cores. The stone tool kit includes side-scrapers, chisel-like tools, notched and chopping tools, as well as micro-inventory: points, burins, backed bladelets, end-scrapers, and retouched flakes. Bone inventory of the Yana site represented by points, awls, and needles, collections of personal ornaments included beads, diadems, bracelets, and pendants made of mammoth tusk, animal teeth and bones, and soft stone (Pitulko et al. 2012). Similar types of personal adornments occur from Southern Siberian sites of the same period (Kurtak-4), earlier IUP and EUP assemblages (Denisova Cave, Kara-Bom, Khotyk, Kamenka, and Podzvonkaya) and complexes dated to the Middle stage of Upper Paleolithic (Malta).

Box 1. Complete genome sequencing of two individuals from the Yana site has revealed that their genomes belonged to the mitochondrial DNA (mtDNA) haplogroup U, typical among the ancient West Eurasian hunter-gatherers. Analysis of the paternally inherited Y-chromosomes (Y-DNA) has shown that the individuals studied belonged to the haplogroup P1, ancestral to the Q and R haplogroups, widespread among present-day Eurasians and Native Americans (Sikora et al. 2019). The study has revealed that the Ancient North Siberian component of the genome of the Yana individuals ("Ancient North Siberians") was ancestral concerning the "Ancient North Eurasian" component which had been previously found in the genome of the child from the burial at Malta site in the Angara region (Raghavan et al. 2014).

2.3 Beringia

At the end of the Late Pleistocene, Northeastern Asia and Northern America's territories were connected by a land bridge and represented a **paleogeographic region of Beringia** (Human colonization… 2017: 231). Large-scale peopling of the Upper Kolyma region, the Continental Priokhotye region, and Chukotka occurred after the end of the last glacial maximum (LGM) (20,000–18,000 uncal BP/ 24,000–21,000 cal BP) in the process of migrations from the Amur and Aldan basins and the Yano-Indigirka Lowland. The majority of present-day scholars support the presence of several cultural traditions, distinguished by the main, identifying types of stone tools and the presence or absence of the microblade component in a lithic reduction in Western and Eastern Beringia the Upper Paleolithic starting from ca. 14,500 cal BP (Goebel et al. 1991; Slobodin 2015; Goebel et al. 2003). The chronology, origins and interrelationships of these complexes remain the subject of discussion (Graf et al. 2015).

Recent research results have contributed to our understanding of the chronology and main pathways used by the Paleolithic populations to enter America (Hoffecker et al. 2016; Pedersen et al. 2016; Lesnek et al. 2018; Moreno-Mayar et al. 2018; Sikora et al. 2019). According to the "**Beringian Standstill**" concept, the human development of the Beringia began even before the LGM (Tamm et al. 2007). This model implies the isolation of the ancestors of the Native Americans in Beringia for ca. 8,000 yrs (ca. 23,000–15,000 cal BP) before the migration of this population to the south (Raghavan et al. 2015). The presence of sporadic and ambiguous archeological evidence associated with the human presence in Eastern Beringia before 14,500 cal BP (Chlachula 2012; Bourgeon et al. 2017) suggests that this isolated population could have resided in Extreme Northeastern Asia. According to one of the scenarios for the peopling of America, the ancestors of the Native Americans migrated to Eastern Beringia ca. 15,000–14,000 cal BP, where they divided into two branches—the northern and southern. Further, ca. 13,000 cal BP, they were followed by the Ancient Beringians (Fig. 1), who settled widely in the northwest of Northern America (the Denali complex) (Moreno-Mayar et al. 2018).

2.4 Non-Microblade Tradition

A non-microblade tradition with stemmed (Kamchatka, the Upper Kolyma region, and the Continental Priokhotye) or drop-shaped bifacial points (the Yano-Indigirka region) existed in 12,000–11,000 uncal BP/ 14,000–13,000 cal BP in Extreme Northeastern Asia (Dikov 1993: 10–21; Slobodin 2002; Pitulko 2011; Pitulko and Pavlova 2014). The evidence testifying to this tradition spreading over the territory of the Yana-Indigirka Lowland include the Berelyokh and Ozero Nikita sites, on Kamchatka—Ushki I and V (cultural layer 7), the Upper Kolyma region and Continental Priokhotye—Bolshoy Elgakhchan I, Avlondya, Kheta (lower cultural

component), Serdyak, and Omchik I (Fedorchenko, Belousova 2020). The lithic assemblages of non-microblade tradition was characterized by subprismatic cores to make blades and bladelets, small flattened bifacial points, stemmed, drop–shaped, or asymmetrically rhombic by shape, also end-scrapers on flakes, oval bifacial knives, side-scrapers, and stone pendants and beads. The archeological sites of this tradition correspond to the Nenana complex in Central Alaska belonging to the same time or a later period (Goebel et al. 1991).

2.5 Beringian Tradition

Movement of the Upper Paleolithic populations with advanced microblade and biface technologies to the Beringia ca. 20,000–16,000 cal BP was accompanied by the emergence and development of the Beringian tradition (West 1991; Mochanov 2009; Dikov 2004: 54–76; Slobodin 2014a; Vorobey 1996; 2010; Pitulko and Pavlova 2016). Lithic assemblages of Beringian tradition are characterized by combinations of wedge-shaped microcores to make microblades, bifacial knives, leaf-shaped and oval bifacial points, end-scrapers, side-scrapers, axe tools, burins, and borers. The origin of this tradition was associated with the spread of the **Selemdzha culture** located in the Amur region (Derevianko et al. 1998: 74–77, 90–92) and the **Dyuktay culture** of Aldan (Mochanov 2009). This tradition spread to Central Alaska through Chukotka and Bering land bridge no later than ca. 15,000 cal BP (Vasilyev et al. 2013). Microblade complexes with wedge-shaped cores continued to exist in Chukotka, Kamchatka, and the Upper Kolyma region in the Early Holocene (Dikov 2004: 76–79; Kiryak et al. 2003; Pitulko 2003: 115–116).

The Dyuktai tradition was found in the Aldan, Lena, Olekma, and Vilyui valleys (Mochanov 2009). The microblade complexes from Kheta, Druchak-V and Ust-Magadaven I sites testify to the processes of intense peopling of the Okhotsk-Kolyma Upland (Slobodin 2014a; Vorobey 1996, 2007). The same Paleolithic assemblages have been reported from Chukotka (Tytylvaam IV, Elgygytgyn II, Kurupka I, Ayon, Talyain, and Inaskvaam II) and Kamchatka (Ushki I, IV, and V (cultural layer 6), Anavgai I–II, and Daika I–II), by the age of 13,000–12,000 cal BP (Slobidin 2001; Ptashinsky 2012).

The unique complex of the Ushki sites contains both evidence of a non-microblade tradition—the **Early Ushki culture (cultural layer 7 of the Ushki I and V sites)**, and the Beringian tradition—the **Late Ushki culture (layer 6).** N. N. Dikov interpreted the Early Ushki culture as Ancestral Native Americans and suggested the possibility of it migration to North America in the Final Late Pleistocene (Dikov 1993: 10–19). He initially regarded the evidence from cultural layer 6 as a basis for the Proto-Eskimo-Aleutian migration to America. However, later the Proto-Eskimo-Aleutian population came to be associated with the **Puturak complex** in Chukotka, while the Late Ushki culture started to be interpreted as linked with the Athabaskan ancestors (Ibid.: 52–53).

Box 2. Anthropological evidence dated to the Late Pleistocene can be found in Northeastern Asia exceptionally rarely. Such finds in the region include a baby tooth from layer 5 of the Khaiyrgas cave in the Middle Lena (13,150 uncal BP) (Zubova et al. 2016), as well as a series of baby teeth belonging to several individuals from a collective burial in cultural layer 6 at the Ushki I site (10,800–10,040 uncal BP) (Fedorchenko 2018). A unique anthropological find—a fragment of an adult's cranial roof dated to 8,770 uncal BP (9,800 cal BP) was discovered in the deposits of the Duvanny Yar site on the Kolyma River (Sikora et al. 2019). The paleogenetic analysis of this finding has revealed mtDNA haplogroup G1b and Y-DNA haplogroup Q-NWT01, and demonstrated a close genomic kinship between this ancient individual from Duvanny Yar and the present-day Koryaks, Itelmens, Chukchi, and Native Americans.

According to the latest paleogenetic data, East Asian populations migrated to Northeastern Siberia ca. 20,000–18,000 cal BP. The migration was accompanied by their mixing with the descendants of the "Ancient North Siberians", represented by the genome from the Yana and Malta individuals. These processes were reflected in the Beringian tradition's wide proliferation in the region and led to the emergence of several ancestral lineages (Fig. 1) in Extreme Northeastern Asia: the Ancient Paleosiberian population represented by the genome of the individual from Duvanny Yar, and the ancestral Native Americans. The latter type subsequently divided into the Ancient Beringians and all other Native Americans (Moreno-Mayar et al. 2018; Sikora et al. 2019).

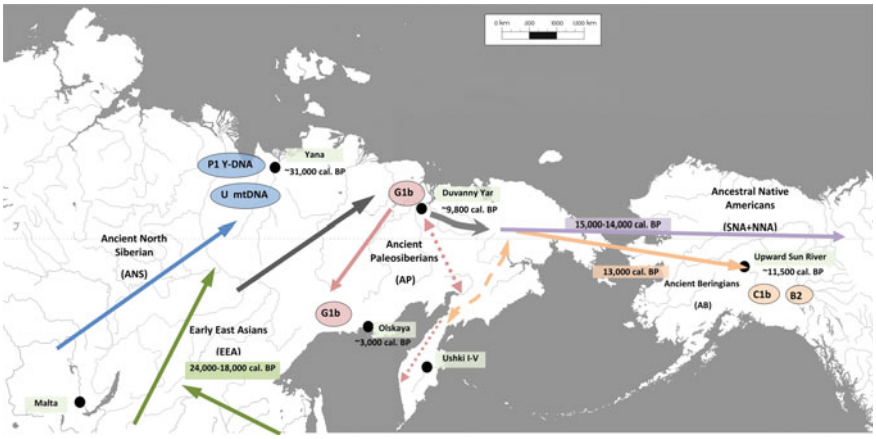

Fig. 1 Ancient migrations on Northeastern Siberia. *Main migratory events are shown according to the variation of the Y-chromosome (for haplogroup P1) and mtDNA (for haplogroups U, G1b, C1b, and B2)* (Grebenyuk et al. 2019). *Source* The Authors' methodology

Thus, it has been established that the gene pool of the Ancient Paleosiberians combined two components—the East Asian and the Ancient North Siberian components, the latter of which is similar to genomes of individuals from the Yana site and the Upper Paleolithic child from Malta. It is assumed that this population emerged ca. 24,000 cal BP and constituted a particular branch of the Paleolithic population of Siberia. This branch was widespread in Northeastern Asia (Sikora et al. 2019). To a large extent, it became the ancestor of many population groups of the Holocene inhabiting Extreme Northeastern Asia and Northern America, including the Paleoeskimos, Neoeskimos, and Chukotka-Kamchatkan community, also affecting the gene pool of the common ancestor of the Kets and Athabaskans. Along with the genetic and archeological evidence, the assumption about the wide distribution of the Ancient Paleosiberians whose history was associated with Beringia corresponds to the results of long-term anthropological research into the skulls' complexes from the ancient cultures of Yakutia (Chikisheva 2016).

3 The Early Holocene Stone Age in Extreme Northeastern Asia

3.1 Sumnagin Culture

The Holocene's onset was accompanied by the adaptation of humans to the changing natural environment and the influx of new populations and their settlement on the entire territory of Northeastern Asia. Around 11,000–10,000 cal BP, the Beringian tradition ended its existence. The Sumnagin culture (9,400–6,200 uncal BP / 10,800–7,200 cal BP) was the most significant Early Holocene cultural phenomenon. This culture spread from the Aldan, Lena, and Vilyuy valleys to Taimyr, the islands of the East Siberian Sea, and the coasts of the Bering Sea and the Sea of Okhotsk (Mochanov 2009; Dikov 1993; Slobodin 2014a; Pitulko 2003: 108–122; Vorobey 2007). There is a lack of continuity between the Sumnagin tradition and the preceding Upper Paleolithic cultures (Mochanov 2009).

The Sumnagin lithic assemblages is characterized by insert tools, retouched blades, end-scrapers and notched scrapers, angle burins and truncation burins, borers, chisel-like tools, and geometrical microliths made of blades which were produced from prismatic, conical, and edge-faced cores (Mochanov 2009). The culture's tool kit is complemented by chopping tools (axes and adzes) and bone tools: flat points with a single side groove, grooved spindle-shaped points or points with a split tip (Mochanov and Fedoseeva 1976: 518). In the Sumnagin culture, tools on blades constituted up to 95% of the total lithic assemblage, and only about 5% were massive chopping tools—tools and axes.

This culture was identified by Y. A. Mochanov and was named after the referential site on the Aldan River—the Sumnagin I site, where Early Holocene complexes

were found in layers 17–44. In addition, the following sites with clear stratigraphy have been found and investigated on the Aldan River: Belkachi I (layers 8–23) and Ust-Timpton (layers 4–5) (Mochanov 1969, 2009). Typologically, the Sumnagin technocomplex have also been identified at many other sites of the Aldan region, including Sumnagin II, Tumulur, Alysardakh, Dyuktai Cave, Bilir, Ust-Mil I, Verkhne-Troitskaya, and Eldikan (Mochanov 2009). The area where this culture was spread also includes the Vilyuy Basin. Here, in clear stratigraphic conditions, the remains of the Sumnagin tradition have been found at the Ust-Chirkuo I (layers 13–3), Khatyngnaakh II (layers 8–6), Syuldyukar (layers 16–6), and at the Kitchan single-layered site. Some components of the Sumnagin culture have also been typologically distinguished at the following sites with mixed cultural layers: Ust-Chirkuo II, Ulakhan-Ediek II, Tuoi-Khaya I, Ogogut, Kuokunu II, and Kuokunu IV (Guseva 1992). In the Middle and Lower Lena, several sites were identified, where the remains of the Sumnagin culture have been found in mixed cultural layers. The Fermennoe Ozero site on Lena contains an unmixed Sumnagin culture complex (Dyakonov 2007b, 2017).

The Mesolithic cultural layers on the Olyokma River have been studied and identified by the archeologists from the Yakutsk State University at the sites of Tensik II (layer 3), Noviy Letyon II (layer 3), Noviy Letyon I (layer 5), Kurung II (layer 5), Krestyakh I, and Ytylakh (Alekseev 1987). The Sumnagin sites have been discovered and explored in the Arctic—on the Anabar, Olenyok, Yana, Indigirka, and Kolyma Rivers. In the following two thousand years after its first appearance in the Lena Basin, this culture reached the New Siberian Islands and the eastern tip of the Chukotka Peninsula (Pitulko 2003).

This Sumnagin distribution area in the Upper Kolyma basin is marked by Buyunda III, Urtychuk IV, Khurenja, Omsukchan III sites (Slobodin 2014a), and BMA 3 site at Northern Priokhotye (Vorobey 2007). On the New Siberian Islands, which are placed in a high-latitudinal Arctic zone, the Zhokhov site reveals a unique pattern of adaptation to the harsh climatic conditions of the maritime Arctic (Pitulko 2013). In Chukotka, the Sumnagin technocomplex are reported from Chelkun IV, Naivan, Tytyl I, III, and IV and Puturak sites (Dikov 1993; Kiryak 1993; Gusev 2006), and in the Lower Kolyma River area these are Panteleikha I–VIII sites (Mochanov 2009).

3.2 Uolba Cultural Component

The spread of the Sumnagin culture was accompanied by the emergence of new local variants at its borders. Based on the evidence from the Early Holocene assemblages of the Kolyma region, Upper Indigirka region, Chukotka, Kamchatka, and the Northern Priokhotye, S. B. Slobodin singled out the **Uolba tradition** with unifacial and bifacial points on blades (Slobodin 2014b).

The Uolbian complex consists of projective stemmed blade points, prismatic and conic cores to make blades and microblades, end-scrapers on blades, burins, insert tools, bifaces, and adzes. In the Upper Kolyma, this cultural tradition is represented by

Ui, Kongo 78, ING 78, Pridorozhnaya, and Agrobaza II sites; in the Upper Indigirka area this is the Yubileiniy site, and in West Chukotka it is the Verkhnetytylskaya VI site (Slobodin 2014b). In Central Kamchatka, the complexes with blades and projective points made of blades has been reported from the Ushki sites (cultural layer 4,8,500–8,400 cal BP) and Avacha 1 and 9 sites (7,100–7,000 cal BP) (Ponomarenko 2000). As is presumed, populations using the technology of blade stemmed projective points could have come to Northeastern Siberia from Northeastern Europe and Northern Siberia (Mochanov 2009) or the Amur River basin and Baikal Lake area (Slobodin 2014b).

Environmental changes proceeding through the Early Holocene caused significant changes in patterns of the subsistence economy of ancient people. The primary procurement sources of the Sumnagin people were hunting elk in taiga and reindeer in the tundra and, in addition to this, the Zhokhov people hunted polar bears and birds. The coastal population at MBA 3, Zhokhov, and Naivan sites could hunt sea animals in their rookeries and fish spawning salmon. Compared to the Paleolithic cultures, the role of fishing increased in the Sumnagin population's economy (Mochanov 1969: 132, 2009; Everstov 1988: 22–23, 144; Cherosov 1988: 70). Several facts testify to the presence of the bow and arrow among the Sumnagin people, who were adapting to hunting cautious and mobile animals, such as elk, deer, roe deer, and bears (Mochanov 2009; Arkhipov 1989: 29–30; Alekseyev 1996a: 42–44; Kashin 2013: 48).

3.3 Arctic Cultural Component: Zhokhovo Site

V. V. Pitulko considered the evidence from the Zhokhovo site and several objects in Chukotka as the **Arctic variant of the Sumnagin tradition** which existed during 9,300–8,600 cal BP (Pitulko 2003: 116–122). A series of bifacial points similar to some Uolbian types was identified in the Zhokhovo assemblage (Girya and Lozovsky 2014). Similar tools, accompanied by advanced blade technology, occurred from the Kamchatka complexes dated 8,500–7,100 cal BP (Dikov 2004: 106–115; Ponomarenko 2000: 29–45).

The evidence from the Zhokhovo site indicates that ca. 9,000 cal BP, draught dog breeding, which provided high mobility of nomadic tribes, and selective dog breeding to create the varieties of dogs adapted for hunting and suitable for riding in teams was practiced in the Far North (Pitulko and Kasparov 2016). It has been found in a recent study that raw materials for the production of obsidian tools on Zhokhovo Island were brought from the vicinity of Lake Krasnoe located in the southeastern part of Chukotka at a distance of two thousand kilometers. According to the authors of that study, the ancient inhabitants of the settlement could overcome great distances with the sled dogs' help (Pitulko et al. 2019).

According to Yu. A. Mochanov, the Sumnagin tradition represented the eastern link in the chain of similar Early Holocene cultures of Northern Eurasia (Mochanov 2009). Yu. A. Mochanov allowed for the possibility that the Sumnagin culture could

have spread to Alaska. As a result, this tradition could have played one of the critical roles in the emergence of the Proto-Eskimo-Aleut population.

3.4 Siberdik Culture

Other peopling Northeastern Siberia events include the Siberdik culture (11,900–8,400 cal BP) (Dikov 2004). The Epipaleolithic Siberdik culture is characterized by wedge-shaped and conical microcores used to make microblades and blades, bifacial knives, and end-scrapers on spalls, side-scrapers, and axe tools. In the Upper Kolyma territory, the Siberdik cultural tradition is represented by sites Kongo and Siberdik (Dikov 2003, 2004).

4 Dynamics of Ancient Cultures in Northeastern Siberia in the Late Holocene Stone and Paleometal Ages

4.1 Syalakh Culture

The Syalakh culture of the Early Neolithic spread ca. 6,000–4,700 uncal BP (6,900–5,500 cal BP) in Yakutia. Syalakh sites have been found in the Lena, Aldan, Olyokma, Vilyuy, Anabar, Olenyok, Indigirka, Yana, and Kolyma, and also sporadically in Taimyr, Chukotka, and Lower Amur. About one hundred and fifty sites of the Syalakh culture are currently known; sixteen of them are sites with clear stratigraphy and unmixed inventory of the Early Neolithic (Alekseyev 1987; Mochanov and Fedoseeva 2013b; Kashin 2013).

The referential marker of the Syalakh culture was pottery with "net-meshwork" imprints. The Syalakh clay vessels had a paraboloid or truncated ovoid shape. The net pottery typically had artistic ornamentation décor in a horizontal band through round or oval holes. The ornamental décor consisted of two notched or non-notched applied coils (Mochanov 1969). Hunting was the economic basis of the Syalakh population; fishing also provided an effective means of food production. In the Early Neolithic, people learned how to use grinding technique to produce adzes and knives. Weapons of ranged combat became widely used, as evidenced by mostly leaf-shaped arrowheads. The largest percentage of tools was made on bladelets and microblades, from which burins, perforators, borers, insert tools, arrowheads, and end-scrapers were produced. As opposed to the Mesolithic lithic assemblages, bifacial tools were used in the Early Neolithic. Osseous artifacts were also common (Mochanov 1969: 159–160; Alekseyev 1996a: 42; Mochanov and Fedoseeva 2013b: 209–210). Judging by the faunal remains, the Syalakh population preferred to hunt moose, and therefore the image of this animal played a central role in their art. The

moose images always numerically dominated and occupied a visually more advantageous place on all known Early Neolithic sites of rock art in Yakutia. The Early Neolithic drawings represented moose, deer, sometimes bears and dogs or wolves, scenes of breeding, and death of animals. Generally, the visual arts of the Syalakh population are rightfully called animal epics (Kochmar 1994; Alekseyev 1996a). The animals were depicted realistically and were usually shown with an expressive style, in motion, and rarely appeared in static postures.

4.2 Belkachi Culture

The Belkachi culture of the Middle Neolithic spread ca. 5,400–3,700 uncal BP (6,300–4,200 cal BP) in Yakutia and several adjacent territories, including, apparently, the Lower Amur region, Northern Sakhalin, Taimyr, and Western Chukotka. Currently, over three hundred Belkachi sites are known. This culture's main marker was distinctive corded pottery with the imprints of twisted yarn-cords on its surface. Pottery fragments with ribbed imprints were found at the Belkachi sites less frequently compared to corded pottery. The pottery sometimes showed artistic ornamental décor in various compositions of horizontal or diagonal lines made with a multipronged stamp. Bands of through holes and sometimes wide applied coils, semicircular in cross-section, appeared under the vessels' rims. Triangular and narrow leaf-shaped arrowheads, polisged stepped adzes, insert-tools, various burins, endscrapers, have also been found at the Belkachi sites (Mochanov 1967; Mochanov 1969: 175–178; Alekseyev 1996a: 49–50; Mochanov and Fedoseeva 2013b). Despite the general prevalence of animal subjects and signs of the moose' hunting cult, anthropomorphic images occurred more frequently at the sites of rock art of the Belkachi period. Images of people, just like images of animals, were made in different techniques with solid or contour lines, and filling in the outline with paint. People were mostly shown in motion (Kochmar 1994; Alekseyev 1996a).

Box 3. The emergence of the Arctic Small Tool tradition (ASTt) became the basis for the subsequent development of the Paleoeskimo cultures in the Canadian Arctic and Greenland, in the American Arctic is usually associated with the expansion of the Belkachi culture. The archeological complexes of the Belkachi culture reveal similarities to the ASTt of the Denbigh Flint complex (DFC) in Alaska (Ackerman 1988). According to molecular dating, the migration of the Paleoeskimo ancestors to Alaska might have started ca. 5,500 BP (Rasmussen et al. 2010). Haplogroup D2a is 5,600 ± 2,400 yrs (Behar et al. 2012) and it marks the appearance of the Paleoeskimo ancestors in the American Arctic. The haplotype D2a'b, the relative for D2a, was found in an individual of the Kitoy culture, with an age of ca. 6,200 cal BP in a burial on Lake Nozhiy in the

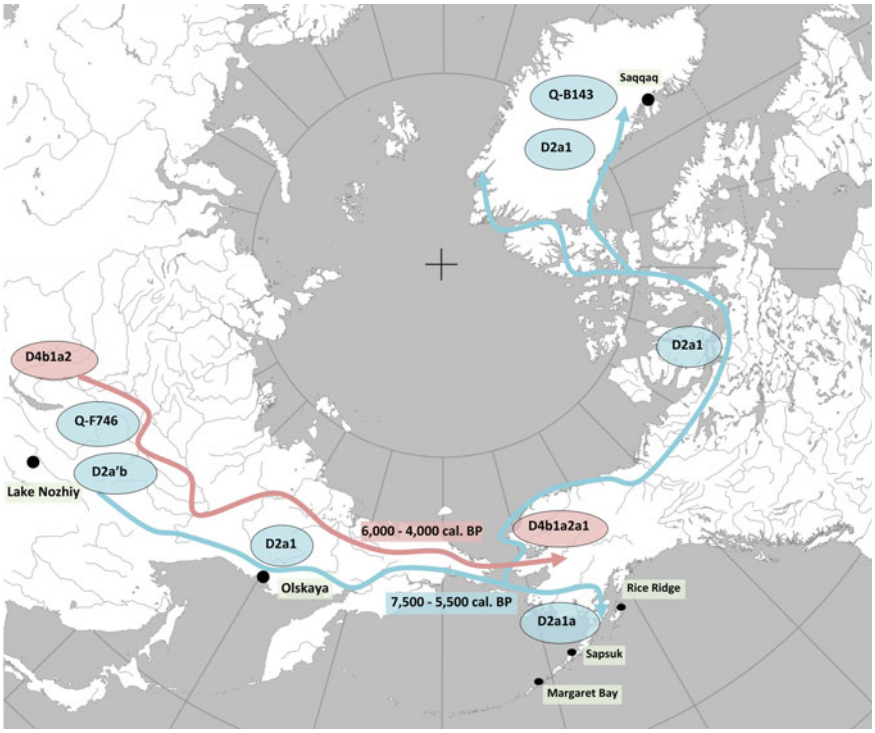

Fig. 2 Migrations of Asian ancestors of Paleoeskimo and Neoeskimo to America. *Main migratory events are shown according to the variation of the Y-chromosome (for haplogroups Q-F746, Q-B143) and mtDNA (for haplogroups D2a'b, D2a1, D2a1a, D4b1a2, and D4b1a2a1a)* (Grebenyuk et al. 2019)

Transbaikal region (Kılınç et al. 2018). The carriers of the D2a'b-haplotypes in the period 9,000–6,000 cal BP must have moved from the Transbaikal region to the Extreme Northeast of Siberia, and the mutation which determines the D2a haplogroup could have occurred in Asia or on the other side of the Bering Strait (Fig. 2).

4.3 Ymyyakhtakh Culture

The Ymyyakhtakh culture of 4,350–2,950 uncal BP (5,000–3,000 cal BP) belonged to the final stage of the Neolithic. In addition to the Eastern Siberia, this population occupied Taimyr, Chukotka, and the north of the Transbaikal and Cis-Baikal regions. Currently, about four hundred objects of the Ymyyakhtakh culture belonging

to different types—sites, burial grounds, single burials, and rock art sites—are known (Mochanov 1969; Fedoseeva 1980: 208; Alekseyev 1987: 116; 1996a: 33–40; Argunov 1990: 198; Vorobey 2007; Dyakonov 2009; Stepanov et al. 2012; Kashin 2013: 18, 137).

Distinctive multilayered waffle-like, ribbed, and smooth-walled pottery with the admixture of organic matter (animal hair, grass, and conifer needles) to the clay fabric has been found at the Ymyyakhtakh sites. In addition to clay and organic matter, the fabric included various mineral fillers. The artistic ornamentation on the vessels also included traced geometric patterns of intersecting lines, zigzags, triangles, and a band of through rounded holes. A typical feature of the Ymyyakhtakh lithic assemblages was the thoroughness and precision of tool processing and clear consistency of their shapes. The Ymyyakhtakh population produced various types of stone tools, including arrowheads and spearheads, end-scrapers, burins, insert tools, knives, grindstones, axes, and adzes. It was familiar with all necessary techniques of stone processing from the previous periods–from retouching, grinding, polishing, drilling and sawing, to producing thin bifaces and microblade etc. Generally, stone processing technique during this period reached its highest peak (Fig. 3).

A significant role in the Ymyyakhtakh complexes was played by osseous artifacts, such as hunting and fishing tools, weaponry, protective armour, personal ornaments, and household items (Mochanov 1969; Fedoseeva 1980; Alekseyev 1996a; Dyakonov 2006, 2009). There are three Ymyyakhtakh burial grounds

Fig. 3 Ancient cultures distribution in Northeastern Siberia (7,000–3,000 cal BP). *Prepared by Viktor Dyakonov.*

(Chuchur-Muransky, Diring-Yuryakhsky, and Pomazkinsky) and several single burials (Fedoseeva 1988; Kashin and Kalinina 1997). The Kyordyugen burial where a warrior with a shield of bone plates and armour of antler plates was buried provided vivid evidence to reconstruct the social structure and warfare of the ancient population of Yakutia in the Late Stone Age (Alekseyev et al. 2006). Human representations became of primary importance In the Late Neolithic rock art, while animal representations receded into the background.

4.4 Ulakhan-Segelennyakh Culture

After the end of the Neolithic, the ancient cultures of Yakutia developed in different ways. The Ulakhan-Segelennyakh culture sites spread in southern, southeastern, and western Yakutia in the Bronze Age during 3,900–3,350 uncal BP (3,900–3,300 ca. BP). The leading indicator of this culture was pottery decorated with "pearls," impressions, and stamps. Sites with such pottery have been found on the Aldan, Olyokma, Vilyuy, and Middle Lena. Population with a similar ceramic tradition settled the southeastern and southwestern regions of Yakutia in the late third – first half of the 2nd millennium BC from the Angara region, the Yenisei Basin, as well as the Upper Lena and Vitim valleys (Dyakonov 2012; Berdnikova et al. 2014; Mandryka and Senotrusova 2014; Ulanov and Berdnikov 2015; Gurulev and Maksimovich 2016; Leontyev et al. 2017). In Yakutia, pottery decorated with "pearls" combined with stamps and impressions has been found on the Middle Lena, Olyokma, Aldan, and Vilyuy. The Ulakhan-Segelennyakh culture was named after the multilayered site of Ulakhan Segelennyakh (the Olyokma Basin, the Tokko river), where such pottery was first discovered in clear stratigraphic conditions in cultural layer VII dated to the Bronze Age (Kirillin 1996; Alekseyev 1996b). In addition to pottery, lithic and osseous artifacts, animal and fish bones, and twenty pieces of smelting ladle were found there, indicating bronze production among the Ulakhan-Segelennyakh population (Alekseyev 1996b: 71). In general, the lithic assemblages of the Ulakhan-Segelennyakh culture retains Neolithic features and shows continuity with previous Neolithic traditions, particularly, with the Ymyyakhtakh culture that might have been parental for it.

4.5 Ust-Mil Culture

The **Ust-Mil culture** spread throughout the territory of present-day Yakutia up to the Arctic Circle ca. 3,400–2,000 uncal BP (3,400–2,000 cal BP). The most frequently occurring material evidence at the Ust-Mil culture sites was pottery decorated with horizontal bands of thin, applied coils. In some cases, the coils were marked with narrow notches, and a horizontal row of through circular holes was under the rim of the vessels (Ertyukov 1990). Dark grey and even black uniform firing color of the Ust-Mil

vessels indicated that a high-temperature manufacturing technology distinguished this thin-walled pottery. It demonstrated the method of firing vessels securely in specially constructed closed pits or even kilns at a temperature of about 900–1,000 degrees. Such a manufacturing method has been known in China since the Neolithic (Kravtsova 2004: 34–35). The Ust-Mil vessels' composition showed continuity with the Ymyyakhtakh pottery traditions; however, pottery with the addition of only sand also occurred, which was not typical of the Ymyyakhtakh vessels. Although that the Ust-Mil population used bronze for making tools, the mass production of the main types of tools was still based on stone and bone. The Ust-Mil lithic assemblages virtually did not differ from the Late Neolithic inventory. Yet the diversity of the tool kit became reduced mainly due to the gradual disappearance of tools made on blades. The most popular stone artifacts were arrowheads, end-scrapers, insert tools, and grindstones (Dyakonov 2013: 273). Arrowheads usually had a sub-triangular shape; they were carefully retouched on both sides; end-scrapers were made on flakes. Subrectangular and semi-lunar knives, chisel-like tools, borers on flakes, burins on blades, prismatic and conical cores also occurred (Ertyukov 1990: 92–94; Alekseyev 1996b: 71). Bronze Age burials in Yakutia were rare. It has been discovered that the Ust-Mil population cremated their dead. It is assumed that the Ust-Mil culture was not entirely imported, but was genetically related to the Ymyyakhtakh culture and emerged in the local Late Neolithic environment (Alekseyev 1996b: 78).

4.6 Sugunnakh Culture

The descendants of the Ymyyakhtakh population, the Sugunnakh population, which was engaged in bronze casting, continued to live in the transpolar regions of Yakutia and possibly in Taimyr and Chukotka in the chronological range of 2,950–1,050 uncal BP (3,000–1,000 cal BP) (Alekseyev and Dyakonov 2009; Everstov 2017; Dyakonov and Takase 2018).

The Sugunnakh Vestigial Ymyyakhtakh culture presumably existed for about 2000 yrs, established by the radiocarbon dates obtained at several sites in the transpolar region, which were similar in their appearance to the Ymyyakhtakh sites. Identification of the Sugunnakh culture of the epi-Ymyyakhtakh was based on indisputable traces of bronze casting and the radiocarbon dating results. The Ymyyakhtakh population's descendants in the transpolar region of Yakutia lived in parallel with the inhabitants of the Bronze and Iron Ages of Central Yakutia, without changing their traditional material and spiritual culture despite already having advanced bronze-casting production (Everstov 1998, 1999a, b, 2006). The area of the Sugunnakh culture has not yet been established. The Sugunnakh population might have coexisted with individual groups of the Ust-Mil population. Still, the degree of their mutual influence in the transpolar region has not yet been determined (Dyakonov 2007a: 65). The lithic assemblages and pottery of the Sugunnakh culture show almost no differences from the Ymyyakhtakh complexes, which has not made it possible to separate these cultural generations. S. I. Everstov, who discovered and investigated

the Sugunnakh sites Deniska-Yuryuiete and Belaya Gora on the Lower Indigirka, faced the problem of separating the cultural complexes of the Ymyyakhtakh and epi-Ymyyakhtakh in the Eastern Siberian transpolar region. At first, he believed that the Ymyyakhtakh population had left the sites he examined on the Indigirka, but very late. Now he has joined the opinion of the existence of the Sugunnakh culture (Everstov 2017).

Matching the rock art sites to specific cultures of the Bronze Age in Yakutia is problematic. Changes in the spiritual life of the people living in the Bronze Age were reflected in the subjects of rock art. The image of a man dominates the petroglyphs of the Bronze Age of Yakutia. Mythological subjects that had already appeared in the Late Neolithic became more sophisticated, which indicated a new stage in developing shamanism's ideology and strengthened the shaman's cult as a potent mediator between people and spirits (Kochmar 1994; Alekseyev 1996b).

4.7 Early Iron Age in Yakutia

The Early Iron Age in Yakutia is now defined as the period from the seventh century BC to the fifth century AD. Its early stage was dated to 2,500–2,150 uncal BP (2,600–2,200 cal BP) (Stepanov et al. 2014). The radiocarbon dates also confirmed the chronology of the late stage, but the boundary between the early stage of the Iron Age and the Early Middle Ages in Yakutia has been established in a rather conventional way (Stepanov 2003). About one hundred and fifty cultural sites of the Iron Age, found mainly in the Lena basin and its tributaries south of the Arctic Circle, are known in Yakutia (Stepanov 2014).

Such objects as knives, arrowheads, awls, fish hooks, and armour plates were made of iron. Simultaneously, in the Early Iron Age people continued to use bone and stone tools. Osseous artifacts were very diverse, while the stone tools showed that there was a gradual simplification of the tool processing technique, and the number of their types became significantly reduced, which indicated a gradual degradation of stone processing and its replacement with iron products (Konstantinov 1978; Alekseyev 1996b). The primary material evidence from the Early Iron Age of Yakutia was pottery. Vessels with smooth walls, waffle-like, and ribbed vessels decorated with various stamp imprints have been found. Sometimes, pottery was decorated with pit-like or nail-like impressions. Some vessels have seen one or two applied coils indented with oval impressions. The clay fabric contained an admixture of inorganic leaners, such as sand, gruss, and chamotte (Stepanov and Dyakonov 2005).

The accompanying inventory of the burials of the Early Iron Age of Yakutia was rich and diverse. The funeral rite was also distinctive. Thus, a person was buried in a crouched position in the Dyupsinsky burial, which was discovered for the first time in the burial rite of the Early Iron Age of Yakutia, since the previously found burial complexes of this period commonly showed the position of a buried person on his back (Stepanov 2010). Rock art most expressively testified to the increased complexity of the worldview among Yakutiya inhabitants in the Iron Age. In terms of

manner and style, representations at the sites of rock art of the Iron Age were predominantly stylized (Kochmar 1994). The beginnings of pictorial writing (pictography) began developing.

5 The Late Holocene Stone and Paleometal Ages in Chukotka

5.1 North-Chukotkan and Ust-Belaya Cultures

In Chukotka, N. N. Dikov distinguished the North-Chukotkan culture of the Late Neolithic, similar to the Ust-Belskaya culture of the Early Bronze Age, which presumably existed in the chronological range of 2,920–2,760 uncal BP (3,200–2,800 cal BP) (Dikov 2004: 134–161; Zelenskaya 2017). V. V. Pitulko believed that these cultures represented the "Eastern Chukotkan variant" of the Ymyyakhtakh tradition (Pitulko 2003: 132). S. B. Slobodin substantiated the point of view according to which these cultures emerged on a local Neolithic basis adopting some features of the Ymyyakhtakh material culture (Slobodin 2012: 120–121). The common Chukotko-Kamchatkan pottery-free cultural region mentioned by Dikov (2004: 133) might have constituted such a regional basis. The area of distribution of the North-Chukotkan culture included the tundra regions of Northern Chukotka adjacent to the Arctic Ocean; the area of distribution of the Ust-Belaya culture was the forest-tundra territories of Chukotka (Fig. 4).

5.1.1 North-Chukotkan Culture

The distribution territory of the North-Chukotkan culture included northern tundra bordering the Arctic Ocean, Aion Island, the valleys of the Pegtymel, Amguema, and Anadyr rivers, the easternmost areas of Chukchi Peninsula, and the areas of the Upper Kolyma and the Upper Omolon rivers (Northeast of Russia from ancient times… 1996: 24; Slobodin 2012). The North-Chukotkan lithic assemblages typically includes prismatic and conical cores to make blades and microblades, bifacial arrow heads with a large subrectangular stem, leaf-shaped or triangular points, leaf-shaped and stemmed bifacial knives, scrapers, multifaceted burins, trapezoid axes, and polished adzes. The North Chukotian ceramics is close to the Ymyyakhtakh style, and in the east of its distribution area consists of plain vessels with impressions of stamped, banded, and incised ornaments (Dikov 1993).

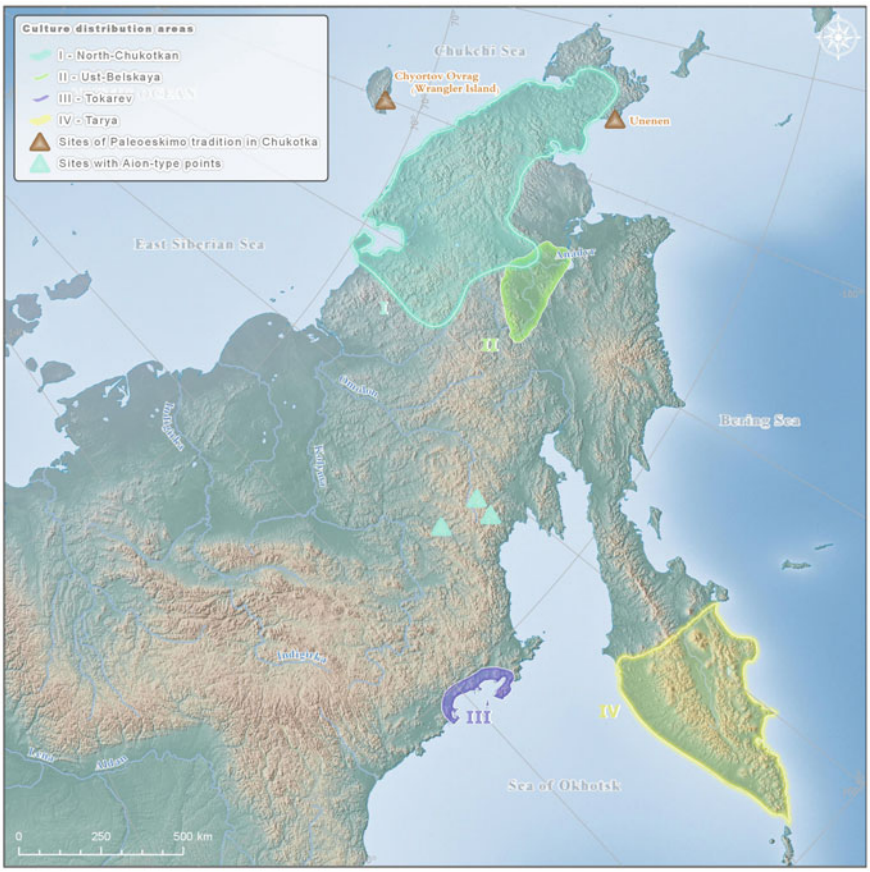

Fig. 4 Ancient cultures of Chukotka, Northern Priokhotye, and Kamchatka (2nd – 1st millennia BC). *Prepared by Pavel Grebenyuk and Alexander Lebedintsev.*

5.1.2 Ust-Belskaya Culture

The Ust-Belskaya cultural tradition was spreading over the forest-tundra areas of Chukotka. It is represented by ancient sites in the Mid-Anadyr River area and by the Ust-Belaya cemetery. Its ancient sites are placed in locations of seasonal reindeer crossing of rivers. The Ust-Belskaya stone inventory is much close to that of the North-Chukotkan culture. However, it is peculiarized by bronze burins and a toggling harpoon point. Its ceramics is as well peculiar for impressions of small spade ribs (Dikov 2004). The populations were occupied with reindeer hunting, also fishing, bird trapping, and gathering.

Thus, the carriers of these cultural traditions practised deer hunting; in ethnic terms, it is possible that they are associated with the Chukchi ancestors, as it is also indicated by the toponymic evidence (Burykin 2001, 2002).

5.2 The Paleoeskimo Tradition of Chukotka

The Paleoeskimo cultural tradition in Chukotka is represented by the Chertov Ovrag site on Wrangel Island (3,300–2,850 uncal BP/ 3,500–2,900 cal BP) and the settlement of Unenen (3,300–2,900 uncal BP / 3,500–3,000 cal BP) (Dikov 2003: 210–212; Gerasimov et al. 2003; Gusev 2014). Its lithic assemblages consists of leaf-shaped and stemmed points, edge-retouched flake knives, polished burins, end- and stemmed scrapers, side-scrapers and saws, and retouched and polished end and side inserts.

5.2.1 Chertov Ovrag site on Wrangel Island

The lithic assemblage's general appearance and discovery of a single-hole toggling harpoon head with an open socket and one side spur allowed N. N. Dikov to identify the complex on Wrangel Island as a Paleoeskimo site (Dikov 2004). The remains of dwellings at the Chertov Ovrag site have not been found, but rectangular hearths and garbage pits with the faunal remains of marine mammals, polar bears, and birds have been discovered. According to scholars, this was a temporary seasonal encampment of sea hunters who arrived from the Asian coast of the Chukchi Sea, where permanent Paleoeskimo settlements which have not yet been detected, could have been located. T. S. Tein linked the origin of this site with direct migration from Northern America and Greenland (Tein 1979). According to R. Ackerman, the site on Wrangel Island and the settlement on Cape Krusenstern in Alaska (1,150–850 BC) are culturally related and resulted from the Paleoeskimo influence from the Canadian Arctic (Ackerman 1988; Darwent and Darwent 2016).

5.2.2 Unenen Settlement

The Unenen settlement is located on the southern tip of the Chukchi Peninsula (Gusev 2014). The lithic assemblage of this site shows parallels with the cultures of the Pre-Dorset and Dorset in the Canadian Arctic, and the Old Whaling culture. The toggling harpoon heads found are identical to the objects of this type of Independence culture and from the site on Wrangel Island. The barbed harpoons heads of the Aleut type, faunal remains of whales and Pinnipeds, the unique find of a walrus tusk with engraved whale-hunting scenes, ritual objects and highly artistic pieces made of walrus tusk, antler, wood, whalebone, and leather confirm the existence of highly developed marine hunting as early as the second half of the 2nd millennium BC. S. V. Gusev attributed the settlement of Unenen as belonging to an Old Whaling culture, suggesting this site's the cultural and geochronological unity with Chertov Ovrag, the settlement on Cape Krusenstern, and the Pre-Lakhtin sites to the south of Anadyr Bay (Gusev 2014).

The emergence of the Paleoeskimo tradition in Northeastern Asia should be associated with expanding the Paleoeskimo groups of the Canadian Arctic and Greenland to the Bering Strait region, whose active development began at least a thousand years before, ca. 4,500 cal BP. Available evidence shows that ca. 3,500 cal BP, the Paleoeskimo tradition reached the Chukchi Peninsula (the Unenen settlement), and the site on Wrangel Island most likely existed ca. 2,900 cal. BP (Pitulko 2003).

5.3 The Neoeskimo Tradition of Chukotka

From the end of the 1st millennium BC, the Neoeskimo tradition (the Thule tradition) started to develop in the Bering Sea region. It included the Okvik, Old Bering Sea, Birnirk, Punuk, and Thule cultures, which had a different localization and sometimes coexisted (Arutyunov and Sergeev 1969, 1975; Bronshtein et al. 2016; Dikov 2004: 169–226; Mason and Rasic 2019).

The Okvik tradition had its time interval ranging from the second half of the 1st millennium BP – through the first half of the 1st millennium AD and is one of the oldest maritime ones in Chukotka; Bering Strait coasts bounded distribution area from Uelen to Chaplin. The Old Bering Sea tradition (from second to sixth – eighth centuries AD) was spread over the territory from Anadyr Bay to Shalaurov Island; the Birnirk tradition (the sixth – tenth centuries AD) had its territory from the Kolyma River mouth to the southern edge of Bering Strait, and the Punuk tradition (the eighth – sixteenth centuries AD) was distributed from the Kolyma River mouth to the southern coasts of Bering Bay.

The historical sources of the Neoeskimo tradition in Chukotka are rather intricate. The Old Bering Sea culture has developed due to the interaction of the Paleoeskimo and early Neoeskimo labret traditions (Okvik, Choris, Norton, and, presumably, Ipiutak) and the Ust-Belskaya non-labret culture. The Birnirk tradition spread from Alaska. Its genetic relationship with the Okvik tradition is underlined. This culture was much influenced by the Tule tradition from the Arctic areas of America. However, the Asiatic Punuk elements are as well evident from the Birnirk material culture. The Punuk culture has altered based on the early Neoeskimo traditions including the Old Bering Sea, Okvik, and Birnirk ones and due to certain effects of the interior Paleosiberians elements as the Chukchi-Koryak group.

This region was an influential center for the marine hunter culture, influencing the development of the harpoon complex for the neighboring coastal cultures of the Pacific. Various components of coastal and inland groups of ancient populations participated in forming the Neoeskimo complexes of Chukotka, which resulted in the absolute originality of each of the emerging traditions of marine hunters.

Box 4. The Neoeskimo cultures evolved based on the Paleoeskimo tradition, but the carriers of these cultures were genetically different from the Paleoeskimos. The carriers of the Neoeskimo tradition were the ancestors of the modern Inuit. Almost all Paleoeskimo samples recently studied using molecular genetics techniques belong to the mtDNA haplogroup D2a. This haplogroup has also been found in the modern Aleuts, Chukchi, Sirenik Eskimos, and Na-Dene Native Americans, but it seldom occurs in the modern Inuit (Tackney et al. 2019; Flegontov et al. 2019). At the same time, the analysis of the Neoeskimo anthropological samples found in Chukotka, Alaska, Canada, and Greenland has shown that the individuals belonging to the Thule tradition had common mtDNA haplogroups A2a, A2b, and D4b1a2a1a with present-day Inuit (Raghavan et al. 2014; Tackney et al. 2019). Genetic studies have revealed that ca. 700 BP, the Paleoeskimos were gradually replaced by the carriers of the Thule culture in Northern America and Greenland. The data obtained confirm the hypothesis about the American origin of the Neoeskimos and their subsequent settlement in the eastward and westward directions, including the territory of Chukotka (Tamm et al. 2007; Reich et al. 2012; Achilli et al. 2013; Pugach et al. 2016).

The paleogenetic analysis of the anthropological evidence from the Uelen and Ekven burial grounds has shown that the Old Bering Sea culture individuals belonged to the A2a, A2b, and D4b1a2a1a mtDNA lineages (Sikora et al. 2019; Flegontov et al. 2019). It is assumed that the gene pool of the Neoeskimo cultures of Chukotka was composed of two components—the Ancient Paleosiberian component, represented by the individuals' genome from Duvanny Yar, and the Paleo-Indian component, close to that found among the carriers of the Clovis culture. The emergence of the Neoeskimo cultures took place in the Bering strait area on the basis of the local Paleoeskimo tradition and under the influence of the cultural traditions of Southwestern Alaska and Chukotka. The Ust-Belskaya culture of Chukotka could act as a genetic source for the development of the Neoeskimo cultures.

5.4 The Lakhtin Culture

The Lakhtin culture existed in the northwestern areas of the Bering Sea region and was spread from the Anadyr Bay mouth in the north to Olyutorsky Cape in the south. It had a rather long time span ranging from the mid-2nd millennium BP to the seventeenth century (Orekhov 1999). Two radiocarbon determinations as follows indicate earlier dates and are somewhat apart of the bulk of available datings: 3340 ± 100 BP (MAG-407) date of char from Lakhtina II site, and 3300 ± 140 BP (MAG-405) date of the lower layer of the Orianda II sacrifice place. In the opinion of A.

A. Orekhov, the Lakhtin cultural tradition goes back to the Sumnagin culture of the Mesolithic, the Maltan complex in the Upper Kolyma area, and the Late Ushki culture in Kamchatka (Orekhov 1999). The researcher believes the Lakhtin culture to have been the forming basis for the Kerek ethnos and, following N. N. Dikov, relates its origins to the oldest Proto-Esko-Aleutian and Proto-Itelmen ethnic strata (Dikov 1973). According to A. I. Lebedintsev, the oldest stage of the Lakhtin culture needs further investigation as the data available with the researchers about it are rather contradictory. The researcher assumes that the earlier Lakhtin sites shall be dated by the first half of the 1st millennium BP. The Kerek population is presumed as an independent and peculiar group of the northeastern paleo-Asiatic tribes, which could have been related to the Koryak (Lebedintsev 1998).

5.5 The Kanchalan Culture

A series of ancient sites in the Lower Anadyr River area as Kanchalan, Sedmoi Prichal, and Osinovaya Kosa was identified by N. N. Dikov as the **Kanchalan Culture**. In compliance with similar elements of the Punuk culture, its age is established from the eighth to the sixteenth century (Dikov 2004). According to the researcher, the site's inhabitants were the continent interior hunters, who settled at sea and practised reindeer and sea animal hunting activities (History of Chukotka… 1989: 55). The ethnic nature of the Kanchalan sites remains a subject for discussion. Proceeding from the Kanchalan complex, A. P. Okladnikov and V. V. Naryshkin argued this site to be of neither the Eskimo nor the Koryak cultural origins (Okladnikov 1955). A. A. Orekhov made an assumption that the Kanchalan people could have been extinct ethnos close by their anthropology to the ancient Kerek and Itelmen (Orekhov 2005).

6 The Late Holocene Stone and Paleometal Ages in Kamchatka

6.1 Tarya Neolithic Culture

The Tarya Neolithic culture was spread in Kamchatka's central and southern areas during the 2nd – 1st millennia BC. Its spread territory was bounded by Lopatka Cape to the south, by the Tigil River valley to Southwest, and the Ozyornaya River to Northeast (Dikov 2004; Dikova 1983; History of the Far East… 1989; Ponomarenko 2000, 2014). The Tarya summer houses were shelters of branches mounted on piles, and winter dwellings were pit houses having rectangular depressions, timbered roof on pile supports, and earth embankment over it.

The necessary procurement activities of the Tarya people were fishing and land and seal-rookery hunting, whereas bird hunting and gathering were additional subsistence sources. The Tarya lithic assemblages consists of projective stemmed arrow heads, "humped" narrow- and wide-blade knives with a well-expressed handle, oval bifacial tools, end-, oval and rounded scrapers, sharp-book adzes, labrets and labret-shaped pins, and tiny figurines. Its bone inventory consists of barbed harpoon head, grass-cut, and gathering implements. According to A.V. Ptashinsky, the Tarya culture has southern origin and belongs to the circle of Neolithic cultures which originally were not associated with the ancestors of Itelmens (Ptashinsky, 2001). Meanwhile, the presence of inserted lip adornments – labrets indicated its proximity to the Esko-Aleut circle of cultures. The appereance of labrets in Kamchatka is recorded approximately at the same time as the Aleutian islands.

6.2 Old Itelmen Culture

The prevailing view in historiography, is that the Tarya culture became a basis for the Old Itelmen culture in Kamchatka, the period of which is determined during the 1st – 2nd millennia AD (Fig. 5) (Dikov 2004; Dikova 1983; History of the Far East… 1989; Ponomarenko 1985, 2000). Researchers distinguish the Old Itelmen cultural tradition into the earlier Kronotsky stage (the 1st millennium AD) and the later stage (the 2nd millennium AD), which have their Nikulsky and Nalychev versions of the central and southern Kamchatka, respectively.

The Kronotsky stage assemblages is represented by stemmed, rhomb-shaped, and leaf-shaped points with sharpening, direct or concave inserts, "humped" narrow- and wide-blade oval knives with a well-expressed handle, oval bifaces, end-scrapers with inserts, pear-shaped, oval, rounded, and side-scrapers, triangular or asymmetrically convex adzes, and chisels, and borers with handles. In addition to stone artifacts, there are also barbed and toggling harpoon heads made of bone and antlers, sledge and ski fragments, items of wood, birch bark, whalebone, grass, and leather. The Old Itelmen cultural tradition's later stage is signified by bone points having a slot for a small spear, iron knives, lenticular adzes, and sinkers. Its basic subsistence activities included fishing, land and sea animal and bird hunting, and gathering.

Fig. 5 Ancient cultures of Kamchatka and Northern Priokhotye (1st – beginning of 2nd millennia AD). *Prepared by Pavel Grebenyuk and Alexander Lebedintsev.*

6.3 Tevi Culture

The Tevi tradition (the 1st millennium AD) is identified over the northwestern coastal areas of Kamchatka; it has its counterparts in the Old Itelmen and the Old Koryal cultures, and some of its elements find their correspondences in the Neoeskimo, Aleutian and Okhotian cultures. The origins and cultural assignment of this tradition remain subjects for discussion. Presumably, it can be a local version of the Old Koryak of the Old Itelmen cultures existing in Kamchatka through the 1st millennium AD (Ponomarenko 2000; Ptashinskiy 1996; Ptashinskiy 1999, 2002).

7 The Ancient Maritime Cultures on the Northern Coasts of the Sea of Okhotsk

7.1 The Tokarev Culture

The earliest costal culture on the Sea of Okhotsk's northern coasts is the Tokarev culture (2,640–1,630 uncal BP / 2,800–1,550 cal BP) (Lebedintsev 1990; Lebedintsev and Kuzmin 2010; Takase et al. 2012). Its sites are placed over the sea coasts and on islands in the Tauy Bay. The Tokarev people's procurement economy was based on maritime resources including seal hunting, fishing, and gathering. Their dwellings are slightly depressed, typically oval or circular, 5–9 m in diameter, and rectangular hearths lined with vertically placed stones (Lebedintsev 1999).

The Tokarev lithic assemblage is characterized by the wide use of flakes to make different tools. The most typical stone tools include triangular points with straight, notched, or asymmetrically notched base, tiny triangular end-scrapers, scrapers having a well-defined wide or narrow handle, narrow and wide-blade knives with well-defined handles, rectangular and almond-shaped axes, and adzes.

The Tokarev cultural tradition is amazingly peculiarized by pendants and amulets made of small oval pebbles and flakes by polishing, engraving, and boring techniques. The bone tools of the Tokarev culture consists of borers, awls, composite fishhooks, arrow and spear points, leisters, needles and needle cases.

Such items as harpoon heads, combs, borers, burin handles, and other home utensils and bone artifacts often have ornamentations of incised lines and dots, and scratches (Fig. 6) (Lebedintsev 1990).

The points of harpoons have a particular cultural significance. The Tokarev tradition is characterized by toggling harpoon points having an open socket. A toggling harpoon supplied with two symmetrical barbs and two spurs is the most widespread type. The harpoon implements are peculiarized by bifurcating barbs and two pairs of symmetrical holes placed over the edges and in the lower part of the socket. The Tokarev culture ceramics is represented by pot-shaped vessels with everted rim and flattened base. The vessels are ornamented with incisions, comb-stamped impressions, and scratched lines.

7.1.1 The Problem of the Origin and Development

It is assumed that the Neolithic cultures of the Kolyma region participated in the formation of this culture along with the northern (Chukotko-Kamchatkan coastal) and southern (Amur continental) components (Vasilyevsky 2001; Lebedintsev 2003; Slobodin 2015). A significant influence was as well produced by the Poltsevo or Talakan traditions from the Amur River area, the effects of which are evident to the greatest extent from the Tokarev pottery industry, ornamentations, distributed metal tools, and their stone replicas (Lebedintsev 2003). The harpoon complex of the Tokarev tradition is supposed to be related to Alaska's Paleoeskimo traditions. The

Fig. 6 Tokarev culture bone inventory

cultures reported from the Aleutian Islands and Arctic Canada reveal their similarities, which can be explained by close and intense contacts between ancient cultures of the North Pacific and maritime areas of the Arctic. An opinion was expressed that the coastal culture from the Northern Priokhotye goes back to the Paleoeskimo and Aleutian prototypes (Arutyunov and Sergeev 1975).

The archeological evidence of the Tokarev culture manifests the influence of the Paleoeskimo tradition. At the level of lithic industry, this is shown by the absence of the laminar technique typical of continental cultures, and in the features of the tool kit—the presence of small tools of chalcedony: miniature arrowheads, oval endscrapers, insert tools, and small leaf-shaped knives (Lebedintsev 1990: 27–130). There was no pottery at the initial stage of the Tokarev culture; the tradition sites typically show the use of rectangular hearths identical in shape to the hearths at the site of Chertov Ovrag on Wrangel Island. The Tokarev people possessed technologically advanced tools for marine animal hunting, including toggling harpoon heads of the Dorset tradition with an open socket, and distinctive barbed harpoon heads whose parallels commonly occur in Southwestern Alaska and the Aleutian Islands (Lebedintsev 1998).

Box 5. The problem of the origin of the Tokarev culture is associated with the wider problem of the emergence of the cultures of marine hunters in the Northern Pacific and the spread of harpoon technology and a coastal type of economy. The appearance of a highly technologically advanced culture of marine hunters ca. 3,000–2,800 BP on the Northern Priokhotye along with a lack of archeological data on its gradual formation in this region suggests genetic links with the Paleoeskimo tradition of Chukotka, as well as possible independent migration of the Paleoeskimo and Aleutian groups from Southwestern Alaska and the Aleutian Islands. Paleogenetic analysis of anthropological evidence from the Olskaya site with the age of ca. 3,000 cal BP has shown that the individuals of the Tokarev culture belonged to mtDNA haplogroups D2a1 and G1b, and were the descendants of the Ancient Paleosiberians, represented by the genome of the person from Duvannny Yar (Sikora et al. 2019). Thus, the ancient "Paleoeskimo" mtDNA haplogroup D2a1 was first discovered on the northern coasts of the Sea of Okhotsk. The carriers of the Tokarev culture also have turned out to be close relatives of a Saqqaq Paleoeskimo individual (4,170–3,600 cal BP) who was found in Western Greenland and had haplogroup D2a1 of mtDNA and haplogroup Q-B143 of Y-DNA (Gilbert et al. 2008; Rasmussen et al. 2010). A marked connection of the Saqqaq carrier with the genomes of the Chukchi, Koryaks, and Nganasans has already been observed (Rasmussen et al. 2010).

In phylogenetic terms, the D2a1 haplotype, identified in the individuals of the Tokarev culture, is as old as that of the carrier of the Saqqaq culture. This means that the representatives of this mitochondrial lineage on the Northern Priokhotye and in Chukotka could have been the descendants of the ancestral Paleoeskimo population which had previously passed through these territories on the way to Alaska. However, the possibility of back migration of mtDNA haplogroup D2a1 cannot be excluded (Fig. 7). Interestingly, the Y-DNA haplogroup Q-B143, previously associated with the Saqqaq culture carrier, is present in the gene pool of the modern Koryaks, which in a recent study has been explained by the back migration of the Paleoeskimos (Grugni et al. 2019). In this regard, it is possible to bring up the results of studies into the "Arctic" mutation of the CPT1A gene in Northeastern Asia's indigenous populations. The occurrence of this mutation has been directly linked to the populations of Arctic marine hunters (Malyarchuk et al. 2016). Along with frequent (more than 50%) occurrences of the "Arctic" variant of the CPT1A gene in the populations of the Inuit, Chukchi, and Koryaks, the same mutation has been found with a frequency of 10.3% in the Nanai people of Northeastern China (Li et al. 2018). The presence of the "Arctic" mutation in the Nanai people can be explained by long-distance migrations of the Paleoeskimo and Aleutian groups or later migrations of the Tokarev carriers or Old Koryak culture to the south of the Far East.

Thus, the Tokarev culture of the Northern Priokhotye (800 BC – 500 AD) can be culturally, chronologically, and genetically defined as a culture belonging to the Paleoeskimo circle of archeological cultures which spread over Alaska, the Canadian Arctic, and Greenland since the mid - 3rd millennium BC. (Grebenyuk et al. 2019). All Paleoeskimo cultures were distinguished by certain originality and existed over a vast territory. The period 800–500 BC in the Canadian Arctic, synchronous with the Tokarev culture, is considered to be a "transitional period" from the Pre-Dorset to the Dorset culture; the period 500–300 BC is associated with the Early Dorset culture, and the period 300 BC – 500 AD was the time of the Middle Dorset culture. The Choris culture (750–400 BC) and the Norton culture (from 500 BC) developed on the western coast of Alaska (Ryan 2016; Dumond 2016; Milne and Park 2016; Darwent and Darwent 2016; Grønnow 2016).

According to linguistic evidence, the Eskimo-Aleut linguistic substrate can be observed in the languages of many peoples of the Sea of Okhotsk region, Sakhalin, and the Amur region (Burykin 1996). Analyzing the connection between the Chukchotkan-Kamchatkan languages and the Nivkh language, M. Fortescue suggested a hypothesis according to which the population of the Tokarev culture could have been the carrier of the Proto-Chukotka-Kamchatkan language resulting from ethnic and cultural interaction between the population of the interior regions of the Upper Kolyma region, descending to the Okhotsk Sea coast, and migrants from the Lower Amur region (Fortescue 2011). However, according to archeology, the ancient tribes of the Amur region began to spread northward toward the Northern Priokhotye closer to the end of the 1st millennium BC – early 1st millennium AD, where they interacted with the carriers of the Tokarev culture. The Old Koryak culture, directly connected with the formation of the Koryak ethnos, developed on the basis of the cultural community which emerged (Lebedintsev 1999: 59).

7.2 The Old Koryak Culture

The Tokarev culture became a forming basis for the Old Koryak culture in the 1st millennium AD. R. S. Vasilevskiy distinguished this cultural tradition into five stages as follows: Zavyalova (the fifth–eighth centuries), Bogurchan (about the tenth century), Atargan (the tenth–thirteenth centuries), Lengelval (the thirteenth–fourteenth centuries), and settlements dated to the sixteenth–seventeenth centuries (Vasilevskiy 1971). The distribution territory of the Old Koryak culture was bounded to the SW by Shelting Bay, to the east by the Kavran River in Kamchatka, and to the north by the Anadyr River (Lebedintsev 1990). The Old Koryak sites are placed over river terraces in river mouth areas or over marine terraces.

Zavyalova stage of the Old Koryak culture is dominated by stone implements made of chalcedony and jasper rocks, including tiny quadrangular scrapers, knives, adzes, and leaf-shaped arrow points. Its bone inventory consists of arrow points and toggling harpoons similar in shape to the Dorset and Kachemak I harpoons. The

ceramic pottery is represented by sharp- and round-based vessels with sculptured rolls.

Bogurchan stage is characterized by the same hunting implements and utensil items. However, the stone processing technique becomes worsen at this stage and no chalcedony or jasper items are reported. It's lithic assemblages is based on dark-gray chert rock. The bone inventory preserves the same shapes and types as at the previous stage. Widespread pottery types include round-based vessels with false-textile impressions and vessels with sculptured rolls, also those with incisions and sometimes with composite rolls. Dwelling structures included whale bones (Vasilevskiy 1971: 134).

Seal hunting activities of its people dominated the Atargan stage of the Old Koryak culture. Its stone inventory becomes less frequent both in quantity and categories, and the number of stable shapes of stone items is reduced, whereas the bone industry is flourishing. The harpoon heads are variously shaped and differently intended. The most widespread type is represented by harpoon heads with the obliquely cut base of one basal spur, which has their direct counterparts in the Okhotian cultural tradition. Some harpoon heads had a slot to insert an iron point. There is a growing number of arrow points, combs, needles, adzes, leister points and needle cases, also armor plates and hunters flatten knives made of bone are widespread. Bone items are ornamented with simple geometrical patterns. Vessels with false-textile impressions become less frequent, vessel's rims with sculptured rolls are partly ornamented, and non-ornamented vessels also become widespread.

It should be noted that the dating of the archeological sites of the Northern Priokhotye has been conducted to the present time mainly on coal from cultural layers. Besides, the identification of the stages of development of the Old Koryak culture was carried out more than 50 years ago only based on a typological study of materials, without any radiocarbon data. Clarifying the age and characteristics of the development stages of Tokarev culture and the Old Koryak culture requires additional studies.

8 Conclusions

This chapter presents a brief overview of archeological research into Northeastern Siberia in the Stone Age and Paleometal Age.

The discoveries of recent years have yielded reliable evidence of the early colonization of anatomically modern human populations into the territory of Northern and Eastern Asia, which suggests the possibility of the Northeastern Siberia peopling starting at 45,000 uncal BP. This region's initial peopling could have resulted from migrations from the southern and western—the Altai-Sayan and Baikal—regions of Siberia. Active exploration of the Siberian Arctic by tribes of hunters of large mammals took place in the Early Upper Paleolithic; evidence of their culture appears among the materials of the Yana site.

At the present stage of research, it is assumed that the populations which gave rise to the indigenous population of America and Extreme Northeastern Asia separated from their East Asian ancestors ca. 30,000 BP. Migration of the groups of this population in the northeastern direction ca. 24,000–18,000 cal BP and their mixing with the descendants of the carriers of the "Ancient North Siberian" component (the Yana and Malta sites) led to the emergence of several genomic components in Extreme Northeastern Asia: the "Ancient Paleosiberians", represented by the genome of the individual from Duvanny Yar, and the "Ancestral Native Americans", who later divided into the "Ancient Beringians" and the rest of the Native Americans.

In the period 15,000–10,000 cal BP, two traditions of the Upper Paleolithic coexisted in the region: the non-microblade tradition and the Beringian microblade tradition. The wide distribution of the Beringian tradition was likely associated with the Ancient Paleosiberian population, which largely became ancestral for many groups of the Holocene population of Extreme Northeastern Asia and Northern America, including the Paleoeskimos, Neoeskimos, and Chukotka-Kamchatkan community, also affecting the gene pool of the common ancestor of the Kets and Athabaskans.

According to genetic studies, between 10,000 and 3,000 cal BP, the representatives of the Ancient Paleosiberian population in Northeastern Asia were gradually replaced by genetically different Neosiberian populations which advanced from the territories of Southern Siberia and the Baikal region (Sikora et al. 2019). Around 3,000 cal BP, the habitation area of related Ancient Paleosiberian groups in Northeastern Asia was limited to Kamchatka, Chukotka, and the northern coasts of the Sea of Okhotsk.

The spread of various groups of the Neosiberian population, distinguished by genetics, may have been associated with the sequence of cultural traditions of the Early and Late Holocene Stone Age in Northeastern Siberia, representing one of the most complex and exciting phenomena of prehistory. For thousands of years, Central Yakutia was the source of cultural impulses for Extreme Northeastern Asia. The Sumnagin, Syalakh, Belkachi, Ymyyakhtakh, Ulakhan-Segelennyakh, Ust-Mil, and Sugunnakh cultures succeeded others, often coexisting, in the region (Table 1). Scholars have observed successive elements in the development of these traditions. The appearance of these cultures differs from the preceding Dyuktai culture. Their lithic assemblages contained some common features, including conical microblade cores and multifaceted burins.

According to scholars, the abrupt change of cultural traditions in the Early Holocene was associated with a large migration wave. Wedge-shaped cores and bifacial tools were replaced by prismatic cores, stemmed points, and other tools on blades (Slobodin 2015). The Sumnagin culture existed in the first half of the Holocene, and it had local variants, represented by Uolba and Arctic cultural components. The diversity of cultural elements of the Early Holocene resulted from the influx of new populations and existing cultural components inherited from the local Upper Paleolithic, which was especially evident when the Sumnagin tradition spread to the north and east.

Pottery technologies appeared in the Late Holocene Stone Age in Extreme Northeastern Asia and new types of stone tools. Pottery became the marking element of ancient cultures at the final stage of the Stone Age. Complexes of the Syalakh

Table 1 Ancient cultures of Northeastern Siberia

Sumnagin	9 400–5 900 uncal BP 10 700–6 800 cal BP
Syalakh	6 000–4 700 uncal BP 6 900–5 500 cal BP
Belkachi	5 400–3 700 uncal BP 6 300–4 200 ca BP
Ymyyakhtakh	4 350–2 950 uncal BP 5 000–2 900 cal BP
Ulakhan-Segelennyakh	3 900–3 350 uncal BP 3 900–3 300 cal BP
Ust-Mil	3 400–2 000 uncal BP 3 400–2 000 cal BP
Sugunnakh	2 950–1 050 uncal BP 3 000–1 000 cal BP
Early Iron Age (early stage)	2 500–2150 uncal BP 2 600–2 200 cal BP

Mochanov (1977), Mochanov and Fedoseeva (1976), Fedoseeva (1980), Kiryak (1993), Pitulko (2003, 2004, 2016), Dyakonov (2008, 2012), Alekseyev and Dyakonov (2009); Stepanov et al. (2014), Dyakonov and Takase (2018)

culture typically showed the presence of pottery with imprints of "net-meshwork"; the Belkachi culture had corded ware with imprints of cord-threads; the Ymyyakhtakh culture showed waffle-like, ribbed, and smooth-walled pottery with distinctive ornamentation in the form of a band of through round holes. The critical problem of the Neolithic is finding the reasons for the changes in the regional cultural traditions, each of which was widespread in Northeastern Siberia. The driving cultural impulses that determined the direction for these traditions' development came from the adjacent Cis-Baikal, Transbaikal, and the Amur regions.

The genesis of the Ymyyakhtakh tradition, which at its early stage coexisted with the Belkachi culture and gradually spread over a large part of Eastern Siberia, could have been associated with cultural and migration impulses from the Baikal region. The carriers of this tradition might have included the representatives of various ethnic and linguistic groups. The carriers of the Ymyyakhtakh culture contributed to the gene pools of the ancestral Chukotko-Kamchatkan populations which had previously settled in Extreme Northeastern Asia. The chronology of the related Northern-Chukotka and Ust-Belaya cultures of Chukotka requires additional clarification.

Sites of the Ulakhan-Segelennyakh culture spread in Yakutia during the Bronze Age. Pottery decorated with "pearls" impressions, and stamps are the markers of these sites. The evidence of the Ust-Mil culture is represented by pottery decorated with thin, applied coils with horizontal bands. Evidence of bronze casting has been found at the Sugunnakh culture sites in the polar regions of Yakutia, while the stone inventory and pottery show almost no differences from the materials of the Ymyyakhtakh

culture. In the Early Iron Age in Yakutia, pottery consisted of waffle-like, ribbed, and smooth-walled vessels decorated with ornamented stamp imprints.

There are pronounced interrelations between natural and cultural processes of the Holocene in Extreme Northeastern Asia. Scholars have observed that cultural events occurred at the beginning of warm periods; however, the previous periods of cooling were the dominant factors behind these changes (Pitulko and Pavlova 2016). The back migrations of the Paleoeskimos and Neoeskimos from Northern America to the Extreme Northeastern Asia could have been directly related to changes in the climatic conditions affecting marine mammals and humans.

The East Asian ancestors of the Paleoeskimos probably migrated to Alaska between 6,000 and 5,500 cal BP. This migration could have been associated with Belkachi culture representatives, or related pottery-free traditions, which brought the ancestral haplotype for mtDNA haplogroup D2a to Alaska. Archeological evidence shows that since the first half of the 3rd millennium BC, the Paleoeskimo tradition extended in Alaska, the Canadian Arctic, and Greenland, from where it penetrated to the Asian shores of the Bering Strait.

The Tokarev culture of the Northern Priokhotye can be culturally, chronologically, and genetically defined as a culture belonging to the Paleoeskimo circle of archeological cultures. The origin of Tokarev culture is associated with the Paleoeskimo traditions of Chukotka or an independent Paleoeskimo and Paleo-Aleut wave of migration from Southwestern Alaska and the Aleutian Islands. The Tokarev culture was likely formed on the basis of the "Ancient Paleosiberian" component (inland Kolyma and Kamchatka groups) and the Paleoeskimo and Paleo-Aleut cultural component, as well as the Lower Amur cultural component in the later stages of its existence. Based on the Tokarev culture, the Old Koryak culture is being formed, but the transition period associated with the formation of the Old Koryak culture has not yet been studied. The available radiocarbon dates of several archeological sites of the Northern Priokhotye and Kamchatka are not enough to justify the cultural and chronological distinction, especially in the early and late periods of Tokarev culture and the early period of the Old Koryak culture.

The emergence of the Neoeskimo cultures took place based on the local Paleoeskimo tradition and under the influence of the cultural traditions of Southwestern Alaska and Chukotka. The Ust-Belskaya culture of Chukotka could act as a genetic source for the development of the Neoeskimo cultures. The presence of inserted lip adornments – labrets in Tarya culture indicated its proximity to the Eskoaleut circle of cultures. With the emergence and development of the Neoeskimo cultures in 2,200–1,200 cal BP, the dominance of the Paleoeskimos in the Bering Sea and American Arctic ceased. The appearance of the Neoeskimo culture of Thule in Alaska and its rapid spread after 1,000 A.D. to the territory of the Canadian Arctic and Greenland led to the disappearance of the Paleoeskimo cultures.

The available evidence makes it possible to distinguish at least two large waves of a back migration from North America to Extreme Northeastern Asia (Fig. 7). The migration of the Paleoeskimo and related groups starting from ca. 3,500 cal BP was manifested in the emergence of the Paleoeskimo tradition in Chukotka and the Tokarev culture on the Sea of Okhotsk's northern coasts. The Sirenik language

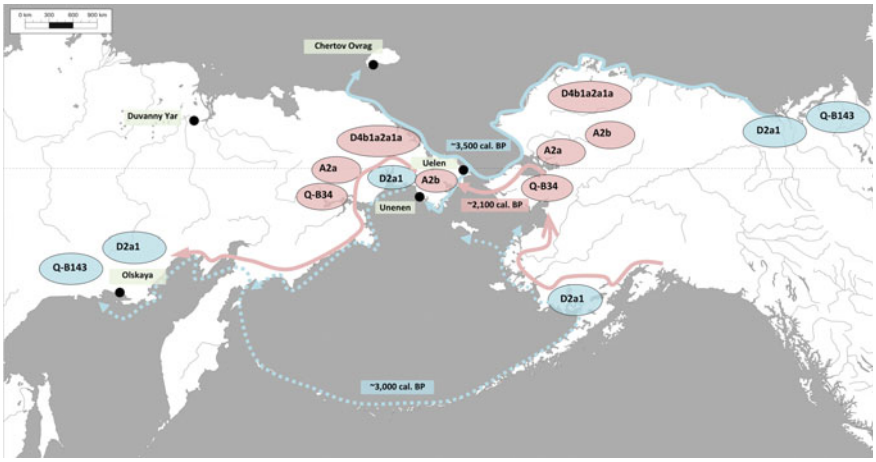

Fig. 7 Back migrations of Paleoeskimo and Neoeskimo groups to Northeastern Siberia. *Main migratory events are shown according to the variation of the Y-chromosome (for haplogroups Q-B143, Q-B34) and mtDNA (for haplogroups A2, A2a, A2b, D2a1, and D4b1a2a1a)* (Grebenyuk et al. 2019)

probably resulted from the Paleoeskimo presence in Chukotka. Starting from ca. 2,200 cal BP, we can observe the beginning of the Eskoaleut migration to the Bering strait, which was manifested in the emergence of the Neoeskimo tradition.

Acknowledgements Pavel Grebenyuk, Alexander Lebedintsev and Boris Malyarchuk are supported by Russian Science Foundation project (RSF) №22-18-00319 (https://rscf.ru/project/22-18-00319/). The analytical aspect of this study for A. Yu. Fedorchenko was supported by Russian Science Foundation (Project №20-78-10125). Studies on Yakutia written by V.M. Dyakonov, were carried out within the framework of the state order of the Institute of Archeology and Ethnography SB RAS FWZG-2022-0003.

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Russian Territorial Expansion into Siberia: The Initial Stage (XVI–XVII Centuries)

Yuri N. Golubchikov and Dmitry V. Sevastyanov

Abstract This chapter discusses the Russian colonization of northeast Eurasia. The earlier migrations of Russians to Siberia is linked to the period of medieval climatic warming. The role of the Pomors in the land explorations is analyzed. It is argued that the Pomors built the most sophisticated ships of the time for river and sea ice navigation. A comparative, cross-cultural analysis of the Western European (Anglo-American) and Eastern European (Russian-Siberian) types of the frontier indicates their simultaneous emergence in world history. The prohibition of navigation for foreigners in the Arctic seas of Russia in 1620 marked the beginning of the English colonization of North America. The conquest of Siberia is seen as part of the continuing national liberation struggle of the Russian people against the Tatar-Mongol rule. However, no single Siberian ethnicity was lost in that war and the habitats of indigenous peoples in North Asia did not change for centuries. The successful conquest of such a vast territory with such a complex ethnic composition in such a short period (60 years) by such a small number of people as performed by the Russian Cossack explorers of Siberia reaching the Pacific Ocean remains something unique in the world history. For the Anglo-Europeans explorers it took about 350 years to conquer the territory of North America from the Atlantic to the Pacific Ocean. However, the Russian territorial expansion was not seen as a national triumph. Specific attention is paid to the role of the frontier in the self-representation of the respective nations.

Keywords Pomors · Frontier · Waterways · Territorial expansion · Indigenous peoples · Colonizer · Tatar-Mongol yoke

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V. N. Bocharnikov and A. N. Steblyanskaya (eds.), *Humans in the Siberian Landscapes*, Springer Geography, https://doi.org/10.1007/978-3-030-90061-8_5

Glossary

Waterway routes	river routes with transitions through watersheds in convenient locations (walkways).
Explorers	small (sometimes in several people) groups of hardy and courageous "servicemen" (Cossacks, archers, gunners) and "eager" (free people), who connected the Moscow kingdom with Siberia. They often spent many years in campaigns.
Colonizer	a person who conducts or implements the policy of the development of a territory in order to join it to the metropolis.
Koch	a small one-mast vessel on which it was possible to go only downwind, with rounded contours, suitable for sailing among the ice on Grumant (Svalbard) and for other Arctic sea voyages.
Metropolis	from the Greek. metroupolis from *meter* "mother" and *polis* "town". In ancient Greece, a city-state (polis) in relation to the settlements (colonies) it created.
Pomors	an ethnographic group of the Russian population (immigrants from Novgorod and Pskov) who settled permanently along the Arctic coast (from Murman to Kolguev Island) and the northern rivers of Eastern Europe.
Ushkuy	a flat-bottomed ship (up to 14 m in length), having a symmetrical shape of the bow and stern, which made it possible to sail along rivers in opposite directions without turning the ship.
Frontier	(from English, literally the border between civilization and wildness). In the history and literature of the United States indicates the era of the conquest of Indian lands in the western United States. In the image plan frontier corresponds to boldness, courage, "pathfinders", the feat, the struggle against the treacherous aborigines.

1 Introduction

Mystically, at the same time, from almost one northern European area, Russians and Englishmen are starting to build the largest empires in world history. There is a lot in common between them. Where they came from, the subsoil did not store any gold, silver, or any other valuables. The principal value of their fatherland were people, their arrogance, enterprise, insurmountable craving for overcoming large spaces, and the desire to go beyond the horizon, to sail around the bend. The word "tourism" comes from the English "tour"—a journey. The British were more attracted to sailing than to advance by land. Not one nation of the world is comparable to the British in conquering long-distance sea. The people of the world were beyond the control of those overland distances that the Russian people overcame.

The character of the Russian person was shaped mainly in continuous walking for several kilometers, in long hikes and wanderings, in pilgrimage. The life and forms of settlement of Russians are such that, even when living in one place, a person must walk a lot. It also follows from this that active travel or even just walking is vital for a Russian person. At the same time, no nation can compare with the Russians in the development of river ways. Since ancient times, they settled exceptionally on rivers. Moreover, all types of river tourism, including rafting on inflatable boats, canoes, catamarans, are developing widely in Russia even today. Not every nation is capable of that. Not one nation of the world is comparable to the British in conquering the long-distance sea. Not one nation of the world is subject to those overland distances that the Russian people overcame.

At last, these people created the most ambitious empires in the history of humankind, connected divided continents and their parts, and introduced many new elements into the life of aboriginal peoples, not always useful. Comparison of the life and living conditions of these people is "necessary for understanding both our history and the origin of the world in which we live and which is becoming ever closer" (Akimov 2010, p. 358).

After two or three centuries, these two branches of Europeans converged again on the shores of the Pacific Ocean. The history of these peoples is the history of colonization. However, the attitude to this story is different.

We cannot imagine a single course in American history without a colorfully illustrated chapter on Indians and their confrontation with cowboys and first settlers. Whole line of research has emerged on the role of the frontier in the formation of American and British nations and a states (Belash 1996). The Russian territorial expansion did not become a triumph of national history and geography. There is no such an enthusiasm for explorers and glorification of the steppe frontier in Russia as Americans have for cowboys in jeans on horseback.

Colonization, according to Klyuchevsky V. O., is the main factor in Russian history: "The history of Russia is the history of a country that is being colonized. … the colonization of the country was the basic fact of our history, with which all its other facts stood in close or distant connection" (Klyuchevsky 1987, p. 50–51). However, after the work of the repressed Lyubavsky (1996), the theory of colonization disappeared from Soviet historiography (Oleynikov 2013). Since then the course of Russian history has developed along the evolutionary ladder of socio-economic formations: from the Middle Ages to the new and modern era. Meanwhile, spatial and mental, country and continental differences come to the fore today.

Comprehension of the Russian colonization process was developed in English-language studies, mainly as a problematic phenomenon. (Ananiev 2006; Pallot and Shaw 1990). In post-reform Russia, comparisons of the Russian and English colonization processes were carried out in the works of N. Yu. Belash (Zamyatina) (Belash 1996) and us (Golubchikov 2003). Further similar studies were undertaken by Akimov (2010).

2 Waterway Tracks to Siberia

In the historical past the only possible means of communication in the forest and tundra zones were rivers and lakes. The first northern territories mastered by the Scandinavian, Finno-Ugric, and Slavic peoples were the areas adjacent to the waters of the ice-free seas—the modern Norwegian, Barents seas, as well as the Inland White Sea. The waters of the Norwegian and Barents Sea are still free of ice in winter, due to the warming influence of the North Atlantic Current. Therefore, the Barents Sea region from Murman to Novaya Zemlya was familiar to the Scandinavian and Slavic sailors from the early Middle Ages.

Further advancement of Europeans, first—of the Slavs, to the east, beyond the Urals, to Siberia began in the period of medieval climate warming and was accompanied by the development of shipbuilding and navigation. According to paleogeographic materials (Lamb and Vander Kraas 1995) and historical documents (Klimenko 2004), the Middle Ages (X–XIII cc.) in the north of Europe were characterized by significant climate warming (on average 1.5–2 °C compared to modern).

In the summertime the Arctic seas, located to the east of Novaya Zemlya, were free from ice, thus Pomors from the 10th to the 12th centuries lay the sea routes along the unexplored shores of Yamal and Taimyr, explore the Baydaratskaya Bay and the Gulf of Ob, the Yenisei Gulf and set up new camps in the mouths of rivers flowing into the Arctic Ocean and on numerous islands. Pomors was attracted by the rich fishing: "soft junk" (furs), sea fish and beast, walrus tusk. Scientists, who researched the history of Northern territories of Eurasia development, noted that, starting from the 8th to the 10th centuries, Novgorodians were the main pathfinders and discoverers of new river and sea routes, industries, and lands in the north of Eurasia (Belov 1956; Magidovich 1982; Grigoriev 2014). The outposts of first medieval Russian republic were located in the lower reaches of the Volkhov river (Ladoga, mentioned in the annals from the VIII century.), and in the source of the Volkhov river on the Ilmen lake (Novgorod, from the 9th century), as well as on the Vuoksa river, near the Nevo lake (Ladoga) (Korela fortress, known from X century). In the X–XI centuries intensified movement of Novgorodians from the Il'men lake across Volkhov to the Nevo lake and further along the Svir river in the Onego lake and northeast up the Vodla river, through portages in Zavolochye, to the Studenoye Sea, on the Mezen and the Pechora. According to the "Tale of Bygone Years", by the end of the XI century Novgorodians had trades in Zavolochye on the Studenoye Sea (Barents and White), where permanent Russian settlers appeared (The Tale of Bygone Years 1999). They visited the land of Pechora, the most distant forest region of Northern Europe at that time. Envoys of the boyars and other rich people were among the first settlers, as well as free ushkuinniki, "wrongdoers" who fled from serfdom or the Mongol yoke. They, as a rule, settled among the Karelians and Saami, Chad and Pechora, in some places mixed with them, and somewhere they divided the coast and crowded the locals. There was a diffusion of the Slavic population from forest-steppe territories into taiga and tundra landscapes, on the coast of the Studenoye Sea (White and Barents),

inhabited by other ethnic groups. Population, engaged in various crafts settled for permanent living began to be called Pomors, which means the people "living by the sea", and the whole coastal region—Pomorye from Murman to Kolguev Island (Opolovnikov 1977; Semushin 2010).

The development of sea and river fisheries in the XII–XIV centuries made a contribution to this process. The Pomors built the most sophisticated ships of that time to navigate inland waters, including those intended for ice navigation: sea and common boats, ranshin, shnyak, karbas, and ushkui. It is here, according to historians, in the XIII century a new model of the Pomor fishing vessel appeared—the Koch—a vessel with rounded contours, suitable for navigation among the ice on Grumant (Svalbard) and for other Arctic sea voyages. On ships of this type continued the development of sea routes to the mouths of the largest Siberian rivers flowing into the Arctic Ocean and discovery of the interior regions of northern Siberia. A new type of ship, the ushkui, became popular in Novgorod Russia at the end of the XIII–XIV centuries. It was a flat-bottomed ship (up to 14 m in length), having a symmetrical shape of the bow and stern, which made it possible to sail along rivers in opposite directions without turning the ship (Belov 1956; Korostelev et al. 2014). The Pomors passed the entire Northern Sea Route, rounded the most eastern extremity of Asia and entered the Pacific Ocean during the XVI–XVIII centuries (the Sea of Okhotsk—"Lamskoe" sea).

On the territory between Scandinavia, the Baltic Sea and the Ural mountain country Novgorodians laid water routes on small and large ushukuy, overcame portages between the upper reaches of rivers, and sometimes built canals on watersheds. They erected wooden Christian chapels and temples, graveyards and jails, and founded settlements near the portages. It is known that the name "Russian North" stuck with the Pomeranian region only from the XVI century and began to be applied in written documents, when the Russian population became predominant on the banks of rivers, lakes, and the Studenoye Sea, where a particular Pomeranian culture was formed. At present, "the Russian North is a grandiose, unique reserve of folk wooden architecture" (Opolovnikov 1977). It is in the taiga landscapes in the Russian north that preserves a large number of unique highly artistic monuments of wooden architecture—chapels, churches, and graveyards, which are objects of cultural heritage and attract foreign tourists (Sevastyanov 2007).

Here the architectural ensemble of the Kizhi pogost, which consists of two churches and a bell tower of the XVIII–XIX centuries, surrounded by a fence, which is preserved on the Kizhi Island in the Onega lake, is considered to be the greatest example of artistic carpentry skill. The wooden Preobrazhenskaya church, cut down in 1714, topped with 22 chapters, being a UNESCO object, is a unique masterpiece (Fig. 1).

Tribute and duty collection sites were organized along the river routes from Novgorod in Zavolochye and Yugra in convenient locations on the portages in the interfluves and in the mouths of the forked rivers starting from the XII century. The largest cities (Kargopol, Tot'ma, Velikiy Ustyug, Vologda, Arkhangelsk) arise at the crossroads of trade routes—from the Black Sea coast to the White Sea or from the

Fig. 1 Wooden Church of the Transfiguration. Kizhi. Karelia. *Source* https//commons.wikimedia.org/w/index.php?curid=38,865,187

Caspian Sea to the Baltic. The harsh road of Russian history should be drawn from these cities and from the epic North, but not from Kiev.

Additional human hands, and even "horsepower", were needed to service the portages. Therefore, large and rich villages with magnificent Christian churches sprang up along river valleys and in portage knots. In Arkhangelsk (Dvina land), from XIII to XVIII centuries, the most inhabited and major portages that connected the Baltic and White seas were considered Kensky portage (from the Vodla river to the Kena river and into the Onega river), Yemetsky portage (from the Onega river to the Yemtsu river, a tributary of the Northern Dvina river), Pinezhsky portage—from the Pinegs river to salt mines on the Kuloy river and the Mezen Bay. There is a watershed between the basins of the Baltic, White, and Caspian Seas to the south, on the land of Vologda, on the Andomsk Upland. The Sheksna river, flowing from the White Lake into the Volga, and the Sukhona river, tributary of the Northern Dvina, were the main highways here. Volochek Slovensky (between the Slavyanka river and the Prozorovitsa river, which flowed into the Kubenskoe lake and further along the Sukhona river to the Northern Dvina) and Volochyok Krasniy (between the Beloye and Vozhe lakes, then along the Ukhtoma river into the Onega river and the White Sea) were the main roads here (Fig. 2).

An important waterway led along the Sukhona river to the Northern Dvina and along it to the White Sea or moved to the right tributary of the Northern Dvina—Vychegda river, and in its upper reaches—in the Vym river. From the Izhma portage water way went into the Izhma river—left tributary of Pechora river, descended into the Pechora Bay. This lower water route from the Volga Basin to the Northern Dvina and Pechora was mainly used by Nizovtsy—residents of Rostov and Suzdal, who

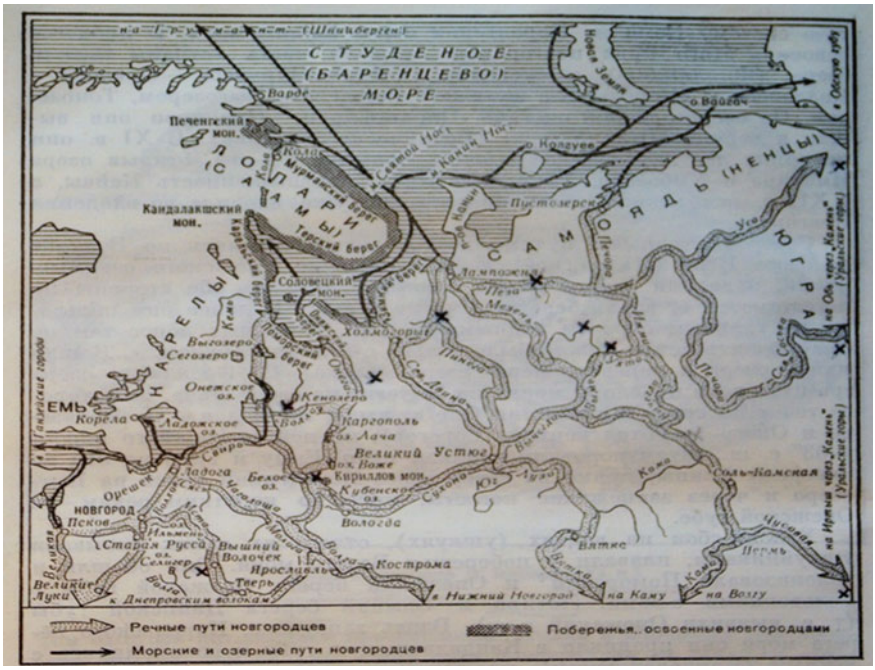

Fig. 2 Ways of Russian settlement in the North of Europe. *Source* Magidovich (1982)

competed with the Novgorodians in pursuit of "furs" and the development of northern lands (Zelutkina et al. 2013).

By the end of the XIII century Russian found the way through the Kamen (Ural). The main northern path on the Ob river passed from the middle course of the Pechera river on the Usa river and further to the Yelets river. Eletsky filament went through the antecedent valley, cutting the Polar Urals, through a system of lakes at the watershed on the Sob river, flowing down from the eastern slope of the ridge and flowing into the Ob river (opposite Obdorsk, the current Salekhard). It was the most convenient and shortest way to the Gulf of Ob in the XIV–XVII centuries. Another portage through Kamen, which led from the headwaters of the Pechora river, through its right tributaries the Ilych and Shchuger rivers on portages through Kamen into the Lyapin river, the Northern Sosva and further to the Ob river, Gulf of Ob and to the islands of the Kara Sea or upstream the Ob River—on the Irtysh river or from the headwaters of the Ob on the Ket river—to the Makovsky portage on the Yenisei (Fig. 3).

In 1601, the Polar Mangazeya was built on the Taz River, which played the role of a fortified tribute collection center and a stronghold for the advancement of Russians into the depths of Siberia. Mangazeya was built in the midst of the "Time of Troubles" (Fig. 3). Barter was held here with the local population and people who came from the Yenisei. A settlement was founded on the portage from the headwaters of the

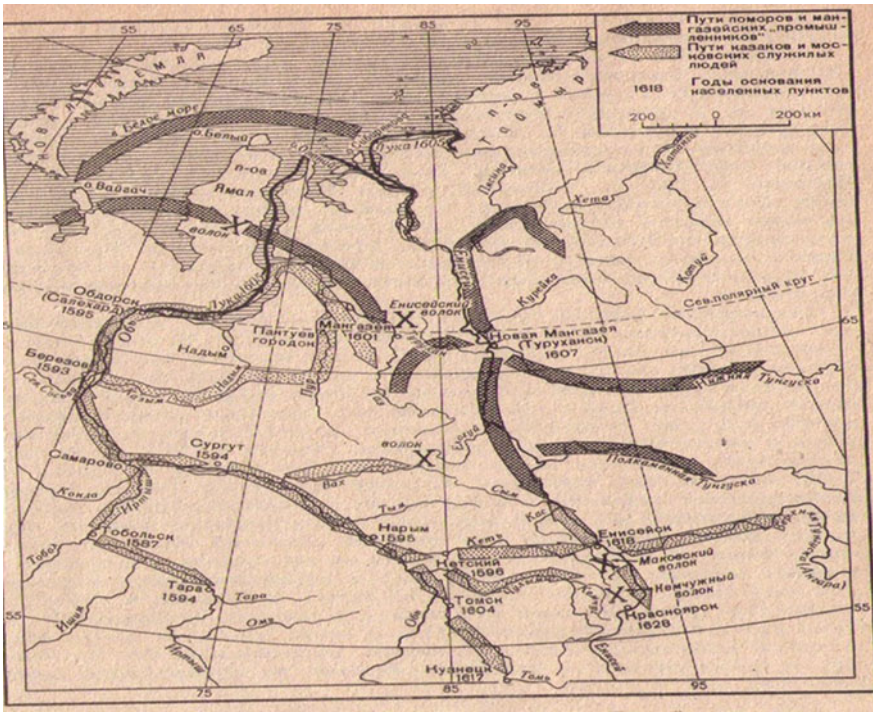

Fig. 3 Russian water-trail routes to Mangazeya and beyond the Yenisei. *Source* Magidovich (1983)

Messoyakha river into the Solenaya river (left tributary of the Yenisei) assisted for the transshipment of ships and cargo on the route between Mangazeya and the Yenisei.

Mangazeya quickly becomes an international trade crossroad. Traders from China meet here with Dutch and English merchants. However, in 1620—at the beginning of the reign of Mikhail Fedorovich Romanov—sailing to Mangazeya was forbidden to foreigners on pain of the death penalty. This was because Mangazeya became the strategical stronghold of the Western European colonization of Western Siberia. Siberia could then become an English or Dutch colony, like North America, India, Indonesia, and others. The history of the Russian state would have been quite different then. Below we will follow what would be this fate on the example of North America.

3 The Beginning of the Colonization Process

Initially, the British movement was also directed to the east, to China. From Chanceler's trip to England, they started talking about the "discovery" of Russia (Klyuchevsky 1991; Trapeznikov 1922). Anthony Jenkinson traveled in 1558 from the shores of the White Sea to Moscow and then through the western Kazakhstan

steppes proceeded to Bukhara. There were other travelers (Massey Stewart 2018). The English navigator Stefan Borro opened the island of Vaygach in 1556 in search of the Northeast passage to China.

With the prohibition on sending foreigners to Mangazeya, the streams of Russians and British were divided. The British were forced to completely reorient themselves to the West. The Russians continue their journey to the East. In 1620, the first houses were laid in New Plymouth, the first English permanent settlement in North America. In the 1620s and 1630s, several settlements were founded in New England, the largest of which was Boston. At the same time, Tomsk (1604), Yeniseisk (1616), Krasnoyarsk (1628), Yakutsk (1632) emerge in Siberia, and by 1649 the Anadyr stockade was founded on the Anadyr river flowing into the Bering Sea.

4 The Beginning of the Russian Colonization of Siberia

Russians, having crossed the Urals, entered, albeit in a sparsely populated, but long-lived country. From time immemorial there was a constant movement of warlike tribes and peoples on the territory of Siberia: the Ugri Magyar (Khanty, Mansi, Nenets), the Turks (Tatars, Yakuts), the Manchu (Evenks, Daurs), and the Mongols (Buryats).

Central and Western Asia since ancient times lived thanks to Altai gold. There are more than 30 thousand monuments of ancient cultures in one Minusinsk hollow with two thousand years of experience in irrigation construction (Butanaev 1995). Such a density of monuments is not inferior to the territory of ancient Egypt. Kyrgyz state appeared in the south of Siberia in the VI century AD, which existed right up to the Mongol conquest. One of the achievements of his culture was the creation of runic writing.

The predominant part of the Siberian population for arrival of the Russians was at the stage of disintegration of tribal relations and the formation of local ethnic elites, characterized by constant war and the existence of slavery. All Siberian peoples without exception, including those of the Yukagirs and Chukchi who were at the Stone Age level, had a certain number of captured slaves and their way of life in many ways approached the slave-owning (Nikitin 1999). More and more weakened tribes and clans adopted the language and customs of stronger neighbors and merged with them.

In the XVI–XVII centuries small (sometimes in a few people) groups of hardy and courageous people rushed to the “Siberian ukraina”. They were based on the Russian Kazakhs, archers, gunners, free people, and “industrial people”. Boldly and desperately they penetrated “unheard of lands”, hastily strengthened winter quarters and guards, traded with “peaceful” and entered into fierce fights with “non-peaceful foreigners”. They often spent years and decades in their campaigns. In an exceptionally harsh environment, they captured Siberia and tied it to the Moscow kingdom. For these “servicemen” and “hunt” people stuck the name “zemleprohodets” (in translation pathfinder).

In the late XVI–early XVII centuries from Mangazeya, from the Taz river, the pathfinders have already actively used the main Yenisei portage on the Turukhan river, where they founded Turukhansky Pogost (Novaya Mangazeya) where the river fall into the Yenisei. Routes to the Nizhnyaya Tunguska and to the portages on the Pyasina and Heta rivers, with access to the Khatanga Gulf of the Laptev Sea and further east to the mouth of the Lena river carried out from there.

Thus, water-runways through the Polar, Subpolar, and Northern Urals by the end of the XVI century—the beginning of the XVII century were discovered. The pathfinders crossed the Stone Belt (the Urals) in several places, moved to the Ob and Irtysh rivers, reached the Yenisei, i.e., laid the foundation for the development of the vast West Siberian Plain and the joining of the Trans-Ural lands to the Grand Duchy of Moscow (Magidovich 1983).

From the Taz River, explorers developed the Yenisei portage. At the confluence of the river Turukhan in the Yenisei the Turukhanskiy Pogost (New Mangazeya) was founded in 1607. From here, routes to the Lower Tunguska and to the portages on the rivers Pyasina and Hetu, with access to the Khatanga Bay of the Laptev Sea and further east to the mouth of the Lena.

The construction of fortress cities contributed to the consolidation of new lands behind Russia. A fortified fortress Tomsk has been built since 1604. The fortress of Krasnoyarsk was created in 1628 to repel the Kyrgyz invasions by the detachment of Andrei Dubensky. The city was well located between the possessions of the Kyrgyz and Buryat rulers and often endured heavy sieges in the future. The multiple heroic defense of Krasnoyarsk has now become almost unknown, even to its inhabitants.

The Cossack centurion Peter Beketov laid the Yakut fortress in 1632. Mikhail Stadukhin in 1644 went from here to the mouth of the Kolyma and founded the Nizhne-Kolymsk there. Okhotsk was founded in 1648; Anadyr—in 1649. The first overland roads run through new fortresses (Rasskazov 2008).

The city has become a completely new phenomenon in all North Asia. Local peoples knew only refuge fortresses that were not economic and spiritual centers before that. The pathfinders brought the new culture of the Russian people, higher forms of economy and production, and trade to the aborigines. The materials collected by the pathfinders served as the basis for the first descriptions and maps of Siberia. The book “The Great Drawing”, published in 1627, contains descriptions of roads, rivers, cities, and islands of Western Siberia. The Tobolsk war boss Peter Godunov published the “Drawing of All Siberia” in 1667, on the maps of which Yenisei, Lena, Pyasina, Olenek, and Baikal were depicted with great precision for that time.

Land settlement was carried out through the “sacralization” of the developed territories. The general rule of the Russians at that time was where is wintering, there is a cross or even a chapel; where the fortress is, there is the church; where the city, there is a monastery, except for the church. But forcibly converting conquered peoples to Christianity was forbidden: “by no means bring fear and cruelty”. However, several measures were developed to attract them to Orthodoxy through various material benefits.

5 Two Types of Colonizers

The whole campaign in Siberia was essentially not so much a hunting campaign for sables, as it is usually represented, but a continuation of the 400-year war with the Golden Horde. Precisely the 400-year-old, since considering the victory of the Russians only liberation from the tribute of the Golden Horde, is the same as celebrating the victory in the Great Patriotic War from the date of the expulsion of the fascists from the USSR and not from the capture of Berlin and Vienna.

The victory over the steppe nomads is one of the greatest pages of Russian history, and Siberia became the main field of this battle. With the experience taken from here, having protected itself from the East, the Russian state could turn to the South, to New Russia (Novorossia), the Caucasus, and Central Asia. This experience is of world historical importance, since it developed a special national policy of stable governance of polyethnic and multireligious Russia (Zuev 2017).

Though the colonial gains of the Russian Empire were a direct continuation of the national liberation war of the Russian people, it is noteworthy that not one of the ethnos was lost in this war. Even the zones of settlement of the Siberian peoples have not changed for centuries, despite the continued movement and migration of peoples, and devastating epidemics on the territory of North Asia.

The number of the Siberian population is well known, since it was tiled with yasak (tribute) and copied to the scribes. They were studied by historians Dolgikh (1960), and Nikitin (1999). Based on this data, Table 1 was compiled.

The table shows that by the end of XVII–beginning of XVIII century 320–360 thousand indigenous people lived in North Asia. In 2002 there were 1,170 thousand people. This numerical growth was possible only with a decisive predominance of a positive beginning in contacts with Russian immigrants over a negative.

6 Two Types of Frontier

In 1600, the northern part of the Northern Hemisphere was known within the following boundaries: in the west in America—almost only one Atlantic coast was discovered (up to about 75°W.); in the east—the line of the rivers Taza and Ob (approximately 85°E). After 100 years, in 1700, the Europeans in America crossed the Appalachians, reached the Great Lakes and moved about 20 degrees' longitude, i.e., up to 95°W. Meanwhile, the Cossacks of Ivan Moskvitin as early as in 1639 went to the Sea of Okhotsk. Over the next 10 years, explorers go to the Pacific seas in several places.

The Anglo-Europeans took about 350 years to develop the territory of North America from the Atlantic to the Pacific Ocean. Russian Cossacks passed all of Siberia from the Urals to the Pacific Ocean in 60 years. In the whole world history, it is impossible to point out another similar example of the final conquest of such vast spaces with such a complex ethnic composition, in such a short period of time and

Table 1 Dynamics of the number of indigenous peoples of Northern Asia

Ethnic groups	Name in the pre-revolutionary Russian literature	Number to the end of XVII–beginning of XVIII century, thousand people	Number, thousand people according to the 2002 census
Siberian Tatars		15–20	9,6*
Khakas	Yenisei Kyrgyz, including Teleuts, Arins, Cats	17–19	75,6
Nenets	Samoyeds, Juraks	5–8	41,3
Khanty	Ostyaks	8–10	28,7
Shors	Kuznetsk Tatars	5–6	14
Mansi	Voguls	7–8	11,4
Selkups	Ostyak-Samoyeds	3	4,3
Kets	Inbaki, Yenisei-Ostyaks, Yeniseians	4	1,5
Tofalars	Karagasy	2	0,8
Nganasans	Samoyeds-Tavgians	15–20	0.8
Enets	Hantai Samoyeds	3	0,2
Buryats		40–50	445**
Yakuts		40	444
Evenks	Tungus	25–30	35,5***
Evens	Lamuts, Tungus		19,1
Yukagirs		5–6	1,5
Chukchi and Chuvans		2,5	16,8
Koryaks		7–13	8,7
Itelmens		13–15	3,2
Asian Eskimos		40–50	1,8
Aleuts from them in Russia		16	0,5
Dauri		100	0****
Indigenous peoples of Siberia and the Far East as a whole		322–359	1170

* According to the 2002 census, many of them identify themselves as Russians, 180–190 (estimated)
** About 70 thousand Buryats live in Mongolia and, partially, in China
*** The number is indicated without Evens. Another 38.7 thousand of Evenks and Orochon people live in the North-East of China (2000) and from 1 to several thousand in Mongolia
**** In 1656, the Dauri were resettled by the Manchus to the right bank of the Amur and now do not live in Russia. There are 100 thousand of Daurs in China

Fig. 4 Stages of expansion of the Russian State: dark green color—to the beginning of the XVI century; green color—to the beginning of the XVII century; light green—to the beginning of the XIX century (according to Historical and cultural atlas of Buryatia 2001, p. 159)

with such an insignificant number of people. Without a single leader and commander, without orders from a distant government, a handful of troops and groups subjugates and pacifies the militant fragments of Genghis—Han horde. For 60 years, Russian Cossacks occupied a territory that is almost 11 times larger than the whole Europe, or two Indies (Fig. 4).

On the border of Alaska and Canada, the Russian tribe meets with the Anglo-Saxon, who managed to the middle of the nineteenth century go through the entire American continent. Russian Cossacks went all over Siberia from the Urals to the Pacific in 60 years, while the English-Europeans took about 350 years to master the smaller territory of North America from the Atlantic to the Pacific. For 60 years, the Russian Cossacks occupied the territory, almost 11 times surpassing the whole of Europe. Even today, the contour of the Siberian Federal District, considerably trimmed from the former Siberia, can be freely covered over the whole of Western Europe or two India. Meanwhile, it is not even the largest district area in Russia (the second after the Far East).

7 Conclusion

Throughout world history, it is impossible to point out another similar example of the final conquest of such vast spaces with such a complex ethnic composition, in such a short period of time and with such an insignificant number of people. Without a single leader and chief, without orders from a distant government, a handful of troops and groups subjugates and pacifies the militant fragments of Genghis Khan's horde. Russians overcome Amur, enter Manchuria, reach the northern tip of Taimyr,

go through the strait between Asia and America, and enter the Kuril Islands. From the Kamchatka expeditions of Bering, Russians establish themselves on the Aleutian Islands and north-west of America, and Russia eventually becomes an oceanic power.

In the end, it was the Russians and the British who created the most grandiose Empires in the history of mankind, connected the divided continents and their parts by means of completely reliable ways of communication, introduced many new elements into the life of the indigenous peoples.

The study of Russian territorial expansion allows us to teach the history of Russia together with its geography in such physiographic countries as the Urals, Western Siberia, the mountains of Southern Siberia, and the Far East. Perhaps it would be more correct to combine the courses of history and geography in the framework of "country studies" and "local history". They may be preceded by some introductory courses like "General History" and "General Geography".

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Siberia Within the Russian Empire of the XVIII–Beginning of the XX Centuries

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Abstract In the period from XVIIIth till XXth century Russia had been strengthening its presence in Northern Europe, and in XVII–XIX centuries Russia even had been colonizing Northeast America shore. However, these territories were very remote, communications were weak, the population density was low, and indigenous peoples were hostile. So the decision was made to give up the American territories and accumulate powers for a denser population of Siberian regions. The agrarian

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V. N. Bocharnikov and A. N. Steblyanskaya (eds.), *Humans in the Siberian Landscapes*, Springer Geography, https://doi.org/10.1007/978-3-030-90061-8_6

settling to Siberia started in the second half of XVIIIth century and grew up in XIX–XX centuries. It was promoted by a row of measures taken by the Government: from easier land demarcation to a wide range of support measures for new coming peasants to settle on Siberian lands. Adaptation mechanisms to the new natural and social environment are shown in the example of Belorussian settlers. Siberia entered the Industrial Era. It influenced not only mining but also processing industries. If in the past economic development in Siberia relied on waterways, later the Transsiberian Railroad construction gave significant influence for Siberia economy. The creation and rise of the city of Novonikolayevsk (Novosibirsk) reflected new tendencies in Siberia's development. The region became an agrarian-industrial territory of Russia. From the very beginning of Russian settlement, Siberian aboriginal peoples were constant element of regional social, economic, and political processes. At the face of XXth century, aboriginal society was deformed, which resulted in the archaization of their society and world view. By the beginning of the XXth century, Siberia, having saved some specific cultural features, became engrained in Russia.

Keywords Peasant settlements · Russian America · Siberian peoples · Trans-Siberian railway

Glossary

Academic expeditions of the XVIII century	scientific expeditions on studying natural resources, geographic objects, plant and animal life as well as cultures of peoples of the Russian Empire.
The Altai and Nerchinsk mountain districts	special administrative-territorial regions of Siberia. Were under the jurisdiction of the Cabinet of His Imperial Majesty, had their own system of internal structure and management, different from the provincial. The main labor force was represented by craftsmen, assigned peasants and convicts. Academic expeditions of the XVIII century—scientific expeditions on studying natural resources, geographic objects, plant and animal life as well as cultures of peoples of the Russian Empire.
Anthropogenic transformation	is a natural landscape change resulted from human impact.
Dessiatin (arpent)	a land measure equivalent to 1.1 hectares; colonization—the development of uninhabited or sparsely-populated territories;

Land notification process	a set of activities carried out by surveyors to research and delimit special areas for resettled peasants.
Colony	a dependent territory under the authority of a foreign state (mother country), without independent political and economic power, managed on the basis of a special regime.
Novosibirsk	is a millionaire city located in the south of Western Siberia, being the center of Novosibirsk agglomeration and one of the largest trading, business, cultural, industrial, transportation and scientific center of Siberia.
Russian America	[at the end of the 18th–mid-19th centuries, the unofficial name of the colonies of the Russian Empire in Alaska, the Aleutian Islands, the Northwestern coast of North America to 54° 40′. n. l., as well as settlements in the Kuril and Commander Islands, in California (1812–41) and in the Hawaiian Islands (1816–17)].
Stages of industrial development of Siberia	(1) XVII—first quarter of the XVIII century—the beginning of early capitalist entrepreneurship on a very modest scale; (2) the second quarter of the XVIII century—first quarter of the XIX century—growth, and then the domination of the feudal manufactory of the Treasury, Cabinet, nobility; (3) the second quarter of the XIX century—1861—the crisis of feudal industry, the growth and victory of private capitalist entrepreneurship in transport and gold mining, the beginning of the industrial revolution in water transport; (4) 1861–1890s—the collapse of feudal entrepreneurship, the domination of capitalist manufacture in industry, the beginning of the industrial revolution, the beginning of the construction of the railways; (5) 1890s–1930s—industrial revolution in all sectors of the economy, the beginning of the industrialization of Siberia.
The Trans-Siberian Railway (TransSib, The Great Siberian Railway)	is a network of railway roads of 9288.2 km length that runs through all the territory of Eurasia and connects Moscow with the major industrial cities of the Russian Far East and Eastern Siberia.
Evolutionism	research area in ethnic studies formed in the second half of the XIX century that outlined

	the concept of mankind evolution as a progressive process. The problem of regress or dead end development within the framework of this research area was not questioned.
Yasak policy	the policy of Muskovy and then of the Russian Empire toward inclusion of Siberian natives in socio-economic structure through payment of a special kind of tribute in the form of furs and arrangement of social stratum affiliation first as "yasak-payers", then as "inorodtsy".

1 Features of the Development of the North-West of America by the Russian Empire

The news about the valuable furs of the sea animal, brought by survivors of the shipwreck members of the Vitus Bering's expedition, was the impetus for the next movement phase of the Russian adventurers to the East. However, from the very beginning the difference in the development of the mainland and overseas territories was noticeable. If during the development of the expanses of Siberia, the state, perceiving the achievements of the explorers as an adnation of resource colony, was slowly "lagging behind" (Yakovlev 1916), setting up ostrogs (burgs), sending garrisons, and establishing tight centralized control. Then the expeditions to the Pacific were organized by the government. These fundamental differences are noted in the works by the American professor Dmytryshyn (1988). The Russian frontier's movement to the expanses of the Pacific Ocean has significantly changed the usual pattern of movement. The expeditions proved to be too expensive for the Russian government; as a result, it transferred the initiative to merchants and entrepreneurs, reserving only general regulation of the developing process of the Pacific region by the norms of public law (state and administrative law) (Ermolaev and Saveliev 2016). According to R. V. Makarova, in the second half of the 18 century, 101 expeditions were in operation in the Pacific (Makarova 1968). It was the time of the Aleutian Islands' Russian conquest and the establishment of permanent Russian posts in Alaska. The Russian government, supporting all the steps of entrepreneurs, placed state peasants from the Northern regions of European Russia, to demonstrate the Russian presence in this zone. However, the assigned amount was too small, and the area was too large and too inhospitable to allow new settlers to act as both industrialists and defenders for private national interests. In 1799, the RAK was created—the only monopoly company supported and controlled by the government, which existed until 1867.

However, the change of fur-bearing animals—from sable and squirrel to the seals and sea lions also meant a change of housing—from the mainland to the seaside,

and the market—from European to Chinese. If on the territory of Siberia manufacturers could hunt as well as the Buryats, the Yakuts, the Koryaks, and other indigenous peoples, then sea fur hunting was an entirely different matter. The Russians became utterly dependent on the local population. Therefore, the Aleuts aged 15–50 had to work for them (Gibson 1976). This entailed the ever-increasing exploitation of the Aleuts sea-hunters, more complex and expensive equipment, and more complex trading conditions. The most acute and vital was the problem of providing a colony, and, above all, with food. Despite numerous attempts at planting gardens and vegetables, breeding livestock and poultry, they all failed. Cattle breeding was so unproductive that the settlers were forced to buy wild sheep, hens, ducks, geese, and halibuts from the Tlingit on the market at continually increasing prices. This reliance on disloyal Aboriginal people reflected the unproductive state of agriculture in Alaska and the unreliability of the colonial supply. Therefore, the local population was used to pick berries and other wild plants that replaced fruit and vegetables for the settlers. In turn, the Tlingit repeatedly attacked Russian settlements (1802, 1805, 1866), causing severe damage and killing their inhabitants. Moreover, the annual spring course of herring gathered thousands of Tlingit at the walls of Sitka (Novo-Arkhangelsk), which was becoming a constant threat to its inhabitants, the Russians always felt in danger and did not risk to leave the fort more than 50 steps away (Gibson 1979).

However, most of all the Russians were dependent on the local population in labor and gender matters. Diseases, epidemics, and the difficult climate for living and drunkenness dramatically reduced the number of settlers. The company had no choice but to hire workers from the local population; they became seamen, lumberjacks, stevedores, and fishers. The number of Russian women was eight times less than men, in search of a full life, Russian men were turning to local women, and children born from Russian fathers—Creoles, became the central employees of the RAK. (Gibson). By 1843, the number of Creoles exceeded the number of Russians by half. Thus, the dependence on the local population was one of the most critical factors determining the subsequent sale of Russian America.

Besides, Russia moved from the powerful vacuum of Siberia to the field of the international rivalry of the North Pacific, which faced the imperial interests of Russia, Spain, Great Britain, and America, the rivalry over territory and resources, especially on the North-West coast, where a military conflict could always break out. In Russia, there was also a small but influential group, headed by Emperor Alexander II, Konstantin' brother, who wanted to save Russia from this financial and political responsibility. Moreover, finally, there were several powerful dreamers in the United States, headed by Secretary of State William Seward, who saw great value in the annexation of the Russian colonies by the United States.

2 The Content and Results of the State Policy of Agrarian Colonization of Siberia in 1861—Early XX Centuries

The post-reform period and the beginning of the XX century became a time of intensive peasant colonization of Western Siberia. After the agrarian reform of 1861 peasant migrations was increased, which in the 1861–1880 were mostly uncontrollable and unauthorized. Since the 1890s the state began to use peasant resettlement to solve its own tasks: the development of Siberia's unused lands, the reduction of agrarian crowdedness in the high populated provinces of European Russia, and the strengthening of Russia's positions in the Asian region. To implement these tasks, in 1889 and in 1904, some laws were published to provide several benefits to the peasant resettlers (in the first few years they were entirely exempt from taxes, in the next few years they paid half taxes). A set of state measures to provide other types of assistance to new resettlers was developed and implemented.

Since 1893 the state had expanded the work on the procurement of resettlement lands. Several special detachments had been formed for this purpose. The allocations for the study of new lands for the colonization increased: in 1906–1914 a significant work was done on the scientific study of the colonization capacities of Siberia. Every year the Resettlement Department organized scientific and reconnaissance expeditions with the participation of leading soil scientists of Russia and representatives of academic science (Glinka 1912), which made it possible to expand land notification process in previously unknown areas. Road, ameliorative, and hydrotechnical works were started in resettlement areas for the interests of colonization. Thus, during 1906–1915 in Asian Russia on resettlement lands 12,449 wells and 153 reservoirs and dams were built by water engineers, as a result of road works 17,075 versts of roads were built to service the resettlement fund of 713,409 per capita proportions (Materials 1918, pp. 32–33).

A network of medical and food supply settlements was created. This allowed supplying people with food and providing them with medical assistance on their way to Siberia. Agricultural warehouses arose to supply the resettlers with inventory, the size of loans for new resettlers increased, and the assistance in building churches and schools in resettlement villages was organized.

The practical result of the government resettlement policy was the economic development of Siberia. In 1896–1914 more than 3.6 million people had settled in Siberia (Turchaninov 1910, pp.62–63; Turchaninov and Domrachev 1916, pp.72–81). Besides, the materials of personal interviews of resettlers showed that the absolute majority of new settlers believed that they had settled better in Siberia than in the province of origin. According to the results of personal interviews, the absolute majority of resettlers (63%), showed that they lived better in Siberia than in the province of origin. Even among the new settlers without sowing land, an absolute majority (54.3%) stated that their life after resettlement had improved (Nagnibeda 1913, p. 135). The data of this survey testified the general improvement of the economic life of the new settlers, and the success of their social, cultural, and psychological adaptation in Siberia. During the years of the Stolypin resettlements

new settlers had reclaimed 16.5 million dessiatines of new land, including about 8 million plowed up (Goryushkin 1976, p. 136). The resource potential of Siberia was involved in the economics of the country. Siberia began to turn into one of the prominent grain providing regions of the country. By 1914 the lands reclaimed by the new settlers produced about 100 million pounds of bread, of which about 50 million pounds were marketable grain (Sklyarov 1962, p. 493).

The intensity of the development of agriculture in Siberia is evidenced by the fact that by 1913 the population of Siberia and the Steppe Territory was 8.9% of the total population of the country (Rashin 1956, pp. 26–27). However, the ratio of Siberia in the all-Russian grain harvest in the pre-revolutionary period was 17%. Siberia became a dynamically developing agricultural region, and the growth reserves were far from exhausted: in 1917 the grain harvest there reached 600 million pounds, and in the 1920s, according to forecasts of the Resettlement Department, it should had increased to 1 billion pounds (Alekseev et al. 2004, p. 495).

During the process of agrarian colonization Siberia from a backward outskirts turned into a source of food for central Russia regions that suffered from crop failures. The colonization of Siberia played a vital role in military-strategic and geopolitical terms. On the eve of the era of wars and revolutions, Asian Russia had become one of the most economically crucial regions of the country.

The government policy of agrarian-peasant resettlement had covered almost half a century of evolution. During that period the state was able to organize the resettlement of several million peasants beyond the Urals. State-sponsored assistance had contributed to their success in new places. That contributed to the general economic upsurge of Siberia and the strengthening of Russian statehood on the country's eastern outskirts.

3 Belarusians in Sociocultural Space of Siberia and the Russian Far East

The first people from the territory of modern Belarus took part in the early stages of the settling of Siberia by East Slavs from the end of 16th century. As a rule, they were different serving people, industrialists, and exiled. Up to the 18th century they were called in Siberia as "Litva/Litvin" and "Poles" (identifying with the population of Grand Duchy of Lithuania and the Polish-Lithuanian Commonwealth). After the inclusion of the territory of Belarus to the Russian state at the end of the 18th century, migration from it to Siberia became internal. The most intensive peasant resettlements of Belarusians to Siberia and the Russian Far East took place in the second half of 19th—the beginnings of the 20th centuries. During this period among the Belarusian migrants dominated a regional identity according to which they called themselves as "Mogilev", "Vitebsk", "Grodno", etc. In Siberia Belarusians were also called by "samokhody" (self-movers) as well as "katsapy", "hohly", "bulbashi" (from the Belarusian word "bulba"—potato), etc.

Peasant migrations of Belarusians to Western Siberia have begun from the middle of the 19th century after P. D. Kiselyov's agrarian reform. Eastern Siberia and the Russian Far East become populated by Belarusians later—mainly at the beginning of the 20th century. Unlike Siberia which East Slavic population was divided into *Starozhily* (Old Settlers) and *Pereselency* (Migrants) the Far East area was settled by the peasants who were in similar social and economic conditions. This situation has affected to the faster interethnic integration of the Belarusians living there with people from the neighboring provinces of Russia and Ukraine.

The national identity of the Belarusian migrants began formed in the 1920th due to the indigenization policy in the USSR. By results of the (All-Union population census of 1926), 320320 Belarusians (4.24% of all population) lived in Siberia. The rural population has absolute majority of them and was 311329 people. 41124 Belarusians (3.15% of the population) lived in the Russian Far East. Its rural population was 36 186 people (All-Union Population Census of 1926). Now most of all Belarusians live in the Tyumen region (36000 people), Khanty-Mansi Autonomous Okrug (20500 people), Krasnoyarsk Krai (18200 people), the Irkutsk region (14000 people), and Primorsky Krai (11000 people).

In Siberia and in the Far East there were several types of settlement of Belarusian peasant-migrants. In the second half of the 19th century they were often settled to existing villages of the Russian old settlers named *Cheldony*. Also there were monoethnic settlements which have been initially founded by migrants. At the time of agrarian reform of P. A. Stolypin one resettlement site was quite often settled by people from different regions, forming multiethnic community. At that time Belarusians also founded *khutors* (farms). Now Belarusians, as a rule, live particulate in multiethnic environment in which dominates Russian culture.

The traditional culture of the Belarusian peasants-migrants had a common typological basis for all East Slavs. At the same time, it had some features. Most of Belarusian peasants belonged to Orthodox Christians, but among them also have been Catholics and Uniats. The first generation of migrants talked in Belarusian language, however soon more and more words from Russian began to get into it that led to wide use in rural areas of a specific dialect—"trasyanka". Now most of Belarusians of Siberia and the Far East consider the Russian language as native. The major economic activities for Belarusians peasants have been agriculture and livestock breeding. Belarusians grew up grain, vegetable, and commercial crops. Potatoes and flax were the most widespread among them. Belarusians bred large and small cattle, horses, pigs, geese, ducks, hens, etc. The favorite meat of Belarusians was pork. An important role in the economic activity of migrants have also played hunting, fishery, beekeeping, collecting, and various crafts (processing of wood, leather and fur, spinning and weaving, blacksmithing, etc.).

The Belarusian migrants introduced to the territory of Siberia and the Far East a number of features of traditional dwelling. Belarusians used to build wooden houses with Russian stove. They might have one room (*khata*), two rooms (*pyatistenok* or *dom na svyazi*), and four rooms (*krestovoy dom*). Belarusians preferred to build a house along the street by its wide side (Lokotko 1991, p. 115).

Originally Belarusians preferred marriage with fellow countryman. Since the first third of the 20th century the number of marriages with people of different nationality steadily grew. Family ceremonies of Belarusians just a little differed from Russians. In a maternity and baptismal cycle, it should be noted prevalence *hrestinnye* (christening) songs. In the Belarusian wedding ceremonialism we can find elements of South Russian and Ukrainian traditions as well as some authentic Belarusian ceremonial and folklore features.

A distinctive feature of the funeral ceremonialism of the Belarusian migrants was the remembrance days *Dedy* (Grandfathers). Belarusian people believed that it *Dedy* died relatives visit their houses at night. In different regions of Belarus *Dedy* could be dated for such holidays as Christmas, *Maslenitsa*, *Troica* (Trinity), and *Nikola* (St. Nicholas day). In Siberia the Autumn *Dedy* dated for St. Demetrius Saturday (Fedorov et al. 2015) and also—by Easter and Christmas the best of all remained. Many calendar fests of Belarusians in Siberia and in the Far East throughout a long time kept names and features which have been introduced from places of an exit. The Christmas cycle was often called *Kalyady*. The important place was taken by such fests as *Gramnitsy* (Candlemas), *Gukannie Veasny* (Calling of the Spring), Easter, Trinity, *Kupala Night*, *Pokrov*, St. Nicholas day, etc. (Fursova 2011).

To the middle of the 20th century division of the East Slavic population of Siberia and the Far East into local, social, confessional, and other groups was almost lost (Zhigunova 2015, p. 138). Due to proximity to the Russian culture Belarusians quickly undergo the assimilation. Today descendants of Belarusian migrants often define themselves as "I have Belarusian roots, but I identify myself as a Russian". Many of our respondents in 2000–2018 do not see any general difference between Russians and Belarusians (Zhigunova 2016, pp. 66–67).

Migrations from Belarus to Siberia and to the Russian Far East actively continued in the 20th century and during the Post-Soviet period. Belarusians organically fitted into society of Asian Russia and found here their new homeland. During process of accommodation, the local differences in culture of Belarusians were gradually erased. Today some features of traditional culture of Belarusians keep its authentic existing in a fragmentary way. Belarusian traditions have also become the part of the common cultural heritage of the peoples of Siberia and the Russian Far East (Bagashev and Fedorov 2012).

4 Industrial Aspect of the Colonization of Siberia and the Far East

The industrial development of Siberia went through several stages. During the XIX–XX centuries Siberia was experiencing a transition from an agrarian society to an industrial one. The process of industrial revolution in Siberia in the 1860–1890s was just beginning. Water transport became the first branch of the regional economy where a technical revolution took place. Manufacturing industries were inferior to mining

ones in terms of production and the number of workers employed. Facilities for the processing of agricultural products were predominant. Difficult productions—match, glass, weaving, porcelain, paper, metal—were represented by individual institutions due to the lack of equipment, lack of raw materials, qualified personnel, and narrow market. Unsustainable, due to the narrowness of the sales markets and raw materials, the constant shortage of working capital, enterprises were built complex for a more rational use of raw materials and capital maneuvering. The mining of precious metals was the most significant of the extractive industries. Siberia gave almost all silver and more than a half of all gold of the Empire.

The industry was located unevenly: the main areas of the mining industry were located in Eastern Siberia, the majority of manufacturing enterprises—in Western Siberia.

A new stage in the industrial development of Siberia began in 1880–1890s with the construction of railways. At the expense of the treasury in 1883–1885 the Ekaterinburg-Tyumen railway was built, which connected the Ob-Irtysh basin with the Volga-Kama one. The construction of the Trans-Siberian Railway was the biggest event of the industrial revolution in Siberia and one of the most ambitious events in the industrialization of the world economy. For 14 years (1891–1904), 8180 versts of the main railway were built. Siberian, Trans-Baikal, Chinese Eastern, South China, Ussurian, Amur, and Omsk railways in 1913 made up 10.6 thousand miles. The Siberian economy began to quickly come up to the all-Russian level. By 1908, 252 factories (55.5% of all enterprises) yielded 57.7 million rubles of products (90%), involved 14,376 workers (78.2%) in the census industry (Zinoviev 2007).

The coal industry grew, gaining a constant and rapidly growing market of railways and shipping companies. The steam navigation contributed to the development of commercial fish production in the lower reaches of the rivers—Ob, Yenisei, Lena, in the Far East and Baikal Lake. The coast of the Far East became the largest center of commercial fishing industry.

Since the end of the XIX century in Siberia the tendency of concentration of economic activity in cities, that is indicative for the period of the industrial revolution, began to appear more and more. By 1907–1908, Tomsk (2.9 thousand workers), Omsk (3.8 thousand), Krasnoyarsk (3.3 thousand), Tyumen (3.2 thousand), Irkutsk (1.2 thousand), Chita (2 thousand), and Vladivostok (10 thousand) became large industrial and transport hubs. They were also trade, communication, and vocational training centers. At the turn of the XIX–XX centuries there were all signs of the industrial revolution, which basically ended in the industrial sphere in the 1930s after the mechanization of the mining industry.

At the beginning of the XX century some structural changes in the industry of North Asia took place. Previously dominated mining industries had yielded the position to the manufacturing ones.

The railway network had increased due to roads stretching to the south of Siberia, in grain and mountain areas. The Altai, Kulundinsk, Tyumen-Omsk, and Kolchuginsk railways were built; the Achinsk-Minusinsk railway was under construction. Water transport was significantly inferior to the railway in terms of freight turnover (155

million pounds in 1911). However, it played an important local role, linking the northern and southern districts of the region between themselves and with the railway.

Among the extractive fields, the role of fisheries, especially in the Far East, had increased, whereas the importance of the fur trade had decreased due to the extermination of the most valuable animals—sable, beaver, sea otters, ermine, otter, marten, fox, and arctic fox. Fur farms became the main competitor of hunters on the world market. North Asia had a high degree of concentration of capital and production, which made the economy manageable for the interests of the state and big business. The Trans-Siberian Railway was state-owned, the transportation along the rivers of Western Siberia was monopolized by the "West Siberian Shipping and Trade Association" (Tovarpar), along the Yenisey—by the "Public Company of shipping along the Yenisey River"; on Baikal—by the "Baikal Partnership of Shipping and Trade", along Lena—by the "The East Siberian Company of Shipping, Commerce and Industry', on the Amur—by the steamboat syndicate. They dictated tariffs and freight.

Two agricultural monopolies had grown in Siberia. The Union of Siberian Butter Production Artels united 1,410 cooperative buttermaking plants, 1,167 shops, 26 offices, including in London, Moscow, and Vladivostok. The Union competed with foreign purchasing and sales corporations. Half of Siberia commodity turnover in rural areas was controlled by the Union of Consumer Cooperatives of Siberia—Zakupsbyt. The gold mining industry had four owners: the Lena Gold Mining Partnership (Lenzoto), the Russian Gold Mining Company (Zolotoross), the Fedorov Society, and the Cabinet had 27% of the mines, 46% of workers, and 80% of the production in 1916. In coal mining 7 enterprises produced 2/3 of Siberian mining.

Trans-Ural enterprises were closely associated with all-Russian monopoly associations under the patronage of the International, Russian-Asian, Siberian Trade, and Gold-Mining banks.

At the beginning of the twentieth century Siberia and the Far East with 8% of the total population of the Empire yielded 16% of the gross grain harvest, about 2% of the cost of industrial production, including 15% of the value of mining products. Siberia and the Far East accounted for 11.4% of the length of railways, 10.8% of the number of steamboats, 6.1% of the number of trade establishments, and 4% of hired workers in Russia. Siberia and the Far East with a population of 13 million people accounted for about 300 thousand industrial workers (mining, factory, and transport) or 2.3% of the population. Cities of Siberia and the Far East accounted 11.9% of the population. This is a characteristic of the colonized, run for the development peripheral region (Zinoviev 2007).

Siberia and the Far East served as a source of raw materials and a resource for solving the strategic tasks of the Empire; they experienced a shortage of capital and personnel. In foreign relations its geopolitical position was used for military and economic advancement to Central Asia; in trade with China and Mongolia Siberia was just a mediator.

5 Conditions for City Formation and Features of Anthropogenic Landscape Change in Novosibirsk

During the first half of the eighteenth century a few villages located mainly on the left bank of the Ob river were built on the territory of a modern Novosibirsk city (Novonikolaevsk before 1926). The early settlement Krivoschyokovo (Krivoschyokovskoe) was first mentioned in 1707 in the case of "the secret deal" made by Tomsk people at "Teleutskaya boundary" (Umanskiy 1994). The peculiar landforms and natural landscapes were important prerequisites for city life primarily on the left river bank. The left bank is relatively flat, whereas the right bank, being a part of the fringe area of the Salair Ridge, is broken-up by numerous ravines. The location of Novosibirsk at the boundary of two nature zones—forest steppe and steppe makes it unique in terms of landscape. Forest steppe ecosystems of the left bank allowed clearing the land for farming and haymaking. On the right bank, opposite Krivoschyokovo there was a dense pine forest with deep valleys of the small rivers, Kamenka, and two El'tsovka rivers. Moreover, not far from the left bank settlements in the first half of the eighteenth century there was the Moscow-Siberian Road that crossed the Ob river at Chausskiy Ostrog and ran to Tomsk. The road to Barnaul that ran along the left bank of the Ob river started from that main thoroughfare at Chausskiy Ostrog.

Local peasants were engaged in agricultural and pastoral activities and worked as carriers in winter (Pallas 1786). The Ob river was a fishing and shipping area. The livestock route led across Krivoschyokovo to ferry the cattle from the steppe fairs at Semipalatinsk to Eastern Siberia (Kann 2010). By 1877 opposite Krivoschyokovo on the right bank in the pine forest not far from the estuary of the small Kamenka river a new permanent settlement, Krivoschyokovskiy vyselok (a new village separated from the bigger settlement) with its first thirty inhabitants was built. The lands of Priobskoy pine forest were intensively developed when during the laying of the Trans-Siberian Railway in 1893 the building of the first railway bridge across the Ob river was started in the most convenient locality with the rock outcrops on both banks at the site of Krivoschyokovskaya crossing-place. At the same time not far from Krivoschyokovskiy vyselok the buildings of the future railway station Ob and the settlement of bridge-builders were constructed to merge into Novonikolaevskiy settlement that acquired the status of a town becoming a non-administrative center of Tomsk province in 1903. The irreplaceable significance of the transport junction situated at the cross-roads of the railway, waterways, and land routes (Ogly 1991) contributed to an increasing growth of the settlement.

Industrial enterprises started replacing the felled forests. By 1897 there were steam locomotive and light maintenance depots, sawmills, a butter-making plant, flour mills, and a printing house in the settlement. By 1912 a number of such large-scale enterprises as a power station, a slaughterhouse, a meat-processing plant, an iron foundry, a rusk making plant, a butter-making plant, breweries, brick factories, tanneries, saddle factories, confectionaries, and bakeries were built and operated

there. The population growth was estimated at 99.2% from 1723 to 1893 and 352.6% from 1893 to 1926 (Golodyaev 2017).

Besides felling the pine forest, the ecosystems of the small rivers initially and mostly used for fishing, providing water, and recreation were damaged. There were clay mines, stone quarries, and water mills along the banks of the Kamenka river that ran its way through the town center (by 1900 there were about thirty stone quarries and dozens of water mills on the flood plain of the river). Early settlers made dugouts in the steep river valley, destroyed the coastal forest areas, and used the river water for household needs and laundry.

In 1915 the Altay Railway connected the city with Biysk and Semipalatinsk and in 1934 with Kuzbass, which turned Novonikolaevsk-Novosibirsk into a major industrial, trading, and transportation hub and, therefore, created the potential for strengthening its role as a center of economic gravity of Siberia. During the Second World War of 1941–1945 thirty-four defense production plants, four research institutions, and some other enterprises were evacuated in Novosibirsk oblast. Subsequently, in the Soviet period a number of industrial facilities increased with many of them having no clearing constructions and, consequently, making a negative impact on the environment (Emelyanova and Goroshko 2020).

In 1950 there was started building Novosibirsk Hydroelectric Power Station, which resulted in flooding the territory of 1082 km^2 when Novosibirsk Reservoir (the Ob Sea) was created. The decision to found Akademgorodok in the forest area nearby was made in 1957.

Taking the third place by the number of population in the country (after Moscow and Saint-Petersburg), Novosibirsk occupies only the thirteenth place in terms of surface area, having an extremely high population density—over three thousand people per km^2.

Generally speaking, the city identity and its individual architectural features were searched for at the very early drafting stage of the master plan, taking into account the natural landscape, natural and climatic and historical conditions. Moreover, the Ob river initially played a dominant role in the city plan. Even though, the city experienced the negative impact from over a dozen of urban development patterns, master plans, and their numerous adjustments with landscaping development being considered under the prevailing city-forming ideas and concepts (garden city, nature, and landscape—based city, water, and greenland—framed city, environmentally infrastructured city) (Artamonova and Lyutykh 2009), the combination of natural, and man-made objects on its territory is far from being optimal. A number of natural sites have been still under enormous pressure from the man-made environments: housing, architectural deformation, and pollution.

6 Transformation of Husbandry and Mentality of the Peoples of Siberia in the Context of Russian Colonization (XVIII—Beginning of the XX Centuries)

By the time the Russians came to Siberia, Siberian natives had reclaimed all of its biomes—from tundra and taiga to prairies and mountain taiga regions. They developed such a mixed farming that enabled them to restructure the economy depending on climate change, availability of food reserve for deer and different kinds of livestock, amount of yield of fisheries and quantity of gross animals from meat hunting.

However, both Russian industrialists and governmental authorities were interested in Siberia because of its fur-bearing animals—furs—that were the major source of Moscow export. As a result of transfer of the major part of Siberian population to the social category of yasak-payers, and from the beginning of XIX century to "inorodtsy", furs became their main tribute and fur trapping involved all the manhood aging 16–60. Shops were established to support indigenous husbandry where people could exchange furs for the things necessary for households after the government yasak had been paid. The result of such policy was curtailment of all industries of indigenous husbandry from pottery and weaving to metallurgy. It was increasingly focusing on fur trapping ceasing to be integrated. As a result, it was growing more and more dependent on natural environment, amount of existing fur resources. Consequently, unsuccessful hunting, forest fires led to both inabilities to pay yasak in full and to purchasing necessary things in shops or from Russian merchants. Indigenous husbandry was growing more and more unstable, dependent, it was slowly decaying (Sherstova 2005).

At the same time the process of archaization of both household and social organization was going. State institutions of the peoples of Siberia at the end of XVI—first half of XVII century—Pelym, Koda, Konda principalities of the Khanate of Sibir, principalities of the Yenisei Kirghiz were gradually substituted by archaic institutions that formally resembled tribal institutions. As a result of collective responsibility for paying yasak, a collective ancestral property on fur hunting acreages firstly revived. From the middle of the XIX century when the value of pine nut increased on the Russian market, ancestral property spread on dwarf pine (Potapov 1936). Economic and social degradation of Siberian communities reflected in their folklore that inevitably contained the topic "about hunger".

Under these circumstances by the beginning of the XX century indigenous society had acquired such external features that enabled researchers to compare it to the early stages of human development. From the perspective of evolutionism or formation theory with their unconditional principle of progress it was impossible to explain "the secondary wave of primitive state". Impoverishment and degradation of indigenous societies resulted in changing their attitude toward nature, it acquired predatory features, some restrictions on hunting during certain time of the year or on some species of animals were broken and this meant a deep crisis of traditional mentality in the first place.

Different forms of religion from universal animism to quite difficult syncretic systems set in shamanistic form had existed among Siberian population before Russian penetration. Besides, natural objects—mountains, rivers, and lakes were the bearers of historical information conveyed in legends and lore about past events and ancestors' doings, which was the base of conventional wisdom and reproduced the continuity of generations. Documents of the XVII century reflect complete indifference of Russians to the traditional world view of indigenous peoples. Moreover, an oath of fidelity to Moscow was sworn under traditional views of the peoples of Siberia. All the efforts of Cyprian, the first bishop of Siberia, to oppose Orthodox Christians to pagans and "unorthodox" (Moslems) did not have any effects either among Russians or indigenous peoples (Dyomin 1995). Adoption of Christianity was individual and voluntary and applied to indigenous elite which was recruited to the service class of Russians in Siberia. Mass christening spread on indigenous women thus the problem of lack of Russian women during the XVII century was being solved (Bakhrushin 1959). Descendants from such marriages did not form a separate social stratum because they referred to the stratum of Russian fathers by default. The government did not strive to increase the number of Orthodox Christians in Siberia for one more reason—it would have affected the volume of yasak obtained and led to social strain. In the XVII century both the government and the church were concerned with keeping peace in newly acquired lands. That is why they did not accelerate Christianization of indigenous peoples. "Europeanization" of Siberia was marked by the decree of Peter I of 18 June 1700 and by designation of Philophey Leschinskiy as the Metropolitan of Tobolsk. This meant fundamental change in the confessional policy toward Siberian natives. At that point colonization of Siberia combined with mass Christianization of its population. Along with the new head of Siberian diocese, priests from Kiev metropolis who had experienced religious disputes with Uniates and Catholics appeared there. They brought with them the spirit of religious intolerance that had been absolutely alien to Siberia until then. Technically, by the middle of the XVIII century the major part of Siberian natives had adopted Orthodox Christianity that acquired the form of orthodox-pagan syncretism. Forced christening not only caused high psychological stress but also destroyed the entire system of the traditional world view that had been time-honored by generations. That made it difficult to orient in the existing world, socio-economic, and political relations. A mindset about weakness of own gods and spirits unable to confront Christian saints was being formed. It caused social and psychological discomfort, the feeling of self-inferiority and conditioned alienation and distrust to Russians (Sherstova 2017). However, Russians, first missionaries and priests, then the participants of Academic expeditions of the XVIII century as well as government officials of the XIX—beginning of XX centuries became convinced of their dominance, of some Kultur trager mission toward "ignorant pagans", and that assurance was growing stronger with the spread of European education. It is telling that neither yasak policy nor mass Christianization aimed at destroying indigenous society. However, their results by the beginning of the XX century turned out to be tragic for natives.

7 Conclusion

The interest of the Russian state in Siberia and the Far East' lands was based on the wealth of natural resources, the collection of yasak, and the annexation of new territories. Industrialists came to replace the explorers, scientific and reconnaissance expeditions were organized, and fortified defensive lines were created. As a result of the transfer of the significant part of the Siberian population to the social category of yasak-payers, and from the beginning of XIX century to "inorodtsy", the fur trade became the main one. Forced migration has replaced the "ripple" (illegal) migration of peasants. Subsequently, state-sponsored assistance to the resettling millions of peasants beyond the Urals contributed to Siberia's general economic recovery and the strengthening of Russian statehood on the eastern outskirts of the country. Siberia has become a dynamically developing agricultural region, and a place for the extraction of precious metals, coal, and commercial fishing. Water transport gave way to rail transport. The construction of the Trans-Siberian Railway was the biggest event of the industrial revolution in Siberia and one of the most ambitious events in the industrialization of the world economy, which served as the basis for the formation of new settlements. Novonikolaevsk (Novosibirsk) is a striking example of the lightning-fast formation of a city on the site of a mighty pine forest at the intersection of the Trans-Siberian Railway and the Ob River. The colonization of Siberia played an essential role concerning raw materials extraction, military strategies in the geopolitical terms. Industrial growth had a negative impact on the wealth of resources and increased the anthropogenic pressure to the natural Siberia regions.

Acknowledgements The Study Section 3 is supported by the State task (project Nr. № AAAA-A17-117,050,400,150–2) and RFBR (grant Nr. 18–09-00,028).

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The Cossacks' Role in the Russian Development of the Altai in the 18th–Early 20th Centuries

Alexander N. Dunets, Victor V. Isaev, and Denis A. Dirin

Abstract The chapter is devoted to the peculiarities of the Altai region' development by Cossacks in the 18th–early 20th centuries. Cossacks formed the skeleton of the Altai Russian settlement, laid the foundations for the further advancement of the Russians deep into this territory and reserving it for the Russian Empire. The Cossack population of the Altai, settling in the new territories, actively interacted with the local Altai peoples and the Kazakhs and was also an essential agency in Russia's relations with state entities. The chapter reveals the features of the appearance of the first defensive settlements and fortresses. Cossacks carried out the defense of the local Altai population and Russian immigrants from the raids of the Dzungars and Kazakhs, which contributed to the stability in this territory. This made it possible to build copper plants and carry out further resettlement of Russian peasants to the Altai. Attention is paid to the duties of Cossacks as a military estate, their living conditions. The changes occurring within Kolyvan-Kuznetsk defensive line, which consisted of Cossack settlements, are revealed. The Cossacks' economy structure is characterized, and distinctions from a peasant economy are revealed. Attention is paid to the way Cossacks used the land and were engaged in livestock breeding.

Keywords Russian development of the Altai · Cossacks · Altai region' population · Economy · Interstate interaction · Kolyvan-Kuznetsk fortified line

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V. N. Bocharnikov and A. N. Steblyanskaya (eds.), *Humans in the Siberian Landscapes*, Springer Geography, https://doi.org/10.1007/978-3-030-90061-8_7

1 Altai Before the Beginning of the Russian Colonization

The Altai has an extremely ancient history of exploration. Due to its geographical location and natural features, it has become one of the ethno-confessional centers and a kind of civilizational pot of Inner Asia (Glebova et al. 2013).

By the middle of the 17th century, the Altai ethnos was finally composed, and it included several tribal groups with their area of residence which formed a peculiar ethno-cultural landscape in the process of utilitarian and semantic development of the environment.

These ethnic communities, according to the geographical habitat features and the nature management specialization related to it, language specific character and some anthropological features, were combined by the Soviet ethnographers into two ethnographic groups: Northern Altaians and Southern Altaians (Potapov 1969).

The Northern Altaians (in the pre-revolutionary literature they are called the Taiga Tatars), which include the Kumandins, Tubalars, and Chelkans, were formed due to the interaction of the ancient Samoyed, Ket, Ugrian, and Turkic tribes. Due to this, they are dominated by the Ural anthropological type. They speak the North Altai language, which belongs to the Uyghur group of Turkic languages (Kumandin and Chelkan dialects are distinguished) (Khar'kov et al. 2007; Potapov 1969).

The traditional habitat of the Northern Altaians includes the taiga lowlands of the Northeast Altai, along the valleys of major rivers and lakes. The Kumandins lived in the middle reaches of the Biya River, the Chelkans lived in the Lebed River basin, and the Tubalars lived on the northeast coast of Lake Teletskoye and on the left bank of the upper reaches of the Biya. Their habitat was consistent with the traditional specialization of the economy—hunting, fishing, wild harvesting, and, only partly, farming (mainly barley and later rye sowing) and livestock breeding (horse breeding, cattle breeding) as auxiliary industries. The culture of the taiga artisans was most prevalent there. It is the need for an extended stay in taiga that identified many elements of the traditional spiritual and material culture of the Northern Altaians (Traditional Knowledge 2009).

The Southern Altaians (Altai-Kizhi, Telengits, Teleuts) were formed due to the mixing of the Turkic and Mongolian tribes and are anthropologically related to the South Siberian Mongoloid type. Their language belongs to the Kypchak group of Turkic languages (Khar'kov et al. 2007; Potapov 1969).

The Southern Altaians occupied the territory of the mountain steppes and valleys of the Central, South-Eastern, and Eastern Altai, as well as the steppe and forest-steppe areas of the Altai plain.

Teleuts, whom the Russians called white Kalmyks, roamed along the Ob and its tributaries: Charysh, Aleyu, Kasmal, Barnaulka, Ina. In the Altai Mountains there were other groups of Southern Altaians: along the Chulyshman River and in the valley of the Chuya River there were Telengits, in the area between the Biya and Katun there were Altai-Kizhi, sometimes called Tau-Teleuts (Mountain Teleuts) (Essays on the History of the Altai Krai 1987). Nomadic livestock breeding determined the basis for the creation of ethnocultural landscapes. The inhabitants of the plain steppe and

forest-steppe—the Teleuts—shepherded, bred small cattle and cattle, horses, camels; despite the active lifestyle, practiced agriculture. Residents of the central, southern, and eastern parts of the Mountain Altai (Altai-Kizhi and Telengits) were typical livestock-breeders, for whom breeding livestock was the predominant occupation. The semi-nomadic type of livestock breeding dominated, but in the high-mountainous Altai steppe the Telengits also had a real nomadic economy.

Sheep and horses, to a lesser extent cattle and goats, prevailed in the herd structure. Yaks and camels were also bred in the highlands, which for the Altai was more exotic than the norm. Hunting was also of great importance in the household (especially among the Telengits).

To ensure the optimal intensity of pasture use, the Southern Altaians used pasture rotations, revealing adequate knowledge about the sustainability of landscapes and their ecological capacity (Traditional Knowledge 2009).

The habitat of the Southern Altaians was an integral part of the so-called "Great Steppe" with intensive ethnopolitical processes typical of it. The mentality of the Southern Altaians was taking shape under the constant threat of invasion and need to fight for living space. In addition to hostile peoples' attacks (Kyrgyz, Mongolians, Dzungars, and others), territorial conflicts often occurred between different Altai tribes and even clans as a result of competition for grazing land. This usually happened due to an increase in livestock population and to the fact that individual tribes and clans, striving to expand their tribal possessions, were becoming more powerful. These factors predetermined a reasonably high level of passionate, expressed in pronounced ethnic self-identity and militancy.

2 The Beginning of the Russian Colonization of the Altai

Ermak's campaign to Siberia at the end of the 16th century discovered the vast expanse of Siberia for the Russian state. During the 17th century active colonization took place on the territory from the Ural Mountains to the Pacific Ocean. During the period under review, the Altai territory was out of the Russian colonization zone, the powerful Dzungarian state prevented Russian settlers from moving to the Altai, and the Russian state did not have sufficient military forces to develop this territory yet. Nevertheless, the first attempts were made to explore new lands by sending reconnaissance Cossack units here.

In 1625, at the upper reaches of the Kondoma River a Cossack troop first penetrated to the upper reaches of the Biya River and imposed a tribute in furs to the Chelkans who lived along the Lebed River. In the same year, accepted by Kuznetsk waywode E. Baskakov's authority, Cossacks under the command of Sidor Fyodorov and Ivan Putimtsev were sent to the northern part of the Altai to "describe and reconnoiter new devious lands" (Ivonin and Kolupaev 2008: 22).

In 1633, an attempt was made to create a Russian burg in the upper reaches of the Ob. For this purpose, a Cossack troop led by Fyodor Pushchin was sent from Tomsk. He was ordered to build from wood a stockade and to make up its military post with

his troop in the area of the confluence of the Biya and Katun, “in a proper place”. Moving up the Ob on three small ships of the plagues, 60 Cossacks, barely reaching the mouth of the Chumysh River, met Telegut prince Abak and his allies, and as a result of a five-day battle were forced to retreat.

This failure did not stop the intentions of the Siberian administration to advance into the Altai lands.

In the same year, 1633, a Cossack troop of the boyar Peter Sabanskiy’s son was sent to the upper reaches of the Biya, and having reached Teletskoye Lake, he defeated the ruler of the Teleses, Prince Mandrak. The prince’s wife, his son Aydar and his daughter-in-law who fell into the hands of the winners, were sent to Tomsk as hostages. In 1634, Mandrak arrived in Tomsk, where he took Russian citizenship, pledging to pay tribute in 10 sables for each person.

The established peace was fragile. As soon as Mandrak and his family members were released, the commitments reached were forgotten, and the payment of the tribute was terminated.

In 1642–1643, Peter Sabansky undertook a second military expedition to Lake Teletskoye. After several clashes, he managed to capture Mandrak, the payment of the tribute was resumed, but after the death of Mandrak, his son Aydar continued to fight with Russia (Ivonin and Kolupaev 2008: 53–54).

Even though military expeditions to the Altai did not produce the desired results, attempts to build a burg at the confluence of the Biya and Katun were not abandoned in the future. In 1653, a military troop was sent again from Kuznetsk to collect information about the confluence area of the Biya and Katun. The main result of those expeditions, in addition to a one-time tribute collection, was a thorough acquaintance of Cossacks with the climatic and geographical features of the Altai. The obtained information was used by well-known Russian cartographer S. U. Remezov when preparing the “Drawing Book of Siberia” (Ivonin and Kolupaev 2008: 23).

By the 1680s, Tomsk and Kuznetsk waywodes were well aware that the most suitable place for the construction of the burg in the Altai was the mouth of the Biya and Katun. “Description of Siberia” in 1683 noted that there were “a great many … of every beast, birds and fish of every kind”, an abundance of forests and fields, excellent soil, and concluded that if a fortress was built there, the royal treasury would have a “great profit” “in fur tribute from yasak and in travel from merchants of all kinds” (Description of Siberia in 1683: 383).

The Siberian administration realized that the foothills of the Altai, in particular, the area of the mouth of the Biya and Katun, were convenient for the resettlement of Russian peasants for the economic development of this region. Besides, this area had a very favorable strategic position. However, at the end of the 17th century, no practical steps were taken to build a burg at the mouth of the Biya and Katun. The power of Dzungaria and the limited military forces hindered the Russian expansion to the Altai.

At the beginning of the 18th century, the situation changed. Russia’s entry into the Northern War, military, and economic reforms demanded significant funds.

An essential source of income for the tsar’s treasury, as in the 17th century, was fur, highly valued in the world market. The Russian government could not allow

leaks of furs in the form of a tribute to the Dzungarian Khan and his vassals—the Teleut and Kyrgyz princes.

Under these conditions, the issue of the establishment of a burg in the field of the Altai tribes resettlement became topical again. For the Siberian authorities, the problem of supplying the Siberian military garrisons with a grain salary also remained difficult. It took a long time to deliver it (5–6 months), while a significant number of service members had to be distracted. Therefore, it was essential to "plant sovereign arable land" on the spot in order to supply garrisons of Siberia with bread. The southern steppes of Western Siberia, as well as the vast expanses of the Altai, which were abundant in numerous rivers and lakes, were convenient areas for the establishment of "sovereign arable land".

The forefront of the colonization of the Altai was formed from military troops, mainly consisting of the Siberian Cossacks sent from Kuznetsk, Tomsk, Tara, and other Siberian cities.

3 Biysk (Bikatun Burg)—The Main Outpost of the Russian Development of the Altai

By decree of Emperor Peter I, in 1709, the Bikatun burg was founded at the confluence of the Biya and Katun Rivers. It was to defend the Russian borders from the Dzungars's attacks. The expedition for the burg construction (more than 600 people) left Kuznetsk on June 2, 1709. Beside Russians, Tatars and Teleuts who accepted Russian citizenship were attracted to the burg construction. Built on a high bank, the burg completely blocked the "floating" Vikhorevsky ferry with fire of its guns, leaving the road leading to Kuznetsk in the rear. In the summer of 1710, the garrison of the fortress was attacked by a large nomads' army, as a result the fortress was burned.

The destruction of Bikatun burg did not stop the advance of the Russian people in the Altai. In 1718, 15 versts away from destroyed Bikatun burg, above the mouth of the Biya and Katun, Biysk fortress was built. Its construction opened the way to the reclaiming of the Altai foothills and mountain areas in the following years (Umansky 1999).

Biysk fortress was wooden, quadrangular in plan, with the perimeter of the walls about 200 m. In the corners, there were four three-story wooden towers with a height of 15 m. Beside the walls, there was an external defensive fence, which consisted of a moat, a double line of snares and slingshots. Inside the fortress, there was a powder magazine, barns, a kitchen, a chapel, and a commandant's house. The fortress became one of the main fortified points of Kolyvan-Kuznetsk defensive line, the residence of the military commandant also located there. Biysk fortress became the administrative and fiscal center of the adjacent lands, the core of the attraction of the first Russian villages that arose in the Altai in the first half of the eighteenth century.

In 1748–1751, the fortress was modernized, and the old fortification elements were used as a citadel. The perimeter of the walls was 650 m. The fortress had five three-story wooden towers: General, Moscow, Kuznetsk, Proezzhaya, and Bikatun. In the fortress there were 12-pound fortress guns. Instead of Cossacks, regular infantry and dragoon units began to form the basis of the garrison. Biysk fortress became the main link of Kolyvan-Kuznetsk defensive line.

In 1758–1761, a second modernization of the fortress took place, and the area of the fortifications increased up to 12 hectares. Fortifications consisted of a palisade, not of fortress walls. In the northwestern corner of the fortifications, a pentagonal earth and wood artillery bastion for 10 large-caliber guns was built. On the south and north sides of the bastion, there were also two open batteries, and each of them had 6 guns. Fortress artillery included 78 guns.

In 1768–1778, new fortifications were built, and the area of the fortress increased to 15 hectares. 6 bastions were erected. On the south side, the fortress was defended with seven triangular redoubts. The number of the fortress garrison exceeded 3 thousand dragoons, soldiers and Cossacks, artillery included 150 guns of various calibers.

By the end of the 18th century, according to the classification of fortification complexes of that time, Biysk fortress was considered as a military fortress of the first rank. In 1782, the fortress became a town (Tourist Encyclopedia of Russian Regions 2017: 107).

4 Assigning the Altai to Russia

Up to the middle of the eighteenth century, the Altai tribes were in the midst of a geopolitical struggle between Dzungaria, the Great Qing Empire and the Russian Empire. If the Northern Altaian actually accepted the status of the Moscow's tributaries, the Southern Altai tribes often became double tributaries (and even triple tributaries), which they desperately resisted, as a rule, without success.

Strengthening of Russia's position in the south of Western Siberia was the key point at the negotiations with the Khong Tayiji ruler of Dzungaria in 1722, as a result the Altai territory remained with Russia (Ivonin and Kolupaev 2008: 26).The Djungars moved back to Western Mongolia. However, they forcibly took with them most of the southern Altaians. Only those who managed to shelter under the protection of Russian fortresses could escape. The Altai managed to escape from bondage only in 1756, when the Dzungars were defeated in the Chinese Qing Empire. Having returned to their ancestral lands, the genearches of the Altai tribes appealed to the Russian empress Elizabeth Petrovna with a request to accept them into eternal Russian citizenship and protect them from raids.

However, in 1757–1758, the Altaians were also attacked by the Qing troops that took people to settle on the lands annexed to the Qing Empire. The tragedy of the Altaians was aggravated by the massive raids of the Middle Zhuzh's Kazakhs, when many Altaians were also captured (Makoshev and Makosheva 2007).

5 The Development of the Altai Foothills by the Russians in the Early 18th Century

Mending differences with the Dzungars made it possible to intensify the settlement of the Altai. The need for its development was dictated primarily by economic interests, information about the ore wealth of the Altai served as the basis for the formation of a new mining and metallurgical center of Russia, along with the traditional Urals.

In the spring of 1726, mining masters, sent to the Altai by Ural entrepreneur Akinfiy Demidov, headed by Dmitry Semyonov built the first furnace and conducted a test smelting of copper ores on the bank of the Kolyvanka River (now the Loktevka River).

On September 21, 1729, under the protection of Cossacks on the Belaya River, Kolyvan-Voskresensky metallurgical works were initiated. In 1739, the construction of the Barnaul copper smelter began, the protection of which was also carried out by Siberian Cossacks. To ensure the production with labor force numerous peasants were attributed to the factories and mines. Demidov relocated several hundred experienced workers to the Altai from his Ural factories.

In the second half of the 18th century, to protect Russian population and enterprises of the mining industry on the territory of 800 miles long from the Kuznetsk fortress in the north to Ust-Kamenogorsk in the south, Kolyvan-Kuznetsk defensive line was built, and it was a chain of military strongholds. In 1758, the Russian military contingent in the Altai was 1,850 military people (including 678 Cossacks) (State archive of Omsk region). To provide the fortresses with everything necessary, the peasants from the northern provinces and the Ural region were forcibly moved there (Khudyakov 1973).

In 1748, Anuy fortress was founded on the Anuy River, Katun fortress was founded on the Katun River. In 1749, Shemanayevsk and Krasnoyarsk outposts were settled. Thus, Kolyvan-Kuznetsk fortress line included the following fortresses: Biysk, Katun, Anuysk, Kuznetsk, seven outposts—Shulbinsk, Krasnoyarsk, Shemanaevsk, St. Catherine's, Aleysk, Nikolaevsk, Flavinsk, four stations—Spasskaya, Kamikhskaya, Belaya, and Bekhtemirskaya, two plants—Shulbinsky and Kolyvansky, Zmeevsky mine, and Kazansky redoubt.

Initially, soldiers and Cossacks from Tobolsk, Tyumen, Tomsk, and Narym carried temporary service in fortresses, redoubts, and outposts. In 1764, a new Siberian Corps commander, General Springer, applied to the Siberian governor with a proposal for the complete and final relocation of Cossacks from the rear cities on the line. He contributed to resettlement of Cossacks with their families on the front lines.

After the transfer of Demidov's plants to the Cabinet of His Imperial Majesty in 1747 and in connection with the arrangement of the defensive line, Cossacks began to live in the Altai permanently. They carried out service together with dragoons, soldiers, and other military units. Cossacks' duties included long-distance reconnaissance, border guarding (guards and patrols), courier postal and convoy duties, security of embassies, fortress and construction work, storage of timber, coal, hay, state agriculture, customs, etc. In 1752, the first levy of Cossacks (91 people) to the

gunners was carried out on Kolyvan line, and they constituted the core of the gunners of the security services of the factories (Ivonin and Kolupaev 2008: 34). The severity of Cossacks' service attracted the attention of the Siberian administration, which tried to improve their financial situation. In 1763, on the report of F. I. Soymonov and D. I. Chicherin to the Senate, Cossacks received permission to trade with border peoples. That was the beginning of the famous later Russian-Mongolian trade passing Biysk (Ivonin and Kolupaev 2008: 49).

In 1768, Kolyvan and Kuznetsk fortified lines were strengthened with four fortresses (Kuznetsky, Anuysky, Katunsky, Biysky), the rest of the line consisted of the outposts (Verhaleysky, Tigeretsky, Charyshsky, Antonevsky, Nicholaevsky, Saydypsky, Kuzedeevsky), redoubts (Bobrovsky, Ubinsky, Ploskiy (Flat), Beloretsky, Tulatinsky, Moraliy Rog (Deer Horn), Tersky, Smolensky), beacons (Ulbinsky, Klyuchevsky, Yarovsky, Sosnovsky, Slyudensky, Bekhtemirsky, Novikovsky, Lebyazhiy (Swan), Saylapsky, Nizhneneninsky, Uruninsky, Kayrakansky, Verhneneninsky, Sarychumyshsky), and semi-beacons (Pyshtylimsky, Kandalepsky). A small number of fortresses could be explained by the fact that the mountainous terrain was a reliable barrier, the government and local authorities, knowing about the forthcoming advance further south, did not want to spend money and energy on the fortress construction. In the 1790s all the beacons on Kuznetsk line became known as the station redoubts.

Responsibilities of the Cossacks on Kolyvan-Kuznetsk defensive line were diverse:

- guarding the defensive line all over;
- protection of the local population from nomad raids;
- maintenance of military posts and pickets in the steppe;
- escort of merchant caravans;
- response team dispatching to gold mines;
- to be on duty when ordered.

In addition, Cossacks financed their internal control and served Zemsky duties, for example, kept in good repair roads, bridges, hurdles, and transports within the troop ground (Fig. 1).

6 Russian Penetration into the Central Part of the Altai Mountains

After creating a defensive line in the Altai, peasants started to arrive in Siberia. Rural settlements were built under the protection of Cossacks.

From the middle of the 18th century, there emerged the infiltration of "illegal groups" of Russian immigrants into the Central Altai. They were not only runaway peasants and factory workers, but mostly Old Believers. There they formed a special range of Russian culture with ethnocultural landscapes specific to that territory.

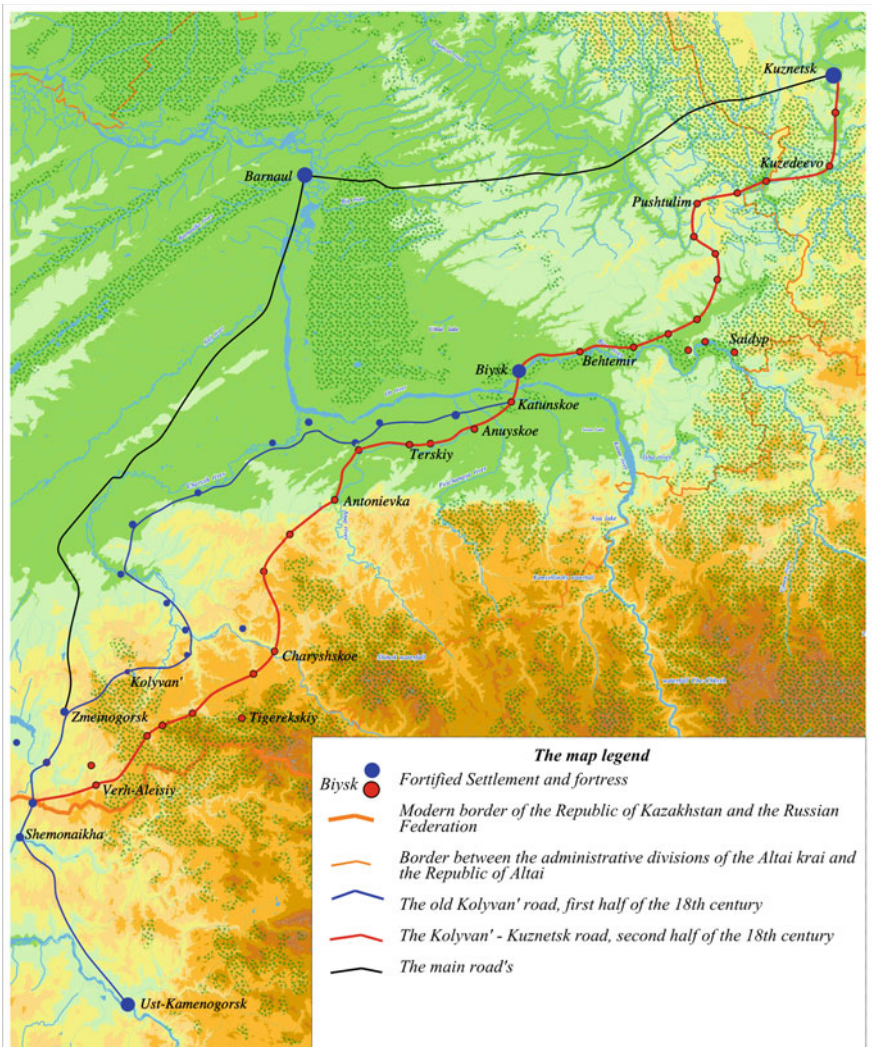

Fig. 1 Map of the Cossack's settlements on Kolyvan-Kuznetsk defensive line (author Dunets A. N.)

Old Believers became an illegal and persecuted group of people after the split of the Orthodox Church in the middle of the 17th century. They had to look for nowheresville inaccessible for the state administration, where they could found their secluded settlements. With sinuosities (through the Russian North, the Urals, Kazakhstan) they penetrated into the Altai. There is information about Russian Old Believers' relocation to the Altai as early as in the 1720s. Especially, Old Believers' inflow to the Altai intensified at the end of the 18th and the beginning of the nineteenth centuries, when the legend of Belovodie spread—"the land of peasant justice

where milk and honey flow"—which many people associated with the Uimon Basin in the Central Altai (Kuchuganova 2000). There, in the Uimon Basin, in 1798 the first permanent Russian settlement in the Altai Mountains (Gorny Altai) village Upper Uymon was founded by Old Believers who came from the Bukhtarma valley. Following it, Ust-Cox, Nizhny Uymon, Multa, and other Old Believers' settlements emerged, which became support frame centers of a peculiar Old Believers' historical and cultural region within the Altai-Sayan historical and cultural area.

The settlement of the Uimon Basin by Russian Old Believers was facilitated by its isolation and favorable natural conditions, which allowed them to get engaged in traditional forms of economic management, farming.

In the first half of the 19th century, the Russians began to settle in the Northern Altai. That was mainly due to the activities of the Altai Orthodox Mission. At that time, the villages of Maima, Ulal (present-day Gorno-Altaisk), Manzherok, and Chemal were founded, where not only Russians settled, but the transition to a sedentary lifestyle among the Altaians began.

Further development and settlement of the Altai was associated with the development of Russian merchants' trade with Mongolia and China. Thus, a large fair in the Chui Basin became the essential factor in the emergence of the village of Kosh-Agach; Shebalino village appeared on the place of Biysk merchants Shebalins' trading warehouses.

By the 1780 Kolyvan-Kuznetsk line had lost its defensive value. That was facilitated by foreign policy events in many ways. The Dzungarian state, which had been threatening the security of the southern borders of Siberia for a long time, was destroyed by China during the bloody Dzungar-Chinese war. Relations with the new neighbor began to line up in a peaceful way, and there was no need for a defensive line and the presence of significant military forces. Before starting active advance into the steppes of Kazakhstan, the authorities put up with that circumstance, using Cossacks in secondary jobs and services. But with the development of the colonization of the "Kyrgyz steppe" in the 1850–60s they were required on other parts of Siberian border lines, which immediately affected the number of the Cossack population of the Altai.

In the late 18th–early 19th centuries the Russian State advanced into the borders of the Altai Mountains, and Cossacks were assigned tasks related to the protection of the state border with Mongolia and China.

In the 1820s on the initiative of the Governor-General of Western Siberia P. M. Kaptsevich attempts were made to raise the Cossacks' standard of living by involving them into arable farming. Despite the failure of that venture, the Cossacks acquired certain skills of grain growers, useful for managing personal farming. That particularly concerned the Cossacks who lived in the Altai, where nature itself favored agriculture in the river valleys on the foothill chernozem (black soil). The only problem was to divide correctly Cossacks' lands and the lands of the Cabinet of His Imperial Majesty (Andreev 2006).

The division of the Cossacks' and the Cabinet's lands in the Altai lasted for a considerable period of time, which was explained by the reluctance of the Altai mining district's administration to make considerable land concessions to Cossacks.

The first land division carried out in 1816–1817, and in some places completed by 1828, resulted in a lot of discontent.

The land question was again raised after the adoption of the "Regulations on the Siberian Linear Cossack Army" in 1846. However, the land surveying commission, which was approved by the highest opinion of the State Council on November 14, 1850, did not start work due to opposition from the Ministry of the Imperial Court. Before the "Great Reforms" and opening of the Altai for mass migrations in 1865, there was no particular land congestion, the value of the land itself was negligible, and therefore the land dissociation was not the primary economic necessity. The Cabinet of His Imperial Majesty contented with the rights of the supreme owner of the Altai lands and as such did not want to share them with anyone, but at the same time they were not opposed to Cossacks' land use in the presence of a significant fund of free lands. But in the post-reform period, the situation changed radically. The massive influx of peasants into the Cossack lands, which had no clear outlines and due legal status, led to the growth of land conflicts, a number of which were particularly acute (Isaev 2009).

In the late 18th–early 19th centuries the Russian State advanced deep into the Altai Mountains and Cossacks were entrusted with the tasks related to the protection of the state border with Mongolia and China.

The abolition of servage in 1861 opened the way to large-scale reforms in various spheres of Russian life. A long colonization stage of the Altai development ended. The Altai (especially its flat part) became one of the main attraction centers for peasant migrants from the European part of the country. The mass immigrants flow to Siberia and, above all, to the Altai during that period was actual for many nations. An enclave of the German population (immigrants from the Volga region), Ukrainian, Belarusian, and Mordovian villages appeared in the western dry-steppe part of the Altai plain, which by then was the least populated.

7 Kazakhs in the Kulunda Steppe in the South-East of the Altai Mountains

Due to the decree of Catherine II in 1782 "On the Abolishment of the Ban to Allow Kazakh Cattle to Come to Russia for Winter" the transfer of Kazakhs of the Middle Zhuzh to the right bank of the Irtysh, into the inner part of the fortified lines, began (albeit with great restrictions and under serious control). That process was intensified with the issuance of decrees of 1788 "On the Relocation of the Kirghiz-Kaisaks from the Distant Steppes into the Interior of Russia" and of 1798 "On Giving Refuge to the Middle Kirghiz-Kaisak Horde and to the Sultans and Foremen Admitted to Russian Citizenship with their Caravans". Several hundred Kazakh families migrated to the Kulunda steppe (western part of the Altai plain).

In the middle of the 19th century, the settlement of the south-eastern part of the Altai Mountains by the Kazakhs began. Their appearance in the Altai was associated with the active ethnogenetic processes mentioned above that took place in Central Asia. Kazakh tribes constantly participated in military raids on their neighbors (including the Altai) and were attacked by other people themselves. With the growth of population in Central Asia, competition for grazing lands, places of nomads grew. The deserted territories of the Altai Mountains, whose population was almost completely destroyed during the China-Dzungarian war (1755–1759), fell into the sphere of close attention of the Kazakh ethnos. In the first half of the 19th century, unauthorized migrations of Kazakh clans in the Ukok Upland region were register, which eventually turned into a kind of a migration corridor between North-Western Mongolia, the Altai and the Irtysh district. In the early 1880s, negotiations were held between the heads of the Kazakh family of the Sarykaldyks and the Telengitian heads of clans concerning the relocation of 50 Kazakh families to the Chui Basin. As a result of the negotiations, lands were allocated for the Kazakh nomads in the basin of the Kolguta River and on the Ukok Upland. However, the territory of the nomads actually spread to the entire Chui Basin, and the number of immigrants turned out to be larger than foreseen. Naturally, that caused discontent and claims on the part of the Telengits, but did not come to serious clashes (Makoshev and Chedurova 2007). As early as in 1898, the expedition of E. Shmurlo recorded on the Ukok Upland about 140 Kazakh caravans, which belonged to the Chingistai clans, Devlets (Daulets), and Sarykaldyks. In the winter they moved to the valley of the Kolguta River.

8 Altai Cossacks in the 19th Century

Many Russian and European scientists study the phenomenon of the Cossacks. Who are Cossacks? These are the knights of orthodoxy, peasants, and bandits. We studied opinions about Cossacks in publications (Goehrke 1980; Kornblatt 1992; Hollquist 1998; Kappeler 2013).

The Cossack (in fact, long-term resident) population of the Altai in the post-reform period was significantly reduced due to the transfer of a considerable part of the personnel to the territory of Semirechensk Cossack army formed in 1867. Besides, earlier in 1848, Kuznetsk sector of Kolyvan-Kuznetsk line was abolished (remaining Kolyvan section was called Biya Cossack line), and the Cossack population was transferred to the peasant class. By January 1, 1864, the Cossack population number was 9,395; after 15 years in 1879, the number of them was 6,733 (Isaev 2014: 99).

Despite the reduction in the Cossack population, the administration of the Altai mining district opposed to transfer the remaining part of Cossacks to the Irtysh line, located on the territory of modern Kazakhstan, as Cossacks, in their opinion, were a kind of stability guarantee in the region.

By the end of the 19th century Biysk Cossack line represented a chain of settlements and villages, scattered in the foothills of the Altai from Ust-Kamenogorsk to Biysk for 389 versts (233 miles).

The territory of Biysk line at this moment was located within Biysk and Zmeinogorsk counties of the Altai district of Tomsk province (from June 17, 1917 of the Altai province). It consisted of seven stanitsas (large Cossack villages): Charyshskaya, Antonievskaya, Verkh-Aleyskaya, Maralyevskaya, Nikolaevskaya, Slyudenskaya, Tereskaya; and 12 villages: Andreevsky, Beloretsky, Bobrovsky, Verkh-Ubinsky, Klyuchevsky, Platovsky, Sekisovsky, Smolensky, Sosnovsky, Tigiretsky, Tulatinsky, and Yarovsky (Isaev 2004: 32–33).

In those 19 settlements there were 13,490 people (6,757 men and 6,733 women). Cossacks constituted the overwhelming majority of the population of Biysk line (89.67%)—12,096 people (6043 men and 6053 women).

Large settlements were stanitsas Charyshskaya—1,687 people, Antonevskaya—1,245 people, and the village of Tulatinsky—1,204 people. The center of Biysk Cossack line was stanitsa Charyshskaya. It was founded in 1765 as a military fortification (outpost) of Kolyvan-Kuznetsk defensive line. At that time, the Charysh Outpost in its position was the extreme Russian point on the Charysh River to repel possible raids of nomads and protect the emerging Russian settlements. By the beginning of the 19th century, the military danger was eliminated, the outpost decayed, and in its place the Cossack stanitsa of Charyshskaya was formed, which turned into one of the richest Cossack settlements of Biysk line. By 1917, 1687 people lived in the stanitsa. 1526 of them were representatives of Cossacks.

The ethnic composition of Altai Cossacks comparing to other regions of the Siberian army was noted for rare homogeneity: 99.83% of the Cossacks (12,075 people) were Russians, 0.1% (12 people) were Kazakhs, and 0.07% (9 people) were Ukrainians. The absolute majority of the Cossacks, 97.4% (11,782 people) were long-term residents (the enumeration attributed to those all people settled before 1861). There were few immigrants—2.5% (299 people). Others (non-enumerated, refugees, etc.) amounted to 0.1% (15 people).

9 The Economy of Altai Cossacks by the Beginning of the 20th Century

At the beginning of the 20th century Cossacks made up a small but very significant part of the Altai population. Extensive information about its demographic and socio-economic situation was provided by the materials of the agricultural enumeration of 1917. That source of information gave a clear idea of the degree of adaptation of Cossacks to local natural and climatic conditions, success in economic activity.

In the late 19th–early 20th centuries Cossacks were intensively engaged in economic activities, combining it with military service. For example, in the stanitsa of Charysh 300 Cossack farms possessed 1,718 horses, 3,219 cattle units. Cossacks owned 3067.5 hectares of arable land. There was a butter factory and trading enterprises in the stanitsa. The Church named after Kazan icon of the Mother of God, a

Fig. 2 Siberian Cossack preparing for the sowing campaign

2-grade school were situated in the stanitsa. Trade fairs were held annually (Dunets and Isaev 2018) (Fig. 2).

According to Usov, in the Siberian Cossack army it was Biysk line that possessed the best natural conditions: "Here we see the luxurious development of forest vegetation and rich flora, the animal world is very diverse. The mineral wealth of the Altai Mountains is universally known. Mountain valleys and slopes are covered with excellent black-earth soil, in which in the sultry heat moisture is maintained from the numerous streams and springs; therefore corn failures are extremely rare here" (Usov 1879: 33–34).

But, along with the advantages, there were significant drawbacks: "However, the inconvenience Biysk line has is that it is in the middle of nowhere, aside from trade and postal ways; moreover, traffic there is difficult, as the mountain roads are impassable in winter with deep snow and slashing, and in spring and autumn from mucky weather" (Usov 1879: 34).

The main branch of the Cossack economy was livestock breeding and, above all, cattle breeding and horse breeding.

The choice in favor of cattle breeding was explained by a number of reasons.

First, cattle breeding was the most ancient, reliable branch of the Cossack economy, while Cossacks began to engage in agriculture in more or less noticeable size only at the beginning of the 20th century and only in the places where the soil conditions allowed it. As agricultural scientist of the Siberian Cossack army N. G. Ovchinnikov noted, "having got accustomed to being a cattle-breeder, a Cossack,

at switching to the grain sowing, did not become a real cereal grower" (Ovchinnikov 1916).

Secondly, due to the peculiarities of military service duty, forcing Cossacks to lead a semi-settled way of life, while cereal growing required lengthy efforts and systematic labor.

Thirdly, due to the natural and climatic conditions that, on the one hand, made it difficult to be engaged in farming, and on the other hand, due to the abundance of hayfields and pasture spaces, favored cattle breeding.

Fourthly, due to the neighborhood with the nomadic Kazakh population, which had huge herds of livestock, and an easy opportunity not only to acquire domestic animals, but also to breed them for sale.

In the early 20th century, the role of cattle breeding increased even more. In many villages and stanitsas, Cossacks began to breed dairy cattle intensively, established public creameries with separators, with co-operative craft society farming, in some cases with association of all or several settlements of a stanitsa, with establishment of consumer shops.

The first cooperatives on Biysk line appeared in 1905 in the stanitsa of Verkh-Aleyskaya (oil co-operative craft society) and the village of Sekisovsky (credit society). In 1907, oil co-operative craft societies appeared in the stanitsa of Tereskaya and the village of Sosnovsky, in 1910—in Slyudenskaya and Antonevskaya stanitsas. By 1914, cooperation had covered 13 stanitsas and villages of Biysk line, but this process was most intensive during World War I. In the period from 1914 to 1917, various forms of cooperatives (oil co-operative craft societies, credit unions, consumer shops, and societies) appeared in 6 settlements of Biysk line, thereby covering its entire territory. The most common form of the cooperative was oil co-operative craft society, developed in 14 stanitsas and villages and out of 19 (Usov 1879).

According to the data of the All-Russian Agricultural Census of 1916, there were 17 butter factories on Biysk line, 13 of which were cooperative and 4 private ones (Usov 1879).

To establish butter production, experts on cheese and butter manufacturing from Switzerland were invited to Biysk line. Brothers Christians and David Lerger worked at the private cheese factory in Antonievskaya stanitsa, Yakov Ivanovich Vitver, and Yakov Yakovlevich Lenshin worked in Nikolaevskaya stanitsa (State Archive of the Altai Krai, F. 233. I. 1a. C. 52. Sh. 115–116; C. 292. Sh. 9, 49.). For 1917, Antonievsky creamery processed 65,000 poods of milk, Charyshky—84,676 poods (State Archive of the Altai Krai, F. 55. I. 1. C. 335. Sh. 676–677, 698).

In 2,100 Cossack farms there were 18,861 cattle units, which averaged 9 units per Cossack yard (4 in farms of non-troop population).

In Charyshskaya stanitsa the household of P. I. Shestakov's heirs, headed by 44-year-old Cossack Lyubov Ivanovna Shestakova, had a truly record population—142 cattle units (State Archive of the Altai Krai, F. 233. I. 1a. C. 781, p. 11.).

In addition to cattle breeding, horse breeding was considered to be a traditionally essential branch of Cossack economy. The agricultural census of 1917 recorded

12,191 horses on Cossack farms, an average of 6 horses per Cossack yard (4 for non-troop population).

The Cossack population of Biysk line was best provided with horses in the Siberian army. In the 3rd military department, which was a leader in the horse breeding development (75 thousand horses from 137.5 thousand were in the Cossack farms of the army), there were 143 horses per 100 male capitas (Korshunov 1994). Biysk line was significantly ahead of this figure—202 horses per 100 male capitas.

The population of Biysk line, in addition to cattle and horses, bred sheep, goats, and swine. In the Cossack farms there were 7,857 sheep, 556 goats, and 2,840 swine. However, they could not be compared with horses and cattle in terms of importance.

Summing up the development of various branches of livestock breeding in Biysk line, we can draw the following conclusions. The greatest attention in Cossack farms was paid to cattle breeding and horse breeding, to a lesser extent to sheep breeding. Swine and goat breeding was not widespread. The interest in cattle breeding was largely dictated by its product orientation, as well as historically established traditions. The need for horse breeding development was directly related to the military duties of Cossacks, which demanded from them to serve with their own horse. Traditions were also of importance—a Cossack without a horse was not considered a Cossack. A characteristic feature of the Cossack livestock breeding of Biysk line was the predominance of Russian breeds, while in the Siberian army in general, Kazakh breeds were more common (Usov 1879).

Agriculture was one of the main occupations of the Cossacks of Biysk line. The first plowing up in the foothill areas of the Altai took place in the first half of the nineteenth century, but only in the post-reform time, a noticeable role was paid to agriculture. Cossacks owned 445,830.85 land dessiatinas (State Archive of the Altai Krai, F. 1061. I. 1. C. 3, p. 184), but its main part lay in hilly-steppe and mountain-steppe regions, poorly adapted for active agriculture.

At the 2nd session of Biysk district land committee, held on November 25–28, 1917, these districts were given the following characteristics: “In the hilly-steppe region it is no longer possible to speak of black soil as the prevailing soil, it is rarely found here, in the form of separated patches among the prevailing podzolic-clay soil. The closer you are to the mountains or to the south and east, the higher is the content of stone and a kind of it, ballast” (State Archive of the Altai Krai, F. 9. I. 1. C. 158, p. 9).

Cossack lands along the entire length of Biysk line were located unevenly, as a result of which the allotment of land norm per capita in stanitsas and villages was different. Thus, in Terskaya stanitsa the allotment of land norm per capita was 18 dessiatinas, in Antonevskaya and Slyudenskaya stanitsas—15.6 dessiatinas, in Nikolayevskaya stanitsa—15 dessiatinas, at the same time in the villages of Klyuchevsky and Beloretsky—only 4 and 4.5 dessiatinas. The situation was the same with the mowing, the gap there was even more significant. In Terskaya and Maralyevskaya stanitsas the norm per capita was 8 dessiatinas, in Sosnovsky, Tulatinsky and Yarovskoy villages—6 dessiatinas, and in Charyshskaya stanitsa—5.5 dessiatinas. In the settlements located in the territory of Zmeinogorsk Uyezd, the mowing norm per capita was several folds smaller: in the villages of Beloretsky, Bobrovsky,

Platovsky and Sekisovsky—2 dessiatinas, in Verkh-Aleyskaya stanitsa—1.3 dessiatina, in Verkh-Ubinsky village—1.2 dessiatina, and in Andreevsky and Klyuchevsky village—1 dessiatina.

According to the degree of availability of arable and mowing land, agricultural areas of Biysk line were located as follows: the Northern region (steppe region, chernozem soils)—the average norm per capita of arable land allotment was 14.9 dessiatinas, mowing land allotment—5.2 dessiatinas; the Central region (mountainous area, stony-gritly and forest soils) —respectively 7 and 5.1 dessiatinas; the Southern region (steppe and forest-steppe, southern chernozem and chernozem)—6.4 and 1.6 dessiatinas. In general, on Biysk line, the average norm of per capita was for arable land—9.2 dessiatinas and for mowing land—3.6 dessiatinas.

Taking into account the fact that in the majority of Cossack farms farming in its significance was inferior to cattle breeding and horse breeding, Cossacks were provided with arable land in sufficient quantities. However, there was not enough mowing land, so necessary for the development of cattle and horse breeding. 505 Cossack farms out of 2,100 farms (24.1%) rented 3,019 dessiatinas of mowing lands, while only 223 (10.6%) farms had to rent arable land (743.95 dessiatinas) (Isaev 2004).

A characteristic feature of the Cossack landholding was its low culture. Mentioned above agronomy scientist N. G. Ovchinnikov noted: "Arable farming, in general, is poorly developed among Cossacks, the methods of land cultivating are the most primitive. For proper land keeping, knowledge, skills and practice are necessary. Cossacks need agronomic assistance no less and no more than other categories of landowners of Siberia" (Ovchinnikov 1916). The traditional form of Cossack land use was the long-fallow landing system.

2,100 Cossack farms used 28,793.75 dessiatinas of arable land. The main part of it, 20,118.06 dessiatinas (69.9%), was long-fallow land, 1,119.71 dessiatinas (3.9%) was fallow and only 7,555.98 dessiatinas (26.2%) under sowing (Ovchinnikov 1916).

Cossacks cultivated: spring wheat, oats, barley, flax, sunflower, millet, potatoes, hemp, winter and summer rye, buckwheat, peas, cucurbits, winter wheat, tobacco, wild flax, and annual grasses. Interest in one or another agricultural crop was dictated by the peculiarities of natural and climatic conditions and established traditions. Spring wheat, oats, flax, hemp, and potatoes were widespread. Barley, millet, and sunflower were very popular.

The five crops most significant for Cossacks were spring wheat, oats, barley, flax, and sunflower. The villagers planted spring wheat, oats, millet, barley, and flax. In general, the economic preferences of Cossack and rural population almost coincided (Fig. 3).

A Cossack farm unit accounted for an average of 3.6 sowing dessiatinas. In a number of settlements this indicator was noticeably higher: in Nikolayevskaya stanitsa—9.16 dessiatinas, Tereskaya stanitsa—7.15 dessiatinas, Smolensky village—5.76 dessiatinas, Bobrovsky village—5.63 dessiatinas, Slyudenskaya stanitsa—5.23 dessiatinas, and Verkh-Aleyskaya stabitsa—5.02 dessiatinas. In 10 stanitsas and villages the average size of crop fields did not exceed 3 acres, and in Beloretsky village and Charyshskaya stanitsa even 2 acres (1.47 and 1.98 dessiatinas respectively).

Fig. 3 Altai Cossack in the apiary

The average size of crop fields in Cossack farms was half smaller than a crop field of the rural population of the province—3.6 dessiatinas against 7.2 dessiatinas (in Biysk Uyezd—6.3 dessiatinas, in Zmeinogorsky Uyezd—8.7 dessiatinas) (Ovchinnikov 1916).

Representatives of non-troop population who lived in the villages and stanitsas of Biysk line, with the exception of a few old-time peasants, had no rights to Cossack land and were forced to rent it (Ovchinnikov 1916).

In Cossack farms of Biysk line various types of crafts were widespread. The agricultural census questionnaires indicate that the most popular crafts for men were beekeeping, shoemaking, carpentry, blacksmithing, carrier's trade; for women—sewing. Among Cossacks, it was possible to meet buttermakers, saddlers, hunters, fishermen, tailors, sawyers, joiners, potters, harness makers, coopers, makers of felt boots, tar-masters, etc. The non-troop population was mainly engaged in agricultural work. Among them, as among Cossacks, there were beekeepers, tailors, coopers, carpenters, saddlers, buttermakers, as well as bricklayers, timber floaters, glaziers, cattle riders, and stovemakers. The greatest attention was paid to beekeeping. For the first time, bees were bred there at the end of the 18th century by the commander of Irkutsk Dragoon regiment, Arshenevsky, who wrote out 7 beehives from Russia with an experienced beekeeper. Beehives installed 27 versts from Ust-Kamenogorsk, in the village of Bobrovka, eventually spread throughout the Altai (Fig. 4).

The characteristics of Biysk line population, given by lieutenant colonel Usov, can make the economy review complete: "It can be said that the inhabitants of Biysk line are the most industrious and homely of the local Cossacks. Therefore, they are closer to the type of peasants, while in other localities, the majority of Cossacks, counting more on resale and bargaining, rather than agricultural classes, are more

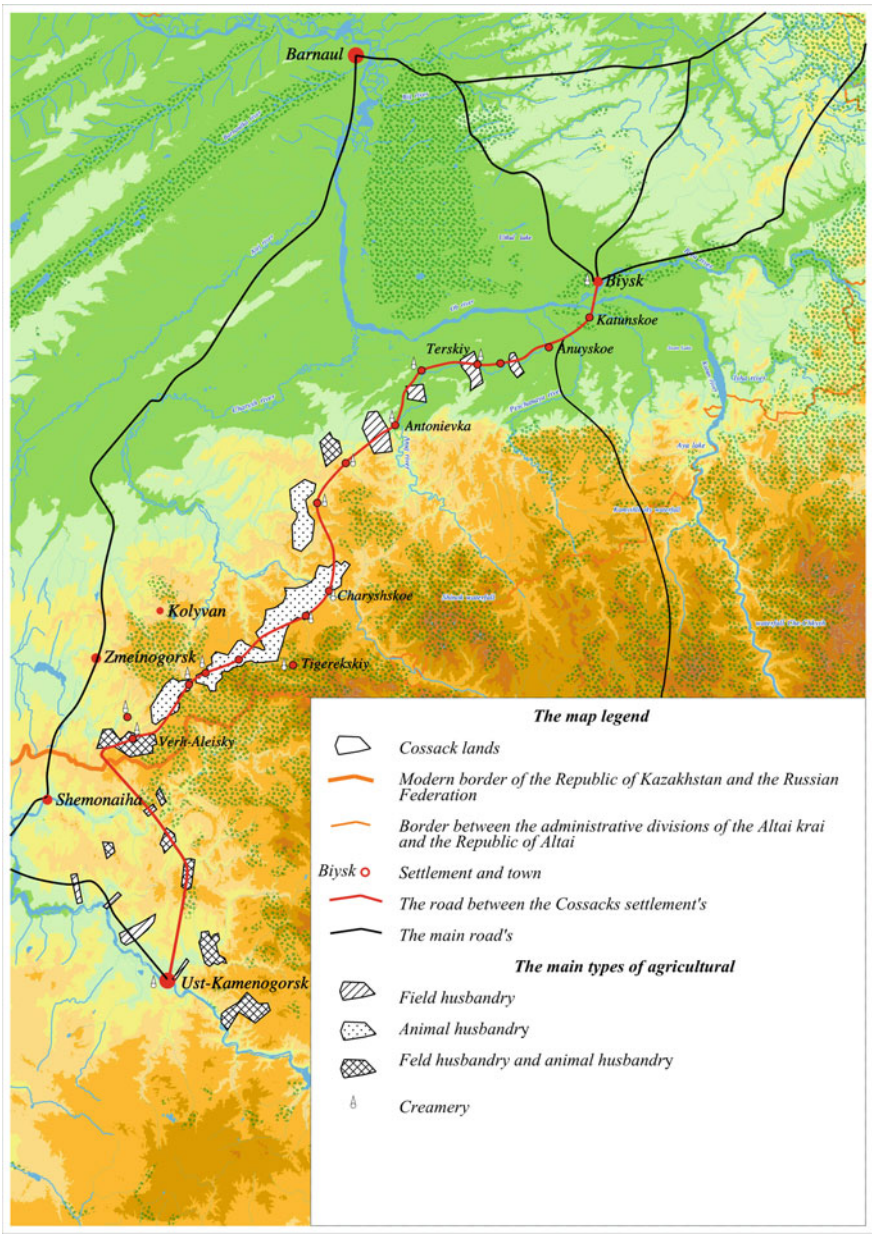

Fig. 4 Map of the Cossack's settlements on Kolyvan-Kuznetsk Defensive Line, first quarter of the 20th century (author: Dunets A. N.)

like townees and wholesale cattle-jobbers. Among Biysk Cossacks welfare is more evenly distributed: there are no people who are abruptly distinguished by their wealth in crop cattle, or various stanitsa men of wealth, which can be found in the Irtysh villages, on the Gorkaya line and in the steppe villages, but the percentage of poor is low" (Isaev 2004).

Cossacks played a significant role in the accession and development of the Altai. Troops of Tomsk and Kuznetsk servicemen were the first to penetrate the Altai territory in the 17th century, for a long time counteracting the expansion of the Dzungarian Khanate, both as an armed force and as intelligence officers and diplomats. Cossacks took an active part in the creation and strengthening of the Irtysh and Kolyvan-Kuznetsk defensive lines, under the protection of which the formation of the mining and smelting complex of Kolyvan-Voskresensky factories took place. Along with dragoons, they mount guarded, pursued border trespassers, participated in the construction and repair of fortresses, carried out various economic assignments.

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From Imperial to Soviet Siberia—The Continuity and Innovations of the Economic Development of the Far East

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Abstract The first third of the twentieth century is a particular epoch in the history of the development of the Far East of Russia. It is the time of military conflicts and the time of intensive development and close attention to the region of the Russian government authorities, but also the time of independence and state sovereignty. The second half of the XIX century was held for the Far East guided by military and agricultural colonization. At the beginning of the twentieth century, industrial development was added to these types of colonization: Trans-Siberian Railway construction, despite the fear of neighbors, was subordinated mainly to economic tasks. In the development of transport, the practical means were the cooperation of the private sector with the state (government-subsidized regular shipping voyages along the Amur basin rivers, the construction of individual sections of the Amur railway, and so on). The state played the first part in such cooperation. The factors hindering the region' transport development were the lack of central planning and insufficient material support for the road industry. These restrictions were partially overcome after the end of the civil war in 1922. After the civil war, centralized planning and management began to be introduced into the practice of economy. However, the civil war caused significant material damage to transport and industry, which reinforced the importance of the state as an administrative power and an economic agent. The prerequisites for the development of free commerce on the Pacific outskirts of Russia always

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V. N. Bocharnikov and A. N. Steblyanskaya (eds.), *Humans in the Siberian Landscapes*, Springer Geography, https://doi.org/10.1007/978-3-030-90061-8_8

faced the importance of a military presence for the state. Military-political interest attracted state funds for the region's development, but the same interest forced the state to distrust foreign labor (and there was always the luck of Russian workers in the Far East), to disbelieve principles of free trade and land tenure. Thus, despite the differences in the pre-revolutionary and post-revolutionary regimes, solving the same tasks in similar conditions dictated similar development methods: the more significant role of the state, centralized management, and reliance on internal resources. In Soviet time, this trend intensified under the pressure of an unfavorable international situation.

Keywords Transport construction · Industrial modernization · Industrial development

Abbreviations

CER (the Chinese Eastern Railway)—railway line on the territory of Manchuria	Connecting up Chita, Vladivostok and Port Arthur.
DVK—Dalne-Vostochniy Kray ("Far-Eastern Territory")	An administrative unit within the RSFSR existed in 1926–1938.
GAKhK (ГАХК)	ГОсударственный архив Хабаровского края)—State archive of Khabarovskiy Territory (Khabarovsk, Russia).
GAPK (ГАПК)	ГОсударственный архив Приморского края)—State archive of Primorskiy Territory (Vladivostok, Russia).
RGIADV (РГИА ДВ)	Российский государственный архив Дальнего Востока)—Russian state archive of the Far East (Vladivostok, Russia)

1 Introduction

The period of 1906–1916 was favorable for the Russian Far East regarding foreign policy and foreign trade. After the end of the Russian–Japanese war, the military danger from Japan was substantially reduced, and after the entry of the Japanese Empire into the Entente, it was completely eliminated. The overthrow of the monarchy and the 1911 revolution in China could not significantly affect the region's external position's stability. In World War I (1914–1918), Vladivostok and other Pacific ports became the main channel of economic communication with the allies.

The period 1923–1929 was less favorable, because of the relations with Japan, which became complicated again. The Japanese troops were the last to leave the Amur region territory when the prospect of defeating the white movement in the Far East was obvious. Soviet Russia (the Far East became a part of) during the 20s was in partial international isolation, which adversely affected the region's economy. Nevertheless, in the second half of the 20s, the region's foreign economic relations (the Chinese-Eastern Railroad played a large role in this) were generally restored.

Thus, it is possible to see noticeable differences in the region's external position: the 20s provide much less external opportunities for development, in parallel with this making much greater demands related to the need to strengthen military security.

The pre-revolutionary Far East was an emerging capitalist economy. The military nature of Russia's presence in the Far East has affected the state's share, both as an organizer and as a customer of services and goods. Defeat in the war with Japan attracted the state treasury attention to the development of the Amur region. The bulk purchase of grain for the army since the late nineteenth century was a significant factor in the development of the agricultural sector. This supported peasant farms, and contributed to their inclusion in the market exchange, although such a system of farming development was full of flaws.

Features of the social and economic system: (a) the mass of temporary workers from China and other related countries, their work was cheap and quite effective, these people occupied the poor 'niche, hiring for the lowest wages in the most challenging forms of labor; (b) the presence of a large mass of visitors and high mobility of the population in general. According to Nikolay Slyunin, from 1861 to 1905, the Amur region's population density increased 29 times (Slyunin 1908). Many traders, military, skilled workers, and workers from neighboring Asian countries lived here temporarily. Peasant migrants, continually replenishing the population of the region, diluted it, not allowing it to develop its distinct local features; (c) a high degree of urbanization, the Amur region for this indicator was second only to metropolitan regions; The average share of citizens in the region in 1905 was 25% (Slyunin 1908).

The post-revolutionary Far East has retained many features of the past: for the 1920s all three region's social lifestyle characteristics remained the same. Small private companies (as part of the NEP policy) and a high proportion of the economy's state continued. A characteristic feature was the absence of large private capital, except for foreign enterprises that participated in the concessions.

Our research aim is to establish the features of the development of transport and industry in the pre-revolutionary and post-revolutionary Far East. This fact could help to formulate a common ground to work on the model of the region's industrial economy.

2 The Development of Transport in the Far East of Russia Early XX Century: Institutions and Practices

By the beginning of the twentieth century, inevitable success had been achieved in transport construction in the Far East. From the total lack of roads, which was the most important deterrent to colonization, it was possible to come to a competent transport system. What institutions ensured the formation and functioning of the transport system at the initial stage? Firstly, these were various government agencies, administrative and advisory bodies (the resettlement department; interdepartmental meetings on road case under the governor-general authority and the authority of military governors of the regions; the Amur basin waterway management; and so on) created for strategic planning in the transport sector and specific projects. Secondly, it is a private initiative, entrepreneurship, spontaneous, non-formalized practice. Thirdly, various types of cooperation between the public and private sectors to make a profit (concession enterprises, contractual relations) were formalized practices.

The critical elements of the infrastructure created at the beginning of the twentieth century include the Siberian Railway (including CER), port capacities on the coast and on inland waterways, and a network of dirt roads of local and regional importance. The synergistic effect of the transport sector development was provided by railway construction—the most capital-intensive and high-tech of all the activities carried out in the Far East before the Russian–Japanese war. As a result, the region's transport system not only acquired a power frame in the form of railways, but a network of local ground "temporary access ways" also appeared, and water and horse-drawn transport progressed.

All the mentioned transport development practices remained relevant in the following years. The state continued to play the first part as the organizer and principal investor in transport construction. One of the breakthrough projects at the beginning of the twentieth century was constructing the Amur railway (1908–1916). This railroad was the last link of a strategically important transport corridor, built on Russian territory, not on the territory of a neighboring state. This part of the Siberian Railway was built both in a contract and in an economical way. The engineering corps, curators from the Ministry of Railways, local authorities, business contractors (who worked in the field as experts, in whom the state was very interested)—all the construction subjects were at their best. At the beginning of the twentieth century, large infrastructure projects, comparable to the Amur Railway, were not implemented on the Primorsky Region territory. The primary attention was paid to the reconstruction of the already existing highway—the Ussury railway.

By 1914, between Vladivostok and Nikolsk-Ussuriisky, the second path was laid, replacing light rails with heavy-type rails. As a result, the Vladivostok trading port successfully competed with Dairen (the former Russian port of Dalniy) for the transshipment of Chinese export goods exported from northeastern China, not landlocked (Tselischev 1925).

Since 1911, in the Far East, consistency in the construction and operation of unpaved roads has appeared. The solution to these questions was not centralized.

Several departments followed the dirt roads: the Migration Board, the Waterways Directorate, and the interdepartmental road meeting under the Governor-General. The Resettlement agency made a valuable contribution to the development of the transport network of the Far East. Until 1917, over 5.5 thousand km of road surveys were produced and more than 2 thousand km of new roadbed were built (Sher 1923). These successes were ensured by the direct participation of the state in transport construction.

Talking about other transport development practices, we should turn to private entrepreneurship. The transportation problem was still one of the most acute, holding back the extensive and intensive development of capitalism in the region. The Far Eastern bourgeoisie actively participated in the exploration of the road issue and its practical solution. Although later than the capitalists of the European part of the country, it began to search for directions of new railways. In particular, the gold producer V. A. Levashov equipped a detachment at his own expense to search for routes of the promising Nikolaevsk and De-Kastri railways. The congress of gold miners in the Amur Region in 1912 once again raised the issue of connecting the Transsiberian Railway with Nikolaevsk-on-Amur. This transport connection provided Russia with a second (including Vladivostok) reliable access to the Pacific Ocean. In 1916, at a special interdepartmental road meeting at the Amur Governor-General, Nikolaevsk, De-Kastri, and some other railways were considered necessary. As a result, in 1916, the Nikolaevsk and De-Kastri lines were included in the government's "Plan for railway construction for 1917–1930 in Eastern Siberia and the Far East" (Zuev 1997).

One way for cooperation between the state and private capital, widely used in transport development of the Far Eastern region, has become contract agreements. An example of such business cooperation and a combination of interests was contracts for the construction of the Amur Railway, parts of which were put up for private contractors at auction. The state strove to reduce its costs, because these enterprises on the colonized outskirts remained extremely capital-intensive. Thus, the public–private sector alliance became a means of solving transport accessibility in many remote parts of the region.

The Far Eastern territory's specific conditions—low transport accessibility, low population density, and border position led to the fact that the usual market and administrative mechanisms here did not always provide the necessary result of development. Where there were no conditions for competition in transportation, the cooperation of entrepreneurs and state structures was used. This practice became a significant factor in the life of the pioneered land. The leading role in such cooperation, naturally, belonged to the state. The factors hindering the region's transport development were the lack of central planning and insufficient material support for the road industry. Summing up the development of transport in the Far East at the beginning of the twentieth century, it is necessary to state the severity of the road problem, despite the totality of institutions involved in its solution and obvious positive advances in this area.

3 Trends and Development Dynamics of the Transport System of the Russian Far East in the 1920s

The transport system of the Russian Far East, which was one of the key factors of settlement, development, and military-strategic strengthening of the region, by the beginning of the 1920s, had undergone significant changes under the influence of the revolution, civil war, and intervention. The fighting operations, the unstable political situation, and the economic crisis had the following effect on transport: the organizational and management structure of transport enterprises was in disarray; material and technical resources declined; communication lines were destroyed; the staff was lost. The interim governments that had broken through to authority sold off vehicles, fuel, and equipment.

As a result of the interventionist's actions, which provided not only military, but also the economic expansion of other states into the territory of the Far East, transportation facilities were plundered and destroyed. Cars, locomotives, rails, tools, cargoes of port warehouses were exported abroad. The losses incurred by the interventionists of the Amur railway from September 1918 to April 1920, were calculated, according to the data of the special state commission, at 12.8 million rubles in gold (Shishkin 1957). Dozens of vessels of the Voluntary Fleet, military departments, and private firms were taken from Far Eastern harbors to foreign ports. Warehouses, jetties, and civil buildings were burned in Nikolaevsk-on-Amur (Flerov 1973). The interventionists assigned the Amur flotilla and a significant part of the vessels of the civil river fleet.

Many transport facilities of the region were lost forever, the rest required a thorough restoration. In 1917–1920, 826 bridges were destroyed on the Far Eastern railways, 14 water supply facilities were destroyed, 20 railway stations and 80 residential buildings of the road employees were burned (Kopytin and Terletskiy 1926). In 1921–1922, station tracks in Vladivostok were cluttered with crashed vehicles. Compared to 1913 and October 1, 1922.[1] On the region's railways, the number of locomotives decreased by almost 2 times and freight cars by 1.5 (Medvedeva 2002). Before the First World War in the Far East, the Voluntary Fleet consisted of 20 steamboats and 2 tugboats (Byankin 1979), in 1923/24 10 own ships were operating in the Far Eastern Branch of the company, a "Diomid" tugboat and 4 rented vessels.[2] The Amur fleet, which included in 1913 285 ships, 76 ships and 343 barges, in 1923 consisted of 90 ships and 22 ships and 89 barges (Khorynskiy 1924).

After the Far Eastern Republic's accession to the RSFSR, the cessation of intervention and the establishment of Soviet authority in the region, the plundering of transport stopped. Even though at the beginning of the 20s a new economic policy (NEP) was actively developed, the Bolsheviks followed the general direction for the creation of the state sector of the economy. An important direction of their activity was the nationalization of transport and regional communications in the all-Russian

[1] The operational year began on October 1 and was pumped on October 1 of next year.

[2] GAPK Fonds 46. Series 77. File 1. Page 3.

system of economic management. In 1922, rail transport came under the authority of the People's Commissariat of Railways. The centralization of the material means of maritime transport was slower. Private Shipping Company G. G. Keiserling and Co., The Zherbovsky and Co. Partnership, and Brinner and Co. in the initial period of transformations were carried out by freight and passenger traffic between Far Eastern ports on the old regulations. On July 18, 1924, the joint-stock company Soviet Commercial Fleet (Sovtorgflot) was created, bringing together transport vessels, formerly belonging to various people's commissariats, departments, societies, and companies. Private shipping companies ceased to exist. A branch of Sovtorgflot was established in Vladivostok, which was later transformed into Far Eastern Shipping Company (FESCO, still exists). Owners of small vessels until the early 1930s could provide commercial marine communication in the coastal zone.

Restoration of transport took place under challenging conditions. The budget funds received from Moscow covered only a small part of the current needs. The lack of capital limited the purchase of technical equipment needed for the reconstruction abroad. The lack of materials and equipment, finance, qualified personnel reduced the possibilities of construction and repair. Despite this, transport facilities were being restored and equipment was revived.

Primary attention was paid to rail transport, which provided communication with central Russia and communication between the Far East regions. In 1922, the Chita, Amur, and Ussury railway lines entered the Far Eastern District of railways (sections of the Chita and Amur roads were later transformed into the Trans-Baikal). The system of the Far Eastern routes also included the CER. In 1924, the USSR and China signed an agreement on transferring the CER to joint management, under which the road operated on a commercial basis. By the mid-1920s, it was possible to achieve sustainable railway traffic. The operational length of the DVK railways on October 1, 1928, was 4,192 km, and also, 310 km of access roads.[3]

Replenishment of sea transport was due to small deliveries from other shipping companies and the purchase of ships abroad. Thanks to the satisfaction of the lawsuits filed by the Soviet Government over the illegal retention of Russian vehicles in foreign ports, it was possible to return part of the Voluntary Fleet vessels. In 1928, Sovtorgflot in the Far East had 18 steamers with a carrying capacity of 34.1 thousand tons. The missing capacity of the Far Eastern office of Sovtorgflot was replenished by chartering foreign, mainly Japanese, ships.[4] In 1928, 30 foreign vessels were chartered; in 1929–32 ones.[5] In 1928/29, in Vladivostok's port, 85% of the total cargo turnover was accounted for by ships under foreign flags.[6]

For inland traffic in the Far East, river navigation was of great importance. The main shipping network of the region was made up of the water arteries of the Amur basin: the Amur, Shilka, Argun, Zeya, Bureya, Amgun, Sungari, Ussuri, and others

[3] GAKhK Fonds 719. Series 9. File 2. Page 32.

[4] RGIADV Fonds 2413. Series 4. File 1301. Page 141.

[5] GAKhK Fonds 353. Series 11. File 6. Page 36.

[6] GAPK Fonds 46. Series 77. File 9. Page 90 rev.

Table 1 Inter-district transportation of goods by various transport types in the Far Eastern Region (thousand tons)

Indicators		The operational years			
		1925/26	1926/27	1927/28	1928/29
By railways	Shipment	2287	2807	3302	3811
	Arrival	3707	4214	4885	5328
By inland waterways	Shipment	396	494	504	539
	Arrival	396	494	504	539
By sea (in small and large cabotage)	Shipment	73	146	175	303
	Arrival	158	188	269	282
Total	Shipment	2756	3447	3981	4652
	Arrival	4261	4896	5658	6149

The table is based on: GAKhK Fonds 719. Series 9. File 2. Pages 8a, 9

rivers. Due to the lack of ships, the cargo was often transported on rafts. The traffic volume on inland waterways increased in the second half of the 1920s (see Table 1).

In the communication between settlements, along with river transport, an important place was horse-drawn. In the southern regions, where there were dirt roads, the locals used horse traction, in the north, to count only on winter roads and trails,—reindeer and dog sleds. Cars were rare on the Far Eastern roads in the 1920s.

During 1926–1929, several expeditions were carried out to identify the possibility of using aviation and laying airlines in the Far East. There were single flights for rescue and urgent delivery of goods and passengers. In 1929, a regional civil aviation authority was created. The study of the conditions of use of aviation in the region had become more intense. Regular overhead lines opened at that time.

The first part in inter-district transportation in the Far East was played by rail transport, which accounted for 82.3% of the total cargo and 86.5% of cargo arrived in 1925/26–1928/29 (Table 1). In the second half of the 20s, the transportation of building silicates, timber, coal, metal, salt, fish, and soybean meal increased significantly in the Far Eastern Territory. The arrival of goods far exceeded the departure. But by the end of the 1920s, the gap between them had narrowed, since during 1925/26–1928/29 cargo departures increased by 1.7, and arrival 1.4 times (Table 1).

The role of maritime transport in the run of goods and passengers gradually grew. If in the 1923 navigation, the Far Eastern sailors made 20 voyages, then in the next operational year— 484 ones.[7] The movement was carried out in coasting, and in the ports of Japan, China, and Korea. In 1925, the Main Office of Sovtorgflot in the Far East, having 36% of the pre-war tonnage, exceeded the pre-war level of cargo turnover by 8% (Byankin 1979).

The largest sea harbor in the Far East was the port of Vladivostok. From 1921, the balance of import and export changed in the port. If in 1913, 939.9 thousand tons of cargo were imported through Vladivostok and 529.7 thousand tons were

[7] GAPK Fonds 46. Series 77. File 1. Page 3 rev.

exported, in 1921–149.4 and 408.7, and 134.4 and 612.2 thousand tons.[8] This trend continued in the future. In the fiscal year 1923/24 of the USSR's twenty leading ports, Vladivostok brought the greatest profit from its activities (Byankin 1979). Its cargo turnover in 1926 exceeded the level of 1913. The export transshipment turned into the port's main direction, averaging 87% of the total port turnover in 1924/25–1927/28 (Medvedeva 2002). Wood and fish were supplied abroad, but the North Manchurian transit export prevailed in the export structure: beans and legume oil flowed through Vladivostok, mainly to Europe, and mainly oilcake to Japan. The import of soy raw materials in the 20s was increased by England, Holland, Denmark, and Germany. The transit of soy products from Manchuria through the Far East' ports and railway lines was an important source of foreign exchange earnings and replenishment of the regional budget. Its flow ceased after the aggravation of relations between the USSR and China in 1929.

The restoration of transport in the Far East in the 1920s was mainly based on regional potential. It was possible to revive leading transport enterprises' activities and the message on the most important directions of the passenger-and-freight movement. The industry's material and technical resources were outdated, and it was impossible to carry out its technical re-equipment and renewal by the available resources. The solution to the problems of the fundamental reconstruction of the Far East transport system began in the years of the first five-year plans.

4 Peculiarity of Industrial Modernization: The Imperial and Soviet Model of Industrial Development

The directions, rates, and results of the development of the Eastern outskirts of Russia were determined by the action of objective factors: the own potential of a particular territory, climate, natural resources, population level. The policy pursued by the state in this regard was of great importance for the development of the region. The Far East was notable for its vast territory, harsh climate, incredible diversity, and wealth of natural resources, but at the same time, it was very poorly populated, which determined the peculiarities of its development. The state's role and the large proportion of its functions and the Far East's influence were also due to the enormous length of state borders, which required a great deal of attention and expense from the state (Gallyamova 2000).

The main direction of Russia's policy toward the Far East was to strengthen its defense capability. Created in the region in the late nineteenth–early twentieth century, large industrial enterprises were state-owned, they served requests from the army, navy, fortress construction, and transport primarily. Private capital developed the mining, forestry, fisheries, food industries, and the sphere of trade. Such a segmentation between state and private capital and the overall dominance of state industry were features of the modernization of the Russian Far East in the imperial

[8] GAPK Fonds 356. Series 24. File 1a. Page 86.

period and reflected the state policy of turning the region into Russia's outpost in the Pacific (Maklyukov 2018).

By the beginning of the twentieth century, the Far East industry's dominant positions were occupied by the extractive industries, which predetermined its importance as a source of raw materials in the system of the national economy of Russia. The gold mining industry accounted for more than half of the annual industrial production. The Far East ranked first in the country in terms of the amount of gold mined. An essential factor in the region's industrial modernization was the technical restructuring of enterprises and the introduction of steam and electric machinery. The first part began to play those sectors of the economy in which mechanisms and engines were more widely used (Maklyukov 2018).

The First World War had a strong influence on the development of the economy of the Far East. Due to its geographical position, the region played the most crucial role in Russia's transport corridor, accepting the considerable volume of cargo arriving along Pacific routes from the USA and Japan. Overloading the transportation system and disrupting inner economic relations led to the deterioration of the region' economic situation, creating the prerequisites for revolution and civil war (Gallyamova 2000).

After the restoration of the Soviet Authority in the region at the end of 1922, a new period of industrial development of the Far East began. The USSR took the modernization path and needed many natural resources, which were concentrated mainly in the eastern regions. That is why it became necessary to shift the industry to the east of the country. Besides, there was a need to strengthen the country's defense potential in the conditions of the intensified struggle for the re-division of the world.

Industrial modernization in the Far East took place in the conditions of the USSR' formation of an authoritarian political system, which demanded the unquestioning implementation of the political and administrative center's directives. Remoteness from Central Russia and low development of the territory required substantial public investment and authoritarian and extraordinary management methods, settlement, and development. Backdating of the Far East's development plans made serious changes, which led to the disorganization of industrial construction, and the waste of material and human resources.

In the imperial model of industrial development of the Eastern territories and state control, there were mechanisms of private property and the free market, which played an essential role in industrial modernization. In the Soviet model, the role of the state in economic life grows dramatically, the volume of its functions increases, the center's influence in solving all the issues of regional development intensified, and market mechanisms completely lose their previous meaning. The primary imperative for developing the country's economy becomes the reliance on the country's internal capabilities (Maklyukov 2018).

Taken all over the world, the imperial model and the Soviet model of industrial development of the Far East were based on a strong state influence on the region. This can be considered a joyful moment. The higher rates of industrial modernization were maintained in the young east than in the west of the country, because there was no particular risk of contradiction with the old, obsolete elements of the social system.

Simultaneously, the enormous influence of centralized management and bureaucratic structures, ignoring local characteristics, conditions, and interests, was manifested.

5 Conclusion

Comparing of development of transport and industry of the pre-revolutionary and post-revolutionary decades in the Far East of Russia demonstrates a high degree of continuity between the two eras. Thus, both periods are characterized by significant state participation as an economic agent, a lack of local development resources, and dependence on external development sources.

The causes of this situation were, firstly, the paradigm of development of the Russian economy driven by extensive participation of state capital, secondly, the large-scale tasks of the initial development of the region: the creation of development infrastructure, accelerated settlement of the region, ensuring military security, and so on.

Only the state could cope with such tasks quickly and follow the government's views. As the obviously high cost of project implementation, such development policy shortcomings justified the region's military-strategic importance for the state.

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Does Siberia Have a Bright Future: The Prospects of the Social, Environmental, and Energy Efficiency Development

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Abstract The authors analyze the problems and prospects of the socio-economic, scientific, and technological development of Siberia and the directions of strengthening positions in the world and Russian space. The primary development problems of Siberia and the Siberian Federal District (further-SFD) are identified, taking into account modern challenges and threats. The authors used Data Envelopment Analysis to define the technical efficiency of the social, environmental investments, and energy consumption level. It is shown that the recovery of the Siberian economy as a whole and the SFD regions, particularly, should be based on a significant increase in investment activity at all levels: macro-regional, regional, and municipal. Need to develop the focus on "embedding" Siberia in new international initiatives, high-tech niches of the Russian and world economies, as well as on a system of priority measures that should be taken at the national, interregional, and regional levels.

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V. N. Bocharnikov and A. N. Steblyanskaya (eds.), *Humans in the Siberian Landscapes*, Springer Geography, https://doi.org/10.1007/978-3-030-90061-8_9

Keywords Siberia · Great projects · Interregional interactions · Siberia system economy · Data envelopment analysis (DEA)

Glossary

GRP Gross Regional Product (GDP)-a comprehensive measure of the economies of counties, metropolitan statistical areas, and some other local areas. Ural-Kuznetsk Industrial Complex (UKIC)—a steel and iron-producing complex consisting of 15 metallurgical plants located in the Urals and Siberia, 7 coal mines, 5 coke chemical enterprises, 14 non-ferrous metallurgy enterprises and 27 power plants. Siberian Federal District (SFD)—the territory of the SFD represents 25.47% of Russia's territory. The population is 17009.2 thousand people (on the 1st January 2021). The district's share accounts for 9.6% of Russia's GDP. The district includes ten subjects, including three republics (Altai, Tyva, Khakassia), two territories (Altai, Krasnoyarsk), and five regions (Irkutsk, Kemerovo, Novosibirsk, Omsk, Tomsk). The total area is 4361.8 thousand square kilometers (25.5% of the Russian Federation's territory). Data Envelopment Analysis (DEA)—is a performance measurement technique that can evaluate the relative efficiency of management processes.

1 Introduction

Siberian Federal District (further-SFD) is the hugest region of the Russian Federation (Siberia is 5114,8th sq km., Russia 17 125,2th sq km, 30% from the territory of the Russian Federation). In 2019, the Spatial Russian Federation development strategy or the period up to 2025″ (SSD 2025) noted that "The purpose of the spatial development of the Russian Federation is to ensure sustainable and balanced spatial development of the Russian Federation, aimed to reduce interregional differences in level and quality life of the population, acceleration of economic growth and technological development, as well as to ensure the national security of the country" (SSD 2025). Siberia's primary economic indicators see in Table 1.

The academic Kryukov V. A and his command in the Russian Academy of Science believe that Russia's rapid development is simply impossible in a situation where Siberian economic progress is hampered. However, Siberia not only started to lose the pace of development, but is also steadily sliding down to the position of the country's economic outsiders. In early 2020, Rosstat published data on population dynamics in the country. Siberian regions occupy one of the leading places in terms of population decline, with Omsk oblast, Altai krai, Kuzbass (Kemerovo oblast) holding the sad title of "leaders" of this process (Kryukov et al. 2020).

Table 1 SFD share in the leading indicators of the Russian Federation, %

Indicator	1995	2010	2016	2017	2018
Population	12.6	12.1	12	12	12
GRP	13.7	10.2	9.6	9.7	8.3
Employment	12.8	13.1	12.6	12.6	12.6
Investment in fixed capital	11.5	9.9	9.1	9	8.9
Energy consumption	12.90	9.80	9.10	9.00	8.9
Consolidate budget revenues	12.8	10.9	10	10	9.8

Source (Kryukov 2020) from statistical collections of the Federal State Statistics Service "Regions of Russia. *Noted* SFD—within modern borders (excluding the Republic of Buryatia and Zabaikalsky krai)

Among the crucial problems of spatial development, particularly, (among others) are marked: "… insufficient number of centers of economic growth to ensure the acceleration of economic growth of the Russian Federation; … unrealized potential of interregional and intermunicipal cooperation; …". The problems mentioned above are very closely related to each other. Thus, we can talk about the fragmentation of the economic, scientific, innovative, and political space of Siberia as a fait accompli and the prevalence of centrifugal trends in the economic interaction of its regions over centripetal ones (Kryukov et al. 2020), within interregional and intermunicipal interaction can significant synergistic effects arise and develop, which will contribute to solving both current and future problems of socio-economic development and the country in the whole and its regions, in particular. This problem is far from new and is a continuation of the "eternal" question of the wearing and interaction of industry and regional profiles solving social and economic development problems. The increased attention to Russian regions is mainly because the scientific, technical, and industrial policy has fallen out from the region's economic growth. Critical spatial development issues are infrastructural restrictions and appropriate economic and environmental indicators analysis. The policy's main object is the develop some system of socio-economic indicators and the system of support measures from the federal center to the regions. This leads to competition between regions for various forms of support to solve the existing problems (from transfers for current social expenditures to getting the opportunity to host "landmark" sports and cultural events). Among the innovations of 2019, aimed at solving the problems mentioned above, is an attempt to "seize" national projects by region of their possible implementation through the system subprojects (NP 2018). This approach creates conditions and a certain framework for the creation and development of interregional economic ties.

However, at the same time, the question remains as to what extent this or that subproject meets the solution of the problem of forming effective interregional and intermunicipal interaction (first of all, achieving a certain synergistic effect). In our opinion, the key problem is the formation of balanced (taking into account spatial characteristics) chains of both added value creation and the "reverse" distribution of the received effects. In other words, it is worth the task of how to take into account

the interests of those regions within the framework of the subproject Siberia, which can be territories of placement or the next processing of extracted raw materials, or be suppliers of science-intensive products and scientific and technical services. The main task is to create such procedures and mechanisms of interaction of interested parties (regions, business, and federal level), which would provide the synergy of efforts of those subprojects who are the territory of the macroregion. At the same time, it seems to us, it is imperative to take into account and take into account not only spatial features of the formation of interactions between business subjects (economic agents) located on the territory of various subjects of the Federation, but also the time frame of the process of their formation and further development of "subprojects". From this point of view, for example, the attempt to "fix" specific "specializations" in the Spatial Development Strategy for the regions raises many questions. The development of infrastructure and the development of interregional interactions in the modern economy is changing quickly. On the other hand, modern "specializations" poorly take into account those changes which are associated with the development of cooperation and interactions between regions in cases where their joint efforts receive a finished form—in the form of a product or a specific type of service—on the territory of only one of the coalition members. The economy of Siberia from the point of view of the above problems—interaction and cooperation of regions located on its territory, has a number of features: (1) the basis of the currently available production and technological potential is formed by previously created assets; (2) the economy of Siberia is dominated by economic and production-technological interconnections associated with one side, with successive stages processing and use of natural resources, and on the other parties with the supply of engineering products and services of a scientific and technical nature; (3) in the process of privatization and reorganization during the transition to market-oriented economy in the 1990–2000s, many industrial and economic ties and relationships were severed; within the framework of value chains, the initial stages were developed—the development and extraction of natural resources, which were oriented toward the export of low-processed products; (4) the natural resource sector of Siberia is rapidly changing—main sources of development and extraction of natural resources all more complicated in terms of qualitative characteristics (types of sources of natural resources, as well as their ever-increasing remoteness from previously established centers of production and processing) present an increased demand for new knowledge and technologies. The circumstances noted above allow us to look differently at Siberia regions' interaction, and Siberia's organizational and economic framework development. Thus, Siberia's microregion economy must have a strong synergistic effect on Russia as a whole.

2 Sinergetic interaction of Siberia regions

It is of interest to understand the dynamic changes in the interaction of territorial and sectoral (specialized) factors and conditions for the development of Siberia from the standpoint of the choice of procedures and mechanisms aimed at the formation of

synergistic interaction of its regions. The primary ideas and approaches to solving the problems of Siberia' socio-economic development, which have not lost their relevance, were formulated in the works of many prominent researchers, publicists, and practitioners of bodies public administration (Yadrintsev 1882; Sapozhnikov et al. 1908). These authors considered the following methods for Siberia' socio-economic development: 1.Granting of significant rights to the natural resource potential territories and the tax benefits; 2.Construction of factories that combine different complementary activities located in various regions of Siberia and Urals; 3.Development of regional production complexes; 4.Creating free economic zones along Siberian rivers; 5.Development of integrated socio-economic-ecological programs for Siberia and every Siberia region.

Each approach had its reasons for being presented and promoted in a specific period in a specific social and economic conditions and circumstances. The general trend over almost a century of history, unfortunately, in the authors' opinion was (and still is prevailing) in emphasis on local organizational and economic forms (in within a relatively smaller area compared to the region). However, the Russian government did not develop the regions of Siberia through the systematic development of interregional ties. The promotion of Siberia' s interregional relations was not a significant priority for the authorities.

The solution to the country's main economic problems in the 1920s—early 30s was based on the idea of forming large territorial industrial complexes (including the so-called agro-industrial plants). USSR authorities embodied this idea into the Ural-Kuznetsk Industrial Complex (UKIC) development plans. That's why the reconstruction of the USSR economy is associated with the transition to a system of territorial socialist industrial complexes (Kolosovsky 1932). Cooperation was investigated within the framework of the main technological chain of ore, coal, and metal smelting. But scientific mechanical engineering' development was the primary goal for industrial complex achievements (SRDP 1931). A significant detail—the development of mechanical engineering was considered both in connection with the development of specialized production facilities of the UKIC, and in connection with the development of natural resources Siberia and the Urals (for example, agricultural engineering, transport engineering, shipbuilding in the cities of Siberia, etc.). When justifying such decisions, they proceeded from maintaining employment in industrial centers, improving the skills and level of competence of workers living in cities and industrial settlements. An important role was played by taking into account the transport component—the cost of transporting machinery and equipment from faraway industrial centers of the European part of the country. Ural-Kuznetsk Industrial Complex took into account the possibilities of interregional trade cooperation. It was based on a certain logic of developing production and technological ties and the opportunities that ensured cooperation and interaction within an extensive territory.

Unfortunately, these plans were destined to come true only partly. Several industries were created. Metallurgical, coal, chemical plants were built, as well as agricultural engineering enterprises were developed. The main reason is not economic in nature. The Second World War approach introduced fundamental adjustments—a

significant part of the machine-building enterprises were redesigned for the production of military products. Later, during the Great Patriotic War, thousands of military-industrial complex enterprises were evacuated to Siberia. Many of these enterprises remained in the post-war years. Siberia has maintained its defensive profile. Civil engineering has also developed (first of all, machine tool building and partly mining machine building), but on a relatively smaller scale.

3 Market Transformations

Subsequently, the Siberian industry's development for a long time was under the predominant influence of the processes associated with the confrontation during the Cold War. Hence, the fundamental feature of the development of the organizational and economic model is the period of construction of the "foundations of communism"—the development and strengthening of the departmental "principle" in managing the country's economy and solving emerging problems and tasks. Departments increasingly "deviated" from the principle of territorial binding—all the main cooperation ties were considered and developed to solve industry problems within the framework of general industry preferences. As a result, imbalances arose, related to the use and development of opportunities for interregional cooperation and interaction, and within the framework of specific local centers and territories. In the second half of the 1950s, it was made the attempt to address these problems within the framework of creating territorial bodies for managing the national economy (economic councils). Alas, the attempt did not occur due to the impossibility of solving the problems of promising scientific and technological development and the complexity of accounting in such a management system of the priorities of the country's socio-economic development as a whole. The next step was associated with a departure from the universal model of combining sectoral and territorial sections of the national economic plan to the electoral model.

Its essence consisted in the creation and development of local intersectoral "project" formations—"territorial production complexes" (Bandman 1980). In the 1960s and 70s, several similar complexes were created. However, some challenges initially faced these complexes in their creation and functioning. It was some difficulties concerning production structure development, primarily due to the inconvenience of regional infrastructure facilities. Those complexes that started and came into effect were mainly limited to the initial stages—mining and primary processing (including metal smelting) of raw materials. For the reasons noted above, development programs for intersectoral complexes of Siberia (which were supposed to form based on the interaction local intersectoral formations) were a set of insufficiently interconnected sectoral subsystems.

As part of the latest Soviet reform aimed at improving economic management methods, an attempt was made to form intersectoral concerns (within the framework of which efforts were also made to harmonize the sectoral and territorial aspects of solving economic problems).

Among the intersectoral concerns created at that time, a number of them managed to adapt to the subsequent radical market transformations (Gazprom and LUKOIL, particularly). The stability of these enterprises in economic reorganization and privatization is explained by the short product chains focused on export. Unfortunately, the same cannot be said about interregional scientific and technical complexes. Market transformations have resulted in the primitivization of production and technological chains emphasizing the initial stages of obtaining export-oriented raw materials. The interregional chains were disunited and the new crises destroyed Siberia' s regional economy as a whole. Among the main reasons is a sharp decline in internal demand, lack of investment resources, and as a consequence, the dominance of those stages within the chain of creating added costs that were associated with the extraction of raw materials and their processing.

4 Methodology

4.1 Data

The authors used data from the Russian Federation official statistical website (http://www.gks.ru), part "Regional statistics, Siberia Federal district". The authors used Russian and SFD economic, social, and environmental indicators.

4.2 Methods

The main methodology of efficiency assessment in various areas, including education, is *Data Envelopment Analysis* (DEA), which was suggested by Farrell (1957), Charnes et al. (1978) and Banker et al. (1984). These authors developed CRS (*Constant Returns to Scale*) and VRS (*Variable Returns to Scale*) models:

CRS model

$$\alpha_k + \varepsilon \sum_{r=1}^{q} s_r + \varepsilon \sum_{i=1}^{m} s_i \to \min$$

$$y_{rk} - \sum_{j=1}^{n} \lambda_j \cdot y_{rj} - s_r = 0$$

$$\alpha_k \cdot x_{ik} - \sum_{j=1}^{n} \lambda_j \cdot x_{ij} + s_i = 0 \qquad (1)$$

$$\sum_{j=1}^{n} \lambda_j = 1$$

$$\alpha_k, \lambda_j, s_i, s_r \geq 0, \forall r = 1..q,$$

$$\forall i = 1..m, \forall j = 1..n, \forall k = 1..n$$

VRS model

$$\alpha_k + \varepsilon \sum_{r=1}^{q} s_r + \varepsilon \sum_{i=1}^{m} s_i \rightarrow \max$$

$$\alpha_k \cdot y_{rk} - \sum_{j=1}^{n} \lambda_j \cdot y_{rj} + s_r = 0$$

$$x_{ik} - \sum_{j=1}^{n} \lambda_j \cdot x_{ij} - s_i = 0 \tag{2}$$

$$\sum_{j=1}^{n} \lambda_j = 1$$

$$\alpha_k, \lambda_j, s_i, s_r \geq 0, \forall r = 1..q,$$

$$\forall i = 1..m, \forall j = 1..n, \forall k = 1..n$$

The graphic presentation of efficiency according to models (1) and (2) is shown in Fig. 1a.

The efficiency is calculated as follows:

CRS model

$$\square\square = X_{\text{ideal}} / X_{\text{fact}} \tag{3}$$

VRS model

$$\square\square = Y_{\text{ideal}} / Y_{\text{fact}} \tag{4}$$

The main shortcoming of this approach is the linearization of the existing multidimensional space of input and output parameters used to describe objects. It introduces an additional error into the task of optimization. This error is presented in models (1) and (2) as *slacks* s.

In order to eliminate these slacks, Tulkens (1986) suggested the *Free Disposal Hull* (FDH) model. The main idea of this approach is to present data on all the

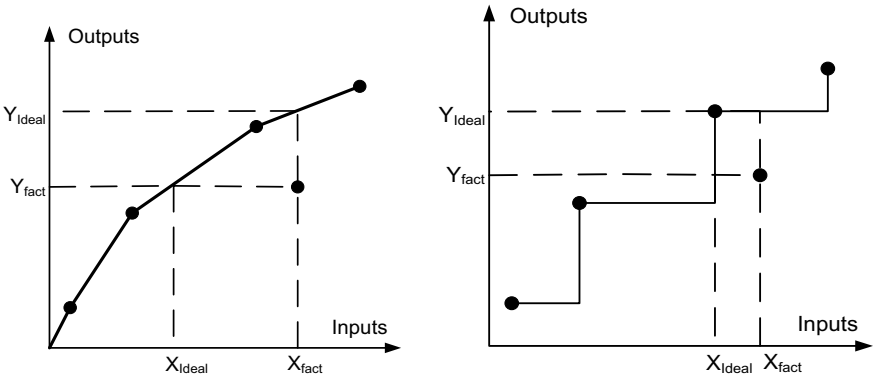

Fig. 1 DEA efficiency graphic presentation

objects under analysis in form of a multidimensional body limited by a convex hull. To describe the convex hull, it was suggested to use the rectangle mesh vertices, which are the objects with the maximum efficiency. The graphic presentation of efficiency according to FDH model is shown in Fig. 1b. However, as the number of objects forming a convex hull is usually small, the mesh to describe it has large *cells*, which significantly decreases the quality of the obtained results. To improve the quality of the assessment, various approaches are used, including:

- approximation of a hull according to parametrical mathematical law;
- clusterization of the inputs and building convex hulls for each cluster followed by combining into the one non-convex surface (Green and Cook (2004), Kerstens and Van de Woestyne (2013)). It can be noted that, in the first case, it is necessary to make a hypothesis about the existence of a mathematic law. On one side, it is not always possible, because approximation is related to introducing an additional error to the system. The latter case does not eliminate the problem of the low variability of the rectangle cell, but eliminates anomalies in assessing the efficiency of objects inside the border cells of the convex hull. In order to eliminate the shortcoming of the FDH model mentioned above, it is suggested to use a triangle mesh instead of a rectangle one (Fig. 1a). It does not require linearizing the hyper-space, but assumes smooth lines between the vertices of the convex hull. This paper suggests the solution to this problem.

5 Results

The authors calculated three models concerning the development of the Siberia region' s social, environmental, and energy indicators.

5.1 Model 1

The authors developed a model for evaluating social efficiency of the Siberia. The following indicators were used:

- Atkinson Index (output)
- Population (input)
- Unemployed population (output)
- Salary (output)
- General health expenses (input)
- General education expenses (input)
- General transport costs (input)
- Damage from traffic accidents (output)
- Divorces (output)
- Crime damage (output).

Figure 2 shows that social-oriented trend was damaged in 1999–2000 and still not recovering. The level of the SFD social efficiency is very low and insufficient. Within inter-regional interaction, significant synergistic effects can arise and develop, which will solve both current and future problems of Siberia's socio-economic development. This problem is far from new and continues the "eternal" question of regional profiles solving social and economic development issues. One of the primary issues is that living in Siberia requires considerable resources for life support and activities. This fact means that the incomes of Siberians should be higher than have Russia's middle and south regions residents. They should reimburse the additional costs associated with a cold climate, transport remoteness, insufficiently formed social infrastructure, higher food prices, and higher utility costs. However, nowadays, the earnings of Siberians are lower than those of the average Russian, and the

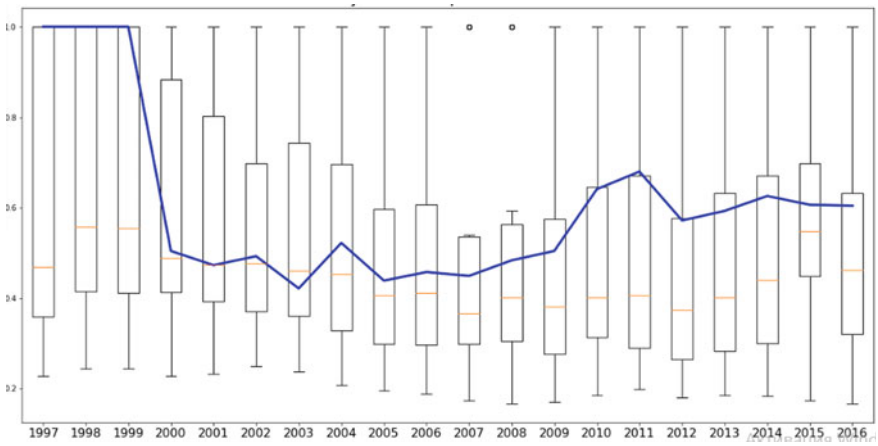

Fig. 2 Social oriented trends technical efficiency

difference in earnings continues to increase. Due to low incomes, family problems, health problems, educational problems and other unfavorable social circumstances increase accordingly.

5.2 Model 2

The authors developed a model for the evaluation of the environmental efficiency of the Siberia region. The following indicators were used:

- Investments into environmental protection (input)
- Costs of eliminating environmental disasters (output)
- Water pollution (output)
- SO2 emissions (output)
- Smoke and dust emissions (output)
- Solid household waste without disposal (output).

Figure 3 shows a stable downward trend concerning SDF ecological efficiency. Several regions of Siberia were included in the lists of subjects with the most unfavorable environmental situation in 2020. Most often, experts point to polluted air. Environmental activists have not observed positive dynamics in these regions in solving ecological problems over the past few years, despite the population's protests. The scale of the problem is so grand that the intervention of the regional authorities alone is not enough and need to ask federal level authorities to regulate the situation.

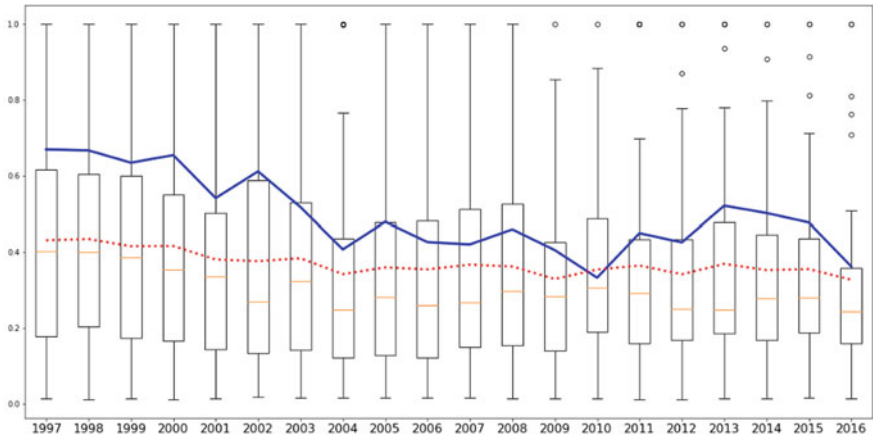

Fig. 3 Ecological protection technical efficiency

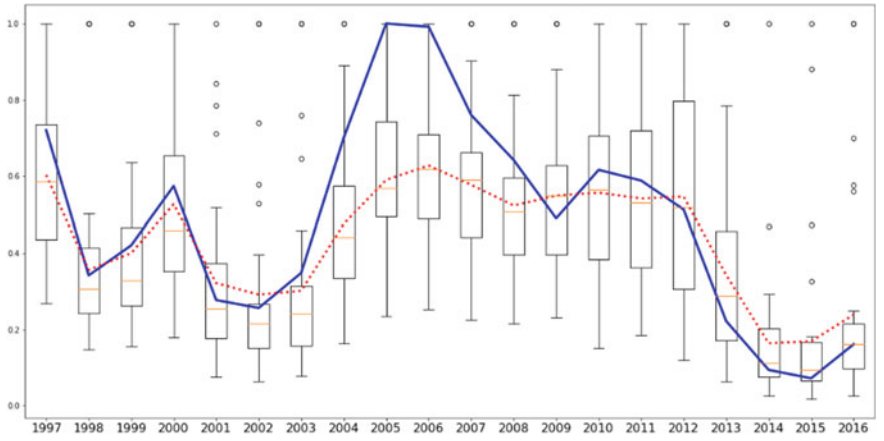

Fig. 4 Economic and Energy technical efficiency

5.3 Model 3

The authors developed a model for the evaluation of the economic and energy efficiency of the Siberia region. The following indicators were used:

- Share of investments in GDP (input)
- GDP (input)
- Oil consumption (output)
- Natural gas consumption (output)
- Electricity consumption (output)
- Coal consumption (output)
- Water consumption (output)

Figure 4 shows a downward unstable trend of the SFD energy efficiency line. The most important consequence of these changes is the significant weakening of Siberia's subregions' inter-connections with the strengthening of economic rent beyond its limits. It is challenging to speak about Siberia's stable economy in such a situation. This circumstance enhances the role and significance of new knowledge and practices for emerging problems' solutions (Karpik 2004). Authorities understood the role and significance of natural resources extraction. However, we have degraded local centers to produce mechanical engineering and backward scientific and technical services without green innovation. Step by step, the industrial belt along the Trans-Siberian Railway increasingly transformed into a belt of various kinds of services concentration (educational, scientific, financial, medical). Simultaneously, territories associated with the natural resources' s extraction have largely reoriented to export raw materials and semi-finished products. The most important sector of the SFD economy is the fuel and energy complex, including electricity, heat, gas supply systems, coal, and oil refining industries. SFO generated about 21% of the electricity and 17% of thermal energy produced in Russia. Amazing that in SFO, about 80%

of Russian coal is extracted. Improving the energy efficiency of the SFD economy is a task of great importance in the next decade. As of January 1, 2021, the average level of natural gasification in Russia was 71.4%. At the same time, the lowest level of gasification—16.8%—remains in the Siberian Federal District. First of all, the increase in the energy efficiency of the SFD should occur due to the intensification of energy conservation, implementation of green technologies, optimization of the settlement system in the Far North, and equivalent areas.

6 Conclusions

World's experience in this area shows that along with knowledge and skills of a general (universal) nature, the role of local knowledge associated with specific conditions for the development and use of natural resources increases in a particular location. This circumstance enhances the importance of global centers for generating knowledge and providing high-tech manufacturing services. In our opinion, in modern conditions, the solution is "eternal" for the economy of Siberia, the problem associated with the harmonization of sectoral and territorial aspects of socio-economic development lies in the management and regulation of the development and using the natural resource potential of a vast territory. It is recommended to embed regional scientific, technical and production development issues into the Siberia socio-economic development program through all management levels. This approach will allow local centers of expertise and scientific organizations not only to accept participation in determining the conditions for the use of regional scientific and production opportunities when providing (and subsequent monitoring, taking into account their development) rights to use natural resources (Shafranik and Kryukov 1997), but also progressively develop their competencies.

Scientific and technical conditions for implementing projects related to the extraction and development of natural resources drive local growth, enhance knowledge skills, and develop production and technological capabilities. Our considerations are based, among other things, on the experience of countries such as Canada, Norway, Australia. Regional scientific and technological development centers were closed without procedures supporting communication processes. As world practice shows, the consequence of this fact is the dominance of foreign high-tech companies and the lack of research demand from domestic origin research centers. So, for example, in the USA (Burnett et al. 1993), with the development of gas resources extraction technologies from shale deposits, we understood that an economic entity's model of rational behavior is not applicable when choosing scientific and technological solutions. This model ignores experts' subjective intuition, does not take into account the palette of opinions and preferences of decision makers, and does not take into account attention to socio-economic circumstances and constraints. For these reasons, it was recognized that the purely market "rational" expectations are unacceptable in determining the strategic directions of scientific and technological policy in the development of unconventional hydrocarbon resources.

It is necessary to widely use modern information technologies to analyze data taking into account the space's various characteristics, for example, geo-information technologies. The modern natural resource sector is very high-tech and has a demand for advanced knowledge and technology. The essential feature of project implementation (subprojects of national projects) should be cooperation between natural resource companies and scientific centers. This direction is feasible and based on Siberia's scientific and technological development priorities. The organizational and economic framework for the implementation of subprojects should be supplemented with procedures for interaction of all parties interested in their implementation.

In the framework of activities at the interregional and regional levels, it is necessary:

1. To carry out regionalization of national projects taking into account the interests, opportunities, and specifics of specific SFD regions.
2. To prepare proposals for establishing a system of project offices and research and analytical centers (primarily for the implementation of the process approach to the implementation of projects in the macroregion).
3. To set up a system for identifying, supporting, and promoting projects aimed at ensuring the connectivity of the macroregion economy and ensuring synergistic effects of the interaction between various territories and various business structures.
4. To strengthen the role of the Siberian Branch of the Russian Academy of Sciences in the scientific support of cross-border interactions in the east of Russia (Parmon et al. 2020).

Acknowledgements This Study was supported by Fundamental Research Fund for the Central Universities (Harbin Engineering University) (GK2090260229, GK2090260236), Heilongjiang Provincial Natural Science Foundation Project (LHG2021009, 2021/07-2024/06) and China ministry of science and technology high-end foreign expert introduction project (DL2021180001L).

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Future of Siberia: Development of Railway Infrastructure

Alexander V. Kotov, Olga V. Efimova, Ai Mingye, Alina N. Steblyanskaya, and Qian Wang

Abstract The paper describes that the main challenge to the transport and transit position of Asian Russia is the difficulty in building and maintaining the railway network. It is emphasized that the fragmentation of the economic space causes focal development. The general lack of coordination between the modes of transport in Siberia could be explained historically by the active use of railways as the panacea for region growth. The significant positive impact of the experience of construction of the Baikal–Amur and Amur–Yakutsk highways is optimal for the development of Siberia in transport development with the parallel creation of industrial complexes. Nowadays, it is necessary to use significant projects to upgrade Siberia's railway infrastructure for the formation of the region's transit potential. It is emphasized that most transport projects initially contain such a possibility. It is determined that the

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V. N. Bocharnikov and A. N. Steblyanskaya (eds.), *Humans in the Siberian Landscapes*, Springer Geography, https://doi.org/10.1007/978-3-030-90061-8_10

"Eastern Polygon" development exclusively for export transportation seems inappropriate. The article discusses critical railway projects for the future, which are of a pronounced urgent nature, and are summarized: the Northern Latitudinal Railway, the railway crossing to Sakhalin, Kyzyl–Kuragino, the North Siberian Railway. These proposals consider the long-term transcontinental road for Russia's northeast integrated development. Finally, we proposed and substantiated that the development of railways remains crucial for the development of Siberia and the formation of international corridors that will take shape by commissioning new infrastructure and reducing the shortage of capacity.

Keywords Siberia · Russian railways · Transsib · Baikal–Amur and Amur–Yakutsk highways · Baikal–Amur and Amur–Yakutsk highways · Promising railway transport in Siberia

Glossary

Amur–Yakutsk Magistral (AYM)	is a railway in the eastern part of Russia connecting Yakutia with BAM and the Transsib.
Baikal–Amur Magistral (BAM)	is the railway passing through Eastern Siberia and the Russian Far East, with a length of 4324 km, one of the largest railway lines in the world. It runs approximately 610–770 km north of the Trans-Siberian Railway and is parallel to it. The main stage of the construction of the highway occurred in 1974–1984. Most of the highway is laid in the permafrost zone.
Eastern polygon	is a project of comprehensive modernization of the BAM and Transsib, which will increase the capacity of railways by almost twice.
Elegest coal deposit	is located in the center of the Republic of Tyva along the left tributary of the Yenisei—the Elegest River. The deposit has reserves of about 1 billion tons of coking coal of the highest quality.
Kuznetsk coal basin (Kuzbass)	is one of the largest coal deposits in the world, located in the south of Western Siberia, in a shallow basin between the mountain ranges of the Kuznetsk

	Alatau. The balance reserves of coal—54.5 billion tons, brown coal—34 billion tons.
Meridional communication paths are	communication routes built from north to south, i.e., along the meridian.
North Siberian Railway (SevSib) is	the project of a railway with a length of about 2 thousand kilometers, which should connect the railway network of the Khanty-Mansiysk Autonomous Okrug—Yugra with the Baikal–Amur mainline.
Northern latitudinal course	is the railway under construction in Siberia with the route Ob-Salekhard–Nadym–Novy Urengoy–Korotchaevo.
The Northern Sea Route	is a sea route in the North Polar Sea along the northern coast of Russia, connecting the Atlantic and the Pacific Oceans.
The South Siberian Railway (YuzhSib)	is a partially electrified railway line in Russia and Kazakhstan. The route is a part of the Trans-Siberian Railway network. The South Siberian Railway runs from Magnitogorsk via Northern Kazakhstan (Nur-Sultan–Ekibastuz–Pavlodar), Barnaul, and Abakan to Taishet.
Transpolar railway is a	project from the shores of the Barents Sea to the coast of the Sea of Okhotsk and to Chukotka; it was developed in the 1930s. The road was never completed, and the sections were built in 1947–1953 were connected to the country's railway network through the Pechora Railway.
Trans-Siberian Railway (Transsib)	is the railway between Chelyabinsk and Vladivostok, connecting the European part of Russia with the largest East Siberian and Far Eastern industrial cities (Perm, Yekaterinburg, Omsk, Novosibirsk, Krasnoyarsk, Irkutsk, Chita, and Khabarovsk). It was built in 1891–1916. The length of the highway at the end of construction was 8.3 thousand km, it is the longest railway in the world.

Vanino	is the largest transport hub of the Khabarovsk Territory, located on the northwestern shore of the Tatar Strait and the Baikal–Amur railway. The Vanino seaport carries out operations with containers, bulk, oil, timber, and general cargo, including dangerous goods.
Yakutsk	is the world's largest city built on permafrost. It is the capital of the Sakha Republic. The region is rich in natural resources: gold, diamonds, oil, and gas, as well as many precious stones and minerals, are mined here.

1 The Role of Railway Transport in Siberia

Historically, the development of railway transport in Siberia began in the 1890s, when the construction of the first Trans-Siberian railway across Siberia started. It also plays a significant development and pioneer role in areas poorly involved in human economic activity. By 1916, the Transsib ultimately passed through the Russian territory and became an essential economic and cultural event (Malov et al. 2008; Kiryash 2011). In 1956–1960, the Russian government launched the electrification of the Trans-Siberian Railway, and by 1961, the most significant electrified highway Chelyabinsk–Omsk–Novosibirsk–Krasnoyarsk–Irkutsk began to operate in Siberia, which significantly increased the capacity of this direction.

In the post-war years, the construction of the Baikal–Amur Mainline was underway. The beginning of the BAM highway survey dates back to 1932, and in 1933, the construction of the first-line linking BAM and Tynda (180 km) has already begun. The first section of the BAM built was the Pivan–Sovetskaya Gavan line (442 km), which started in 1943 and ended in 1945. In September 1947, the rails were laid to Bratsk (311 km). This was the second section of the BAM, which has independent significance as a pioneer railway and ensures the development of the Bratsk industrial hub.

The construction of the third latitudinal highway, the Central Siberian Railway, was fundamental. The line provided the shortest connection of Kuzbass with the Southern Urals and Northern Kazakhstan (Shniper et al. 1978). North of the 60th parallel, there is only a tiny isolated railway line Talnakh–Norilsk–Dudinka.

For many decades, the construction of the Siberian railway network has developed under a significant departmental influence, which does not fully consider the interests of the development of productive forces and population's interests. At the same time,

there was a backlog in the construction of the South Siberian Railway. In 1965, Abakan–Taishet line (east side) was put into operation (Granberg et al. 1980).

The problems of railway transport development in such a macro-region as Siberia require constant consideration at the federal level. The basis of the unified transport system of the macroregion is railway transport and, first of all, the double-track electrified Trans-Siberian railway. The density of traffic on it in 1988 exceeded 100 million tons per 1 km of track in the cargo direction. At the Ural–Kuzbass landfill, up to 40% of latitudinal traffic was carried out along the South Siberian and North Siberian highways. Several railways have been built from the Transsib in the northern direction, mainly to develop forest resources, and to the south—to the Altai Territory, Kuzbass, Kazakhstan. The Tyumen–Tobolsk–Surgut–Urengoy meridional highway has been built to develop oil and gas fields in Western Siberia and export hydrocarbon raw materials (Aganbegyan et al. 1999). The volumes of transport services provided by Yuzhsibom as a "piecemeal" alternative to the Trans-Siberian Railway are subject to the restrictions on the transportation and throughput system of the Kuzbass transport system (where coal shipments are growing). On the other hand, it is based on the opportunities to transit bulk Russian cargo through Kazakhstan.

Overview scheme of the transport railway network in Russia in the first quarter of the twenty-first century and prospects plans in Fig. 1.

The railway network of the Siberian transport complex remains extremely essential today (Melentyev 2019). Transportation of products from factory to consumers requires a railway mode in this region (Suspitsyn 2010).

At the end of the first quarter of the twenty-first century, Russia is faced with the need to begin the formation of the Northern latitudinal belt, and ensure economic

Fig. 1 Overview scheme of the primary transport railway network leading directions in Russia in the first quarter of the twenty-first century and planned schemes

development in the Asian part of Russia. The commissioning of the Trans-Siberian Railway was decisively forming the Southern Latitudinal belt. The Trans-Siberian Railway transformed into an international transport corridor. This is a very high-speed corridor for international container transportation along with the Europe–Asia space. The new transit potential of the corridor comes true through its modernization and reconstruction, along with the new international-class logistics centers. Railway projects are system-forming, followed by a trail of medium and small businesses (SPEF 2005). The connection with the railways of the Korean Peninsula will allow taking part of the container flow without additional transshipment at seaports (Amosenok et al. 2009).

2 Experience in the Building of the Baikal–Amur and Amur–Yakutsk Highways—Economic Development of Siberia

BAM as a project first sounded in government and other documents in the 30 s of the twentieth century. The Baikal–Amur railway has attracted the attention of many specialists for many years and required significant capital investments necessary for the construction of a giant natural–technical railway complex spatially spread over thousands of kilometers (Kin 2014). Due to the prevailing natural, geographical, and economic conditions, the Siberian region, where a considerable amount of work was to be performed, has been developing for many years based on state support. In the 1930s and 1950s, 2,075 railways were built by use of State funds (see in Fig. 1 BAM sections).

The resolution of the USSR's Council of Ministers dated July 8, 1974, "On the construction of the Baikal-Amur Railway" allocated the necessary funds for the construction of the core transport infrastructure—the railway of the first category with a length of 3,100 km, the second Taishet–Lena track—740 km, the Bamovskaya–Tynda and Tynda–Berkakit lines—400 km. For half a century, economical accents have changed, but the dominant ones have remained unchanged: the importance of constructing the Baikal–Amur railway for Siberia and the Far East's economic development has never been denied. Russia always will emphasize attention on the economical, political, and military strategic perspectives of building the Baikal–Amur Railway.

When the construction of BAM moved to the final stage, tasks were put forward to the fore, the solution of which would allow to recoup the costs of the BAM faster (Kin 2016). Firstly, it was necessary to solve the problem of the increasing freight traffic of the Trans-Siberian Railway's eastern sections to BAM. This was important due to a specific part of the cargo (departure from the port of Vanino to the Far North). The BAM highway is shorter than the Transsib highway by about 400 km.

Secondly, the efficiency of the highway under construction was directly dependent on the economic development of the adjacent areas. This vast territory with an

area of about 1.5 million square kilometers is rich in a variety of natural resources. The natural resource base allows establishing new territorial production complexes and industrial hubs here, which will gradually develop into a new industrial belt in the east of Russia. A nationwide comprehensive target program for the economic development of the BAM zone, the draft of which was discussed at the end of 1982 in the USSR State Planning Committee, aimed to fulfill this task. It was decided to develop the final version of the program together with the leading directions of Russia's economic and social development until 2000.

Thirdly, the importance of the BAM in the future was increasingly associated with the development of the north directions. Concerning these territories, the BAM played the role of a transport backbone, from which it was supposed to pull the meridional communication routes in the North, to new areas of economic development. At that time, the economics and technical study of the Bamovskaya–Tynda–Berkakit railway was started to the North of Tommot and Yakutsk.

Fourth, when taking into account the effects of the construction of BAM, the foreign economic role of BAM should be taken into account. Thus, based on compensation deals with Japan, the construction of the Neryungri section and the development of forest resources on the BAM's eastern section were carried out. An agreement was signed with Japan to conduct geological exploration on the Sakhalin Island shelf for oil and gas (Gukova and Kin 1983).

The idea of building a railway to Yakutsk appeared at the beginning of the twentieth century. Back in 1906, the Council of Ministers of Russia, chaired by S. Y. Witte, discussed the need to lay this highway and made the appropriate decision. Nevertheless, it was not possible to implement at that time. In the late 30s and early 40s, the first kilometers of rails were laid from the Trans-Siberian Railway to the north, but the next War intervened again. The rails were dismantled and sent to the Stalingrad rocked. A quarter of a century later, the construction of the Amur–Yakutsk railway (AYM) (Berkakit–Tommot–Yakutsk) was recognized as necessary. This decision was made in the mid-60s, with the beginning of intensive development of gold, tin, antimony, coal, and diamond reserves in Yakutia, in connection with the decision to form the South Yakut territorial production complex. In 1975, the construction of the Tynda–Berkakit line began, and 10 years later, in 1985, the Berkakit–Tommot–-Yakutsk railway was launched. The transition period of radical economic reform that followed did not promote construction.

It was only in 1995, that the Government of the Russian Federation adopted Resolution No. 862-r "Concerning measures to complete the Berkakit–Tommot–Yakutsk railway line" to lay this the most important line for the Russian Economy. On May 15, 2004, the Decree of the Government of the Russian Federation "On urgent measures for the construction of the Berkakit-Tommot-Yakutsk railway line" was adopted. And it investigated the creation of the launch complex Kerdem–Yakutsk (Nizhny Bestyakh).

With the introduction of the railway to Nizhny Bestyakh, the most extensive transshipment and distribution transport and logistics hub in Yakutia was built. This significantly enhances the efficiency of the junction of land, river, sea, and air routes in the capital and the transportation of passengers and cargo in the industrialized

regions of Central and Western Yakutia (Kichkailo 2008). As a result, the construction of the railway eventually led to fundamental shifts in the delivery of goods to the Arctic regions of the Republic and the rise of the role of Yakutsk as a new sizeable multimodal transport hub and logistics center in Northeast Asia. The total length of the Berkakit–Tommot–Nizhny Bestyakh (Yakutsk) railway line is more than 800 km. The new line connects the sizable agglomerations of Russia's northeast and allows strengthening trade and industrial ties between the regions.

The project was implemented at a pace comparable to the speed of construction of BAM. In peak years, builders laid 123 km of railbed per year. At the same time, the cost of construction amounted to about 110 million rubles per kilometer, while the average cost of railway construction in other regions of the country, with less complex geographical and geological conditions, is 200–250 million rubles per kilometer. The commissioning of the Amur–Yakutsk highway was of great importance for further development of the Yakutia and entire Far East's transport infrastructure. The implementation of the project contributed to the development of the productive forces of the industries, the creation of new jobs, and made possible the development of new deposits, including simplified access to more than 1,500 deposits of various minerals.

3 Modernization of the Eastern Polygon

Nowadays, in Siberia, it is planned to elevate the carrying capacity of the Baikal–Amur and Trans-Siberian railways to 180 million tons by 2024. The project increases the Russian region's economic connectivity through the expansion and modernization of railway infrastructure, the development of multimodal transportation, the evolution of the high-speed transportation network (GRF 2019).

Eastern Polygon (BAM and Transsib)'s investment development programs surpass all other significant projects in Russia (Leshchishin 2013; Pekhterev 2015). Transsib ensures at least +30% of coal transportation (about 68 million tons) in the eastern direction by 2024. Obviously, the achievement of these indicators also depends on the modernization of the infrastructure. According to JSC "Russian Railways", the passport of the project's first stage determined financing for 520.5 billion rubles, including 349 billion rubles—at the expense of JSC "Russian Railways". The volume of capital investments for the second stage will reach 777 billion rubles—entirely at the cost of the Russian Railways. The total amount of investments in the railways of the Eastern Polygon over ten years will exceed 1.2 trillion rubles (RZD-Partner 2021).

To date, work on the first stage of the Eastern Landfill modernization project has been actively deployed, and Russian Railways cannot stop. A wide front of work is deployed from Taishet to Nakhodka and Vanino. According to the state-owned company, a total of 527 km of second tracks and 3.1 thousand arrows have been laid at the Eastern Landfill since 2013, 45 stations and 33 sidings have been built and reconstructed (more than 250 km of station tracks have been laid), 101 bridges, and

5 tunnels, including the new Baikal tunnel with a length of 6.7 km. Traffic on it was opened at the end of July. There are also problems in implementing Eastern landfill's modernization program because of a shortage of builders, unscrupulous contractors, and lack of funding. BAM-2 has been experiencing an acute need for labor resources for several years due to the scale of the work and the shortage of migrants. Migrants traditionally accounted for up to a quarter of local workers, but unfortunately left the territories due to the pandemic.

In addition to the shortage of labor resources, construction is still being carried out in the conditions of an operating railway, which is quite tricky given the current intensity of cargo transportation and BAM. Design decisions were often revised, and adverse weather conditions and the pandemic slowed down the work progress. In 2021, the rise in the price of building materials was added to the identified problems.

Currently, the Government of the Russian Federation has already approved the updated passport of the federal project "Development of the railway infrastructure of the Eastern Polygon of Railways" until 2024". Its goal is to increase the BAM and Transsib's throughput and carrying capacity to 180 million tons in 2024. It is assumed that the volume of financing of the Eastern polygon in 2021–2024 will amount to 778 billion rubles, of which 134 billion rubles this year (Andreeva 2021). But at the same time, it is crucial, as with the construction of BAM-1, to orient the highway not only to export coal flows but also to consider it as an axis of development of the neighbors' territories. The construction of transportation routes only for the development of mineral deposits has no long-term prospects. Siberian production complexes must stop focusing on raw materials and start producing products (Alklychev and Zoidov 2020).

4 The Construction of the North Siberian Railway is Necessary

The possibilities of expanding transcontinental transit and ensuring the transportation of bulk goods between the western and eastern regions are more constrained by railways. The Central Siberian and South Siberian highways pass mainly through the territory of Kazakhstan. It is essential to approach the prospect of the BAM continuation in the western direction and the formation of the second Trans-Siberian route (Granberg 1995).

A century after the construction of the Trans-Siberian Railway, which initiated the intensive economic development of the main cities in the Asian part of Russia—Omsk, Novosibirsk, Irkutsk, and Khabarovsk, the question arose about the need to build a new highway (Kibalov et al. 2008; Suslov 2008). In the late 1980s–early 1990s of the twentieth century, cargo flows along the Trans-Siberian Railway reached their capacity: 102 million tons of cargo were transported through Omsk to the west. Therefore, in the 1980s, they began to develop a feasibility study for constructing a railway planned 300–400 km north of the existing North Siberian Railway, which

would become a reference communication in the zone of North development (AN USSR 1980). The primary purpose of the construction of the road was to unload the Trans-Siberian Railway, as well as access to the natural resources of remote areas, especially significant against the background of the depletion of natural resources in the southern regions of Siberia.

In the second quarter of the twenty-first century, the creation of a new transport corridor in the Asian part of Russia can fundamentally affect the country's economic potential and the restoration and strengthening of its position in the world economic system. The possibilities of strengthening the common economic space are connected with the transport and logistics opportunities that demand international transport corridors. It seems that the realization of these opportunities will manifest itself in the creation of integrated highly specialized production and transport zones (Lamin and Malov 2005).

5 Promising Railway Transport Projects in Siberia

Railway crossing to Sakhalin. The transport connection between the mainland and Sakhalin Island is currently and shortly provided unsatisfactorily. For example, the Komsomolsk–Vanino line operates almost at the limit of its carrying capacity. The current fleet needs reserves to significantly increase traffic volume without severe capital costs for the purchase of ships and reconstruction of ports. Difficult natural and climatic conditions are a serious obstacle to regular mainland–Sakhalin transportation and is a necessary and urgent social task in developing the railway network (Animitsa and Khodosh 2019). Any alternative for providing transport links between the mainland and Sakhalin is associated with significant capital and time costs.

The leading technical solution in the field of railway network development is, along with the tunnel, the construction of a new railway from the Selikhin station of the Far Eastern Railway to Cape Lazarev, crossing the Nevelsky Strait to Cape Peri, and the construction of a new railway from Cape Peri to the Nash junction of the Sakhalin Railway (Kruglov et al. 2015). According to experts, the implementation of the project will give a powerful impetus to the development of the transport industry itself and the construction industry, domestic engineering, fuel, energy complex industries, agriculture, forestry, food industry, and non-manufacturing sectors.

The railway construction can reduce the transport component in the cost of products produced in the zone of influence of products and increase its competitiveness in the domestic and foreign markets. The creation of a reliable and relatively cheap transport connection will increase the transport mobility of the Sakhalin population and will contribute to overcoming the insular isolationist psychology. The population's quality of life will also increase because it is expected to create many new jobs. Expected, job opportunities' conditions are provided to stabilize and increase the island's population. Taken together, these factors will contribute to strengthening the integrity of Russia's economic and political space and improve its geostrategic

position in the macro-region of Northeast Asia. It is also vital that the railway development to Sakhalin creates good prerequisites for socio-economic development associated with the subsequent connection of the Russian and Japanese railway networks through the La Perouse Strait and the reconstruction of the Sakhalin Railway. Preliminary expert assessments of the economic efficiency of these prospects show the real possibility of switching to the railway a significant part of export–import traffic Russia–Japan and international transcontinental traffic Japan–Russia–Europe, which ensures high economic efficiency of the railway under consideration (Kibalov and Kin 2018).

The Kyzyl–Kuragino railway line. The Republic of Tyva is still a region almost wholly subsidized by the federal budget. The individual development program of the region and the Complex Investment Project "Yenisei Siberia" provides for a set of investment projects that, in principle, allow filling the budget of the Republic and creating its investment potential. At the same time, the most significant attention is paid to developing the mineral resource complex. Among the priority projects, a special place is occupied for developing the Elegest coking coal deposit (Baisarov 2016). The implementation of this project is possible only if the Republic's railway connection with neighboring regions is improved. The creation of a railway connection to the city of Kyzyl will open up new opportunities for the development of the entire industrial complex and the economy of the Republic as a whole (mineral resources facilities, forestry, timber processing industry, agriculture, light and food industry, and tourism) (Balakina 2019). The assessment of the corresponding aggregate direct budget efficiency, as well as an additional multiplier effect, consider the workload of related industries, the creation of new jobs, the turnover of the share of income going to domestic consumption, the increase in the cost of land, housing, indicates the undoubted expediency of state support and direct participation of the state.

On the expediency and high payback of the state's participation in the construction of the road, which is achieved by: obtaining additional revenues to the federal and regional budgets from the realization of the rights to develop the mineral resource complex of the Republic of Tyva; releasing significant federal budget funds due to a significant reduction in gratuitous financial support for the region; creating a new large coal mining complex of all-Russian significance, capable of fully meeting the needs of the domestic metallurgical industry; creation of a supporting transport infrastructure used to strengthen interregional ties, as well as for defense and security purposes.

The social significance of the road for the population of Tyva is also associated with a radical increase in transport accessibility, providing new opportunities for cultural exchanges, the development of science, art, and education, increasing the attractiveness of natural and ethnographic attractions of the Republic, and the development of tourism and, as a result, increasing financial opportunities for the preservation and development of traditional folk crafts and national culture.

Railway development of the Western Siberia

The most crucial element of the North of Western Siberia's Development Strategy in conjunction with the Urals was the implementation of the investment megaproject "Ural Industrial—Ural Polar". This megaproject was based on implementing of large-scale transport projects, ensuring the development of mineral deposits in new mining areas. The implementation of these interregional projects, together with an increase in the degree of transport and infrastructure security of the north of Western Siberia's territory was crucial to the region' development (GRF 2011).

The Northern Latitudinal Course. An inevitable reincarnation of the Ural Industrial–Ural Polar megaproject was the 686 km-long railway project in the Yamalo–Nenets Autonomous Okrug, which should link the western and eastern parts of the Autonomous Okrug, the Northern Railway with Sverdlovsk. In February 2017, it was announced that construction would be completed in 2023, the project cost was estimated at 236 billion rubles. However, due to the pandemic and several cases of contracts termination, the commissioning dates were expected be postponed.

The formation of the Northern Latitudinal Course railway will ensure the comprehensive economic development of the north of Western Siberia. This railway ensures the growth of tax revenues to budgets of all levels, increase the mobility of region's residents, as well as creates new infrastructure. This fact could ensure the necessity of the development of gas condensate and oil fields and ensure the transportation of extracted natural resources, including liquefied natural gas and other cargo of the Yamalo–Nenets Autonomous Okrug (Tarasova 2018). The project will contribute to the development of the Northern Sea Route, the development of the shelf of the Barents and Kara Seas, and the implementation of the strategic program for the development of the Arctic zone of Russia. A further possible extension of the Northern Latitudinal Course will be the design of potential directions towards the city of Norilsk to ensure transport links and the formation of a railway junction between the Trans-Siberian Railway and the Northern Sea Route. In terms of providing railway transportation to seaports due to the problematic Arctic situation, such work is of priority for the port of Sabetta in connection with the existing secured cargo base (GRF 2021).

The "Transcontinental" project. The attractiveness of a transcontinental connection between Eurasia and America is easily explained when we look through the map. In 1991, the international non-profit corporation "Interhemispheric Bering Strait Tunnel and Railroad Group"—"Transcontinental" was registered in Washington. In 1996, the Russian government submitted a draft decree concerning the conduct of a complex of studies on the possibility of building a highway. Scientific research was carried out that showed the reality of such a large-scale project. The main concept of the highway and tunnel construction and the energy efficiency part were developed. However, the difficult economic situation of Russia in the 1990s postponed the solution of this problem for a long time. The project has been frozen, but the logic fits seamlessly into the tasks formulated by the state for the development of Siberia and the Russian Far East. This logic targeted the rise of the regional economy and improved quality of life.

The global significance of the project is to unite continental transport networks into a single global network, create an international transport corridor, organize large-scale transit traffic between Eurasia and America, and accelerate the economic development of the northern regions of Russia.

As a national project, it will be able to provide all-season access to the use of hard-to-reach natural resources of the east of Russia and realize its transit potential, reduce transport costs, and increase the country's competitiveness. It will contribute to the development of specialized industries improve the local population's quality of life, create new jobs, and develop the migration influx (Granberg 2007).

6 Conclusion

Thus, promising railway projects will have pronounced and confirmed in detail significant socio-economic effects, the importance of obtaining which had significantly increased in recent years, when fundamental decisions were made on the system of strategic transport planning, the development of the Arctic zone, and the Far East of the Russian Federation. The long-term effect of promising 2030 Siberian railway projects, both at the federal and regional levels, should be very significant, including the organic integration of new highways into Russia's enormous transport communications system. However, implementing the Railway projects will lead to Siberia's higher economic activity level.

Prospects for the economic integration of Russia and the Pacific region and the fulfillment by Siberia of the role of a bridge between East and West largely depend on the development of the transport system. At the same time, it is necessary to consider the growth of competition in the transport services market in the Asia-Pacific region and the development of an alternative East–West transport bridge across Central Asia.

The role and task of railways are to remove all transport restrictions on Siberia and the Far East's socio-economic development and to show that Russia can use the economies of scale as a positive, not a negative factor. The Transsib and other railways of the Asian part of Russia are real, not virtual transport and logistics corridors. The railway "century" is not over for Siberia.

Acknowledgements This Study was supported by IEIE SB RAS Project (№ 121040100262–7), Fundamental Research Fund for the Central Universities (Harbin Engineering University) (GK2090260229, GK2090260236), Heilongjiang Provincial Natural Science Foundation Project (LHG2021009, 2021/07-2024/06) and China ministry of science and technology high-end foreign expert introduction project (DL2021180001L).

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Siberia' Geographical Economics & Resources Features in the Last Century

Pacific Russia in the Space of Siberia: Development Processes, Resource Problems, Environmental and Social Challenges

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Abstract Pacific Russia is the eastern part of Russia, washed by the Pacific Ocean, occupying a third of its space. Region's specificity includes allocating several historical and demographic waves of resettlement from the middle of the nineteenth to the beginning of the twenty-first centuries, the periodic implementation of the state resettlement policy for the colonization of the country's outskirts. The remoteness of the territory contributed to the predominance in the Russian Far East's development, the need to solve primarily geopolitical problems (border protection) and using natural resources (soil, agro-climatic, mineral, forest, fish, etc.). The Amur Region joined Russia in the middle of the nineteenth century was not a territory with unchanged landscapes by human economic activity. With the new population, the human pressure on natural landscapes intensified. Ecological problems such as wildfires, reduction of native forest vegetation with loss of biodiversity, long-term transformation of local geosystems in the areas of loose gold mining are inherited

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and are manifested in the region at all stages of its development. At all stages of the Pacific Russia development, the development of resource-extracting industries was based on maximum using of natural resources with lower prices, simple production technologies, and ignoring environmental requirements. Abandoning it in favor of the "green growth" model is complicated by the predominance of regional exports of raw materials and the resource interest of the Asia-Pacific region countries. Nowadays, the region is characterized by a "raw resource" model of development. Modern development strategies of Pacific Russia do not transform radically strategic goals towards reducing environmental pressures and threats. Hence, the practical implementation of spatial planning, based on the territory's adaptive-landscape organization, is relevant.

Keywords Pacific Russia · The Russian Far East · Settlement · Region · Population dynamics · Regional development · Land use · Nature management · Landscape · Adaptive-landscape organization · Landscape planning · Green economy

Glossary

Adaptive-landscape organization	the spatio-temporal organization of the society in specific landscapes in order to adapt perfectly a territory's functional zones to its landscape structure (pattern) and create anthropogenic (cultural) landscapes, as well as maintaining the reproductive potential of the territory.
The Russian Far East	the Administrative Federal District in the East of Russia.
Priamurye	territory related to the Russian part of the Amur River basin.
The territories of priority social and economic development	a part of a Russian Federation administrative provinces, in which in order to create favorable conditions for attracting investments and ensuring accelerated economic development as well as creating comfortable conditions for the population livelihoods a special legal regime for entrepreneurial and other economic activities is established by the government.
Natural landscape	a landscape consisting of interacting natural components and is formed under the influence of natural processes.

Anthropogenic landscape a landscape consisting of interacting natural and anthropogenic components, and is formed under the influence of human activity and natural processes (cultural landscapes in western landscape tradition sense).

1 Introduction

Pacific Russia is the eastern part of Russia, washed by the Pacific Ocean, occupying a third of its space. It was involved in the development processes later than other parts of the country, and these processes are continuing now. The discovery and study of new land in the region went from north to south. The vast territory of Siberia did not allow supplying quickly new population by food. Therefore, searching territories suitable for the development of agriculture, mostly crop production, was one of the Russian's key reasons to enter the Amur River basin. The solution of military-political (geopolitical) problems and natural resources remained the leading factors in the development of land use for all period of colonization of Pacific Russia (Mirzekhanova 2008; Nature Management 2005). Together with other internal factors (mainly, the solution of land lack and national problems), they influenced the state resettlement policy, the land use features, and, consequently, the direction of landscape transformation.

At all stages of the Pacific Russia development, the development of resource-extracting industries was based on maximum using of natural resources with lower prices, simple production technologies, and ignoring environmental requirements. The region is still characterized by the incompleteness of colonization process and contrast of the economy' s territorial structure, the focal pattern of land use and population distribution, the manifestation of inherited and modern environmental problems (Mirzekhanova 2010a; Fetisov 2013).

The appearance and development of different land use types in Siberia were accompanied by changes in anthropogenic (human) impact on the environmental state. Each of these land use types, certain level of the negative impact of human the transformation degree of soils and biota. Land use types are listed in the line "nature reserved, recreational, forestry, agricultural, industrial-urban" by increasing anthropogenic pressure on landscapes (Sturman 2003). The environmental problems in land use were not taken into account in further territorial expansion and were weakly reflected in territorial development policy documents.

One of the international documents identifies landscape as a universal unit of land management is the European Landscape Convention (ELC; Council of Europe 2000; Bastian 2000; Fry 2001; Sayer et al. 2013; Simensen et al. 2018). The Russian Federation has not ratified ELC. However, the outlined principles of land management, the choice of sustainable land management strategies, and the landscape as a universal unit in spatial policy for managers are relevant to the country.

Almost 70% of Pacific Russia is mountainous landscapes, which are particularly vulnerable to economic activity. Vast territories characterized the region with preserved wild ecosystems, a strong contrast in land use, and territories' remoteness.

The adaptation of the general geographical ideas presented in the ELC about the balance of regional economic development and the growth of people' well-being with the ecological features of the landscape was the response of the Russian scientific community to the search ideas for overcoming the negative aspects of the resource-oriented economy of Pacific Russia. It was proposed the impotence to take into account the landscape features in the regional environmental policy, its environmental properties for sustainable development and transformation of the region's economy following the concept of "green growth" (Mirzekhanova 2010b; Towards a Green Economy 2011; Tereshina and Degtyareva 2012; Mirzekhanova 2017).

Over more than 100 years, many national, and in Russia also regional (university and academic) landscape schools have been formed in the world. (Antrop 1997; 2000; Bastian 2000; Lörzing, 2004; Oťaheľ 2004; Ahas et al. 2005; Shaw and Oldfield 2007; Brunetta and Voghera 2008; Messerli 2008; Kozová et al. 2009; Chuman and Romportl 2010; Mucher et al. 2010; Tsilimigkas and Kizos 2014; Myga-Piątek 2014; Warnock and Griffiths 2014; Oldfield and Shaw 2015; Olwig 2016; Sarlöv Herlin 2016; Simensen et al. 2018). They are still discussing the concept of landscape and approaches to their identification, the priority of natural (physical-geographical), cultural (anthropogenic, human-made), or subjective (human perception) factors. According to Simensen et al. (2018), all European landscape approaches can be divided into two traditions: (a) biophysical and (b) based on art and human perception.

As early as in 1913, Lev Berg introduced the scientific notion "landscape" based on concepts of German geographical school (A. Hettner) and ideas of V. V. Dokuchaev (Khoroshev 2020). The predominance of a physically determined approach characterized the Russian scientific tradition. The primary attention is paid to the functional relationships between the natural components of landscapes that form the last ones as a holistic entity. Russian publications examining cultural landscapes in the Western European sense have only appeared recently. This was noted in the first chapter of this monograph. However, it is more traditional in Russian landscape schools to divide landscapes into two types: natural and anthropogenic.

The economic load (development) of the territory results from an active purposeful activity to involve natural resources in the economic cycle and to create infrastructure in this territory in line with public needs (Nature Management 2005). Studies of Pacific Russia development, in particular the Amur River basin, the land use formation as well as land cover transformation have been actively developed in the last decade by Russian and foreign experts (Baklanov and Hansey 2004; Sheyngauz 2007, 2008; Shvedov, Volynchuk et al. 2006; Song, Wang et al. 2011; Fetisov 2013; Dong, Li et al. 2014; Liu, Zhou et al. 2014; Masuda, Haruyama et al. 2015; Mishina 2015; Wang, Su et al. 2016; Baklanov et. al. 2018). The problems of the territorial organization of society in Pacific Russia are raised in the works of P. Ya. Baklanov, P. A. Minakir, S. N. Leonov (Leonov 1998; Pacific Russia 2010, 2012).

This chapter discusses settlement features of Pacific Russia, the interaction of population with landscapes during colonization and the concepts for updating this

interaction in terms of regional sustainable development. The study's main object is the Amur Region (Priamurye, Russian part of the Amur River basin) located in the south of Pacific Russia.

The primary research method was descriptive. An extensive literature review was undertaken. It is related to Pacific Russia's development and settlement periodization, landscapes changes, the current model features of state policy for the development of the region, their compliance with the concept of "green growth" and adaptive-landscape land use. A cartographic method was used by applying geographic information system software.

2 Territorial Organization of the Population of the Russian Far East (Pacific Russia): The Stages of Development and the Results Of Colonization from Middle Nineteenth to Early Twenty-First Centuries

The methodological basis of Russian (Soviet) social geography is a system that explains the laws and features of the spatial and temporal organization of the economy, population, nature management, infrastructure, and society as a whole. It includes the following theories: a unified settlement system (Khorev 1981), a support framework for settlement (Lappo 1982), and others. The most significant contribution to the development of theoretical and practical issues of population settlement was made by Baransky (1980), Vorobev (1977), Poksishevsky (1962).

There are several works dedicated to the far eastern lands development in different periods of settlement. The works of Busse (1896), Poksishevsky (1962), Kabuzan (1985), Rybakovsky (1990), Motrich (2006), and others are devoted to the study of Pacific Russia's population, assessment of initial settlement, economic and geographical conditions of residence. The study of demographic issues was based on empirical data.

In terms of human influence on changing the cultural (anthropogenic) landscape and land cover during the development of a territory its occupation and land use are considered sources of anthropogenic impact. There have been Pacific Russia development along with specific conditions which are uncommon in the country. According to Sheyngauz (2008), the central region's features are the absence of continuous population growth and the gap between the consumption of natural resources goods and their production. The dynamic of the Russian Far East population as one of the regional development indicators reflects the importance of its territory for the country and how the state goals coincide with the interests of potential migrants.

The discovery and exploration of the region's lands were done from North to South, but settlement and development occurred in the opposite direction. The Amur region's total population was about 20–25 thousand people when it joined Russia (History of the Far East 1991). Development and occupation of Priamurye and Primorye (both parts of the Amur Region) got immediately more active on new

lands. The population of the territory was increasing much faster than the population of Russia. Based on the analysis of archival data, the uneven wave character of the settlement was identified. Thus, several historical and demographic periods of settlement in Pacific Russia were detected (Pacific Russia 2012). The discontinuity of the population dynamics caused average annual values of the indicator of population growth. Population census data were used. The criteria for detecting settlement periods included motivation to engage new residents, population dynamics, and natural and migration growth (Table 1) (Sidorkina 2014).

The period of initial settlement, 1860–1920s (pre-revolutionary). Political and military-strategic were the first motives for Russia's settlement of the Far Eastern lands. Using natural resources did not give profits, but losses. The Russian government made an effort to encourage people moved from overpopulated provinces in the European part to Siberia, cop the problems with lack of croplands for peasants, and ensure comfortable conditions for families living in new places. In the 1860s, special rules for colonization of the Amur, South Ussuri, and Primorye territories were established. Subsequently, peasant resettlement began to predominate in colonization. The population in the region increased rapidly. There were already 55.6 thousand people in 1861 and 95.1 thousand people in 1870 in Pacific Russia (Kabuzan 1985). The first Russian population that settled in the Amur Region in the late nineteenth century were the Cossacks. They were settled along the state border on the Amur and Ussuri Rivers banks to protect the territory. Later, peasant migration covered landscapes with the most favorable land and agro-climatic resources (the Zeysko-Bureinskaya plain and the Ussuri River valley). At this stage, land use was mainly oriented on agriculture and gold mining.

The Ussuri and Sino-Eastern Railways commissioning that connected the Ussuri Area with the Trans-Siberian railway stimulated the new wave of the settlement. As a result, from 1897 to 1916, the Pacific Russia's population increased from 371.8 thousand people to 988.3 thousand people (2.65 times). The government's policy to resettle peasants in the Amur Region land acquisition works was carried out on resettlement sites from 1906 to 1912.

The peculiarity of the colonization process in the eastern outskirts was the active growth of the urban population whose number increased faster than the population. The most essential Pacific Russia' trade centers were found: Nikolaevsk, Blagoveshchensk, Khabarovsk, Vladivostok. From 1900 to 1916, the number of city citizens increased 2.6 times (Rybakovsky 1990).

The period of industrial development, 1920s–1930s (pre-war years). After the establishment of the Soviet government, the future of the Russian Far East was determined by industrial development. However, military and strategic goals remained on the priority. The Japanese army was stationed in Manchuria. So, there was organized the defense of the eastern Russian borders, and armed forces were strengthened. Furthermore, migration to Pacific Russia was based on the necessity of economic development. The rapidly growing industry needed labor resources from the European part. The motivation for migration was improving working and living conditions, getting a job. The creation of a new regional metallurgical industry (the city of Komsomolsk-na-Amure), development of oil fields in Sakhalin Oblast, as well

Table 1 Historical and demographic periods of settlement of the Far East (Sidorkina 2014)

Features	Periods			
	Initial settlement (1860–1920 years)	Pre-war industrial settlement (1920–1930 years)	Urbanized population (1940–1991 years)	Market relations (1991–till now)
Form of resettlement	Military, Cossack, peasant, voluntary, forced	Military, forced, agricultural relocation, voluntary, organized recruitment	Agricultural, organized recruitment, transfer of employees, the direction of young professionals	Spontaneous migration, forced relocations, immigration, refugees, certificate relocation
State goals of relocation	Military strategic, economic	Military strategic, economic	Military strategic, development of high-yielding natural resources	Military strategic, geopolitical, development natural resources, foreign trade
Motivational basis of relocation	Getting land for farmers	Providing migrants with work, improving living conditions	Improving the material, qualification educational level	The decline in living standards, rising unemployment, the decline in the importance of compensation payments, natural environmental and environmental catastrophes
Areas of settlement	South of the Amur Region, Primorsky Region	Southern Far East, north of Magadan and Sakhalin Regions	Northern areas of Magadan Oblast and Kamchatsky Kray	Outflow areas: north of Magadan Oblast, Chukotka Autonomous Region, Sakhalin Oblast, Priamurye, Primorye
Population growth rates by decade	2–2.5 times	70–80%	25–50%	In the North, a decrease of 2 times, in the South by 19%
Share of migration in population growth	4/5	2/3	1/3	90% decrease in the North and 35% in the South

as gold mining in the Northern territories and construction of ports started at that time. Mineral deposits of coal, lime, marble, and other building materials were being developed. In addition, workforce could be also recruited forcibly (Sidorkina 2014).

In the late 1920s and early 1930s, changes of the population in the region were influenced by such factors as collectivization, dispossession, and forced eviction people, who used to be wealthy, the famine of 1932–1933s, and the Stalinist repressions. According to a special census of, in 1937, there were 543 thousand people in GULAG camps in Pacific Russia. It was 28% of all prisoners in the country. Most of the 57.8% (314.4 thousand people) were located in Khabarovsk Kray and the Far North. The population of the Eastern regions of Russia constantly increased by self-relocating people as well. The primary purpose of these migrants was to get lost in an uninhabited area.

As part of the new national policy, and needs to solve the "Jewish question" the Jews began to resettle in the Amur Region since 1927. It ended up creating Jewish Autonomous Oblast in 1934. This is discussed in more detail below.

As a result of an active settlement policy, Pacific Russia had the population growth rate that did not exist until the end of the twentieth century. A significant part of the population increase (3,990 thousand people) was seen in the Southern part of the Russian Far East. This stage finished when World War II began.

The period of urban development, 1940s–1991s (post-war years). In the second half of the twentieth century, Pacific Russia's development was military and political orientated. However, economic development was significant as well. Agricultural and industrial resettlement continued. It is important to note that the effectiveness of the post-war migration to the Russian Far East provided by economic ruin in the European part of Russia. The southern part of Sakhalin Island and the Kuril Islands, which rejoined the USSR in 1945, were particularly notable for their population growth (about 15%). Introduced state benefits for this purpose helped active colonization of these islands. In the post-war migratory wave, the region's population reached 4.3 million. The highest growth rates were identified in the Northern areas. The benefits for residents and newcomers remained mainly as a kind of high salary.

In the early 1970s, military garrisons were restored along Chino-Russian borders. The decision to build the Baikal–Amur railway was made. Besides, people often moved to Pacific Russia for temporarily period to improve the educational level, be promoted at the job, and get a bigger salary than in the European part. The influx of migrants contributed to the rapid growth of the population—from 6.8 (1979) to 7.46 million (1985) (Rybakovsky 1990). However, the population growth rate in the Russian Far East was decreasing compared with previous stages. They did not exceed 2.5% all over the region.

The period of market relations, since the early 1990s till now. The collapse of the Soviet Union, shifted from a planned to market economy infused dramatically on the country's Eastern territories. Due to difficult economic and social conditions, the Pacific Russia's population, which reached its maximum in early 1991s (8,057 thousand people), has started to decrease gradually. The population of the Northern territories has declined especially rapidly. The Russian Far East population decreased by 23.3% over the period 1991–2016 (Sidorkina 2018).

A steady trend of population decline characterizes the current demographic situation in Pacific Russia. The natural loss of population is amplified by migration outflow that reduces the level of population and the region's share in Russia's total population. Republic of Sakha (Yakutia) is the only Far Eastern region where the population has increased due to the excess of natural growth over migration outflow. The rate of population decline in Pacific Russia is 3.9 times higher than in the whole country. Including Zabaikalsky Kray and Republic of Buryatia into the Russian Far Eastern Federal District in 2018 increased the number of regional residents by 2048.9 thousand people. It amounts 8189,261 thousand people now (01.01.2019). This act helped the region return the number of population here before starting reforming economic relations.

The disproportionate distribution of the population over the considerable territory is a regional and also a national problem. Pacific Russia having a remote geographical position plays an important economic and geopolitical role in the Asia-Pacific Region. However, with low populated lands, depopulation and migration outflow the region has become a territory of socio-demographic disadvantage. In 2017, The Russian government trying to solve urgent problems had approved the Concept of demographic policy for the Russian Far East up to 2025. Currently, the National program for developing the Russian Far East up to 2025 is being discussed. However, the situation cannot be changed. Nowadays, maintaining the demographic potential of Pacific Russia and moving to its positive dynamics remains a key challenge for state and regional policy.

3 "Birobidzhan Project" in the Development of the Far Eastern Territories of the USSR

For the Soviet government, "Birobidzhan Project" was a way to solve the problem known as the "Jewish question" in the Union of Soviet Socialist Republics (USSR) by creating Jewish national autonomy in the country. By implementing a controlled resettlement policy, the authorities also planned to start developing unsettled territories, their natural resources, cop geopolitical problems in the east of the country, etc.

In the 1920s, the idea of finding free territories for compact Jewish resettlement was suggested. For the resettlement of Jews, various territories were considered in Ukraine, in the Crimea, in Belarus and, in particular, in the Russian Far East. However, proposals for choosing a territory drying by the Bidzhan and Bolshaya Bira Rivers in the Amur River basin found support from the authorities for many reasons. Firstly, the selected territory, which was called Bureya, and later renamed Biro-Bidzhan, was undeveloped. This helped avoided conflicts with the local population. Secondly, it was located on the border with Chinese Manchuria, from where robbers raided regularly into soviet territories. In addition, China was captured by Japan during these years. Thus, the risks of military conflicts at the border got increase.

The territory of the future region was being explored at the stage of its formation. The set of expeditions in the 1920s and 1930s finished by publications devoted to assessing the Biro-Bidzhan profitability for settlement, the possibility of agricultural development, as well as natural resources use (Brooke 1928; Birsko-Bidzhan District 1928; Vaneev 1931; Kirzhnits 1936; Danilov 1937). Preliminary scientific expeditions showed that the selected area is profitable for agriculture. This was important because the Soviet government had set the task of introducing the Jewish population to collective agricultural farming. In addition, according to Arnovitz (1985), in order to build a new Soviet society, the authorities wanted the young Jewish people to leave the influence of their traditional religious families. Amur region (Priamurye) was really far from the traditional centers of Jewish culture in the USSR.

At the end of the nineteenth century and at the beginning of the early twentieth century, the territory of the modern JAO was peripheral to the main development centers in the Amur Region. There was a chain of more than 30 Cossack villages and postal stations located on the left bank of the Amur River. The largest settlements were Radde, Blagoslovenoe, and Ekaterino-Nikolskoe with a population of more than 1 thousand people each. The peasant population was represented by Korean settlers only (the village Blagoslovenoe) and families from the Russian and Ukrainian provinces who had built several villages in the designated resettlement areas in the Bolshaya Bira River basin (On-Birskaya Dacha of Resettlement). Settlements at the Amur railway stations had been settled by railway workers (Description of Amur Oblast 1894; Asian Russia 1914; Vaneev 1931; Districts of the Far Eastern Territory 1931).

In addition to agriculture and border protection gold mining was conducted at the mines in the Lesser Khingan Mountains (the Sutara River basin). In 1894, 41 mines were located in the Sutara River basin, on the Bidzhan River—9, as well as one mine on the Dichun River (Description of the Gold Crafts 1901). Along the Trans-Siberian railway, population worked for the Railway Company, and also was engaged in logging. The needs of railway transport were provided by small industries and enterprises (Danilov 1937).

Such poor territory development mostly was coursed by difficult environmental conditions. The territory of the Middle Amur Region was difficult to develop due to a combination of mountainous and flat landscapes, the prevalence of wet meadows and wetlands on the Middle Amur lowland, periodic high floods on rivers, protracted rains, and a large number of mosquitoes. In addition, the available cropland area was limited as a result of the lack of drainage melioration measures.

In 1928, after the adoption of the government act entitled: “On Holding Free Lands in the Amur Zone of the Far Eastern Territory for Jewish Land Association Needs (KOMZET) to Settlement by Jews Labors,” trains with Jewish settlers started to arrive at the Tikhonkaya station (nowadays, it is Birobidzhan city). In 1934, the Birobidzhan National Area was transformed into Jewish Autonomous Oblast.

In order to avoid potential conflicts with local old-timers, the new Jewish population was located in the least inhabited parts of Biro-Bidzhan (Kirzhnits 1936). The main areas of settlement were the same places at which point lands had been

allocated for peasant resettlement by the Russian Tsarist regime. The Birskoye Experimental Field and the resettlement site of Aleksandrovka (nowadays, called Birofeld village), located 50–60 km from the Tikhonkaya Railway Station, were geographically consistent with the On-Birskaya Dacha of Resettlement that was outlined in 1908–1910.

Jewish migrants arriving in Biro-Bidzhan had been already organized into agricultural communities. On the basis of these communities, collective farms were created. The first collective farms were Birofield, Waldheim, Amurzet, and the Organization for Jewish Colonization (ICOR). The development of virgin lands was accompanied by drainage amelioration. The crop area showed a steady increase between 1928 and 1936: (1) 1928 year/18628 ha; (2) 1930/21238 ha; and (3) 1936/35149 ha (Danilov 1937; districts of the Far Eastern Territory 1931). Industrial land use was actively developing along the railway during this time. In addition to gold mining, mining of construction materials started, including marble, limestone and clay. Industrial logging appeared. There were industrial enterprises established in Birobidzhan, Izvestkovoe, Kimkan, Birakan, and other localities (Vaneev 1931; Danilov 1937).

Many immigrants could not withstand challenges of hard work and lifestyle and left Biro-Bidzhan. For example, by the end of 1928, only one third of the arrived this year immigrants remained here. However, because of arrival of new immigrants the number of population grew. In 1931, it exceeded 32 thousand people, of which more than 5 thousand were Jews (Vaneev 1931; Arnovitz 1985). In 1939–1946, the Jewish population number reached its maximum—about 18 thousand people. In the early 1930s, about 1,400 Jewish immigrants arrived in Birobidzhan from abroad: the USA, Argentina, Europe, Palestine, and others (Geography 2018). There was popular among Jewish pioneers the slogan "Next Year in Biro-Bidzan" as the rephrased Jewish prayer "Next Year in Jerusalem" (Arnovitz 1985). Due to growth in number of the region's population, the number of settlements increased, as well as their type changed. In 1926, there were 233 (283) localities within Biro-Bidzhan, including two small towns Bira and In (Districts of the Far Eastern Territory 1931).

Most of the Jewish immigrants were people who had never lived in the countryside or worked on farms. They had usually had urban professions (such as handicraftsmen, state employees, teachers, and small traders) and were not interested in agriculture. Despite the state policy for involving the Jewish population in agricultural production, many newcomers preferred to live in small towns, first of all, Tikhonkaya Station (named Birobidzhan since 1931). Thus, these immigrants' tendency towards city life style was one of the factors that shifted the Jewish settlement center from Birofield to Birobidzhan. The last center became a city in 1937. The Jewish intelligentsia came and cultural and educational Jewish institutions appeared in the city.

Unfortunately, the Stalinist repressions that followed soon, the struggle against cosmopolitanism in the late 1940s, the formation of Israel, as well as pursuing the anti-Semitic policy ended up losing of interest in the JAO by the Soviet authorities. Since the 1950s, the Jewish population declined steadily.

Nowadays, discussions are arising in society about the need of Jewish Autonomous Oblast existent. But the local elite and the Jewish community support the preservation of the regional independence as a part of Russian Federation.

Foreign researchers are interested in its history, the current state of Jewish lifestyle in "Siberian Zion", and the local mostly Russian population is keen to the history and culture of Jewish immigrants as pioneering founders of JAO (Arnovitz 1985; Siegel 2004).

4 Resource Dependence of Pacific Russia: Manifestation in Modern Models of Development

The territory of Pacific Russia, despite the active use of natural resource potential in the previous periods of development, is currently being notable for not only significant reserves, but also a variety of types of resources. Meanwhile, in terms of spatial localization of resources, the region is heterogeneous. The resources of the zonal types of nature management are concentrated mainly in its southern part and the azonal types are almost everywhere. The natural resources allowed the region to rely on the mining industry for a long time, forming a territorial–sectoral structure of the economy, focused on the export raw material development model (Antonova et al. 2017).

Mineral resources sector (MRS) has a special place in its structure. In the Soviet period, it was a branch of union specialization profile. For example, in the 1990s, about 80% of tin, 98% of diamonds, almost 50% of gold, and 14% of tungsten were mined in Pacific Russia. Extraction of non-ferrous and precious metals was the following: gold—106 tons, platinum—more than 6 tons, silver—230 tons, lead and zinc—33 and 88 thousand tons, respectively, copper—23 thousand tons, tin—17.6 thousand tons, tungsten—approximately 6 thousand tons (Main Problems 1999). In the Pacific Russia economy MRS provided 14.1% of the total industrial product with a value of this parameter in the Russian Federation of 5.7% (Lomakina 2018). In northern territories of the Russian Far East, MRS was the main source of economic dynamics and local budget revenues, reaching over 50% of the value of industrial products. MRS was the most important component of general industrial development in more diversified regions: in Khabarovsk Kray—4.8%, in Primorsky Kray—3.8%, in Amur Oblast—12.5% in the value of industrial products (Lomakina 2018, p.72). The dependence on resources of the region both in previous periods and at the current stage of development is obvious.

Currently, the intensification of local economic activity is associated with the development and implementation of the "Eastern policy" (Mirzekhanova 2016). At its core is the creation of priority development areas (PDA). In all documents, PDAs are considered as the main mechanisms for economic activity revitalization, supported by rather attractive preferences. In strategic planning, resource-intensive areas of economic activity remain prioritized. Asia-Pacific Region countries are primarily interested in their implementation. Their rapid development compared with global indicators largely depends on the resource export. The investment attractiveness, demonstrated in the documents on the revitalization of economic activity within

the framework of the PDA, has already manifested itself not only in expanding the spectrum of the extractive industries, but also in the construction of new transport and energy infrastructure facilities that primarily ensure the export of raw materials. PDA formation will certainly take into account all the existing preconditions with related positive and negative aspects (Table 2).

The 18 PDAs and the territory of the free port of Vladivostok are already functioning within the region. There is no doubt that their number may increase in the near future, because the proposed benefits attract investors to invest in projects in other territories. Additionally, with existing gaps in state of regional exploration there is a possibility of opening new and attractive for development resource objects. According to the data of already implemented projects, up to 90% of residents are local small- and medium-sized enterprises. Foreign investors are mainly interested in projects in the natural resource sector of the region's economy with the highest investment in the minerals and raw materials segment. The share of implemented mining projects in the territorial and sectoral structure of the economy is about 7%. Resource projects that have the maximum financial support for creation and renovation of infrastructure with 60–90% of all budget funds allocated for this purpose. Thus, the export infrastructure construction and development in relation to the new localization of resource industries further attracts export specialization to the raw materials industry. According to analysts, "resource projects are still recognized as consistent with the strategic goals of the region's development and creating the maximum socio-economic effect in the region" (Antonova et al. 2017, p. 23).

Meanwhile, these territories will be created and developed under the conditions of modern world development requirements, determined by the conceptual guidelines of the green economy model (Mirzekhanova 2016, 2018), which takes into account limited global resources and the increasing degradation of geosystems.

Nowadays, attractive economic prerequisites for business development are corrected by more stringent environmental restrictions. In addition, the modern development of Pacific Russia is carried out within the requirements of the world community. Environmental arguments, combined with the developed guidelines for optimizing the use of resources, are a fundamental argument in adjusting the development of the region in the trend of world development requirements.

5 Transformation of Landscapes in Priamurye Due to the Resource Development

Landscapes transformations are changing in the structure and functioning of natural (geographical) systems that determined, on the one hand, by the complexity and contrast of natural conditions, and on the other hand, by human (anthropogenic) activity. During entire period of any lands development, the level of transformations increases. They encompass links between landscape components as well as between

Table 2 Ecological and economic preconditions for the formation territory of advanced development in Pacific Russia in terms of modern development models (Mirzekhanova 2018)

№	Current conditions for the formation of TOSER	Environmental restrictions	Advantages/limitations for the region's economy	Compliance with the priority directions of the RE	The factors that require attention in the formation of an ADZ
1	Resource specialization of the economic structure. Resource-oriented industries provide more than 10% of GRP and 40–80% of export	Formed environmental problems, zones of accumulated environmental damage	Complementarity and full availability of the resource base	Resource industries are not included in the priority areas of the RE	High resource intensity of production
2	The investment attractiveness of resource industries in long-term development plans is explained, among other things, by the low cost of environmental costs, which hinders the implementation of full-scale environmental measures	Formation of new environmental problems within specialized TOCER with high vulnerability of landscapes	Creating new growth points in the newly opened objects of the mineral and raw materials industry	Subsidies to resource industries contradict the requirements of the ZE	Low environmental costs
3	Finishing the operation of the richest and the most easily accessible resource objects. To develop more complex ones in terms of their operation needs to use advanced technologies as well as taking into account their specificity	The transformation of natural resource potential, the accumulation of environmental damage	Introduction of new resource-efficient and innovative technologies at new facilities, use of accumulated waste as raw materials	Resource industries are not included in the priority areas of the RE	Formed technogenic deposits

(continued)

Table 2 (continued)

№	Current conditions for the formation of TOSER	Environmental restrictions	Advantages/limitations for the region's economy	Compliance with the priority directions of the RE	The factors that require attention in the formation of an ADZ
4	Localization of investment projects from the position of demand and high reserves of resources within territories with extreme natural and climatic conditions	Transformation of natural resource potential within the most vulnerable geosystems	Infrastructure constraints, complexity of the logistics basis for the objects being developed	Resource industries are not included in the priority areas of the RE	Low level of comprehensive knowledge of the territory
5	The imperfection of the energy and transport infrastructure. The construction of new facilities is focused on the export of raw materials	Resource and environmental costs of operating existing networks	The need to create a modern infrastructure support for TOSER	Subsidizing the raw material direction of the traditional energy sector contradicts the requirements of the FE	Low level of use of renewable energy sources with their high potential
6	Low level of diversification of the economy structure in the direction of processing and resource-saving industries	Lack of modern waste management technologies in development plans	Use of secondary resources, development of technogenic deposits	* Efficient use of natural resources Abatement	Lack of a clustering strategy for the formed TOCER structure
7	Concentration of production in local areas of the territory—polarized territorial structure of development	The created infrastructure is a factor of potential economic development, as well as environmental risk	Expanding opportunities for organizing territories and developing new spaces	* Conservation and increase of natural capital. The preservation of landscape diversity	Lack of consideration of risks and limitations of economic growth due to the risk of pollution in areas of increased economic activity
8	Close resource and economic ties with the countries of the Asia-Pacific region, regional exports are steadily dominated by the products of the commodity sector	Ensuring environmental safety within cross-border territories	Improving the system of international environmental regulations		Expanding the scale of environmental and technological efficiency of economic development

(continued)

Table 2 (continued)

№	Current conditions for the formation of TOSER	Environmental restrictions	Advantages/limitations for the region's economy	Compliance with the priority directions of the RE	The factors that require attention in the formation of an ADZ
9	High vulnerability of landscapes to anthropogenic load	Increase in the degree of transformation of natural systems with identical effects	High degree of eco-friendliness of the economy	Preventing loss of ecosystem services	Possibility of development in accordance with the environmental regulations of the ZE

Source: Author's development

landscape patches. This can end up restructuring of geosystems of the territory, their functions, and resources.

Practically, from the beginning of development and up to the present time, the main types of nature management in the Amur Region are mineral raw materials extraction and wood harvesting. According to the study of characteristics of nature management, there are changes in the structure of local and regional geosystems associated with a long depleting and nonintegrated use of the resource base. One of them is the fact that only the most accessible and high-quality part of the resource is mined (harvested). At the same time, excessive primary mass is remained as waste, energy consumption increases, the terms of mining facilities are reduced and the transition to a new resource base occurs (Nature Management 2005). This forms a deliberately incomplete resource cycle, characterized by significant resource, ecological and economic costs. In addition, there is the option of returning to the previously used raw material base, when the remaining resource is withdrawn, either with use of new technologies or due to the easy availability reducing the cost of production. However, ignoring environmental damage increases the number and severity of environmental problems.

In recent years, the timber industry has played a priority role in forest management, due to the growing demand for industrial wood in the Asia-Pacific Region (over 95% of harvested wood is exported) (Pacific Russia 2010). Timber industry is also one of the main parts of economy structures of Priamurye regions (Khabarovsky Kray and Primorsky Kray, Amur Oblast, Jewish Autonomous Oblast).

Studies of the commercial composition of timber stand conducted from the 1960–1980s to the present have revealed the following negative trends. First, the share of industrial wood intended for logging in southern Pacific Russia reduced to 60%. Second, commercial quality of wood is reduced due to fires and disordered logging. The reasons for these phenomena are the following: decreased proportion of wild forests, change of ownership (increase in the share of small leaseholders that are not specialists in forest management), growth in territory accessibility and low funding for forest fire services (The Current State 2009).

These lead to an underestimation of the importance of the ecological functions of forests, including the preservation of unchanged and slightly changed landscapes. In the current scientific studies devoted to the solution of these problems, it is noted that it is necessary to take into account the landscape structure of the territory for better assessment of the potential of forest ecosystems and spatial changes (Landscape and ecological planning 2001).

Forrest fires are the main factor in the transformation of natural landscapes of the most developed parts of the region including Khabarovsky Kray. They covered 17.8% of the area, covering from 86.3 thousand hectares to 3153 thousand hectares' region territory per year for the past 19 years (Figs. 1 and 2).

In studied years, the average area of one fire varied in the range of 286–1858 ha on forest land and 114–1180 on non-forest land. The study of the spatial structure of landscapes of the Sikhote-Alin mountain system (within the Khabarovsky Kray) using geo-information methods confirmed the presence of these negative trends. For the period of 1990–2015, the maximum areas of dark coniferous forests decreased by 4.2 times, the average areas by 1.7 times; their total area decreased 1.3 times. Indicators of small-scale areas increased: in 1990, the number of allotments with an area of less than 50 km^2 was 301, in 2011 it was 353. Transformations of the spatial distribution of dark coniferous forests are manifested in the displacement of arrays of fir-spruce forests and spruce forests to greater heights and towards the slopes of the northern exposure. An assessment of forest conditions in forest areas based on the State Accounting of the Forest Fund data showed that, in 1993–2005, there was an increase in the total area of the share of young forests, middle-aged, and maturing forests (coniferous and deciduous), the share of mature and overmatured stands in categories of hardwood and softwood species also increased. The reduction in the area of mature and overmatured coniferous forests is associated with regular logging during this period. As a result, there was a decrease in both the ecological and resource value of forests.

The extraction of mineral raw materials (first of all, gold mining) is one of the branches of specialization of Khabarovsky Kray, which provides significant revenues to the budget. The modern strategy of use of subsurface resources is associated with the maximum extraction of useful components and the dominance of the resource criterion that determines the conditions for solving environmental and social problems. Features of development of this branch for more than one and a half century period of operation of placer deposits are defined by natural change of mining technology that caused numerous returns of the gold mining enterprises to the same objects. Technological losses of the useful component at each previous stage of mining ensured the profitable development of the object in the future, aggravating the ecological situation in the exploited territory (Fig. 3).

At the same time, abandoned placer deposits are still considered as potential sources of extraction of both primary and secondary metals. On the example of alluvial gold deposits in Khabarovsky Kry, the extent of influence on landscapes is revealed. Territories affected by gold mining are characterized by the local nature of placement in the valleys of watercourses of the II–III degree and comprised 4–7% of the total basin area (Mirzekhanova et al. 2014). A rather high degree of

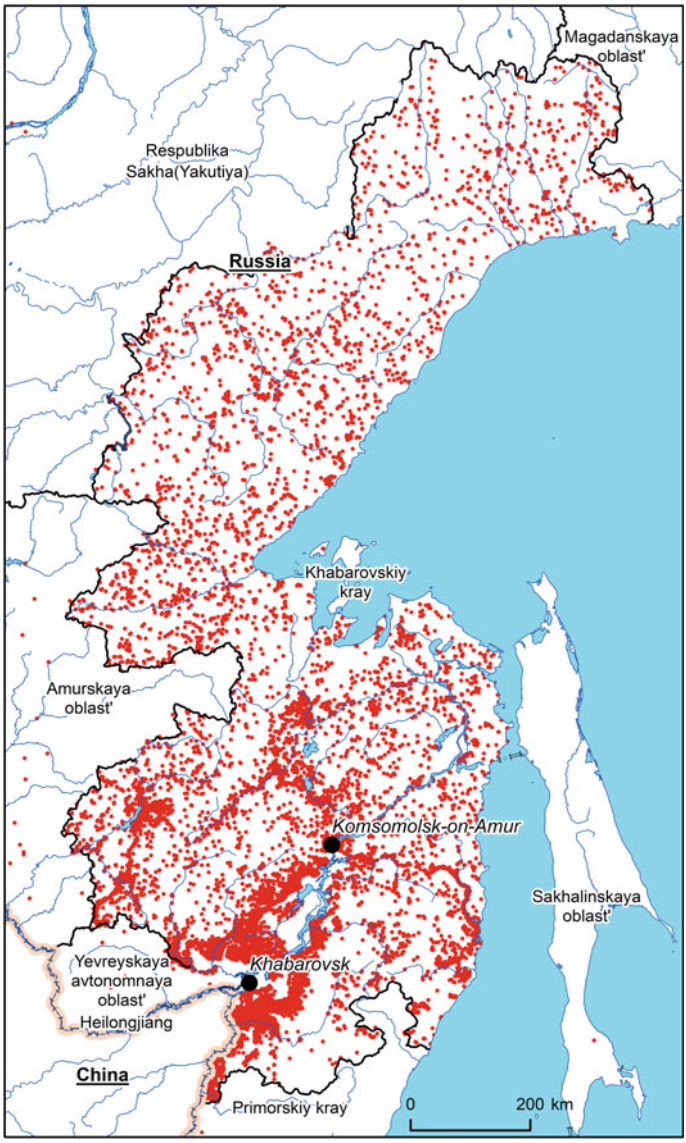

Fig. 1 Points of wildfires in Khabarovsk Kray in 2000–2018 on the forest lands (according to ISDM-Rosleskhoz). Data source Remote monitoring information system. Federal Forestry Agency https://public.aviales.ru/main_pages/public.shtml. Accessed 03 Des 2019

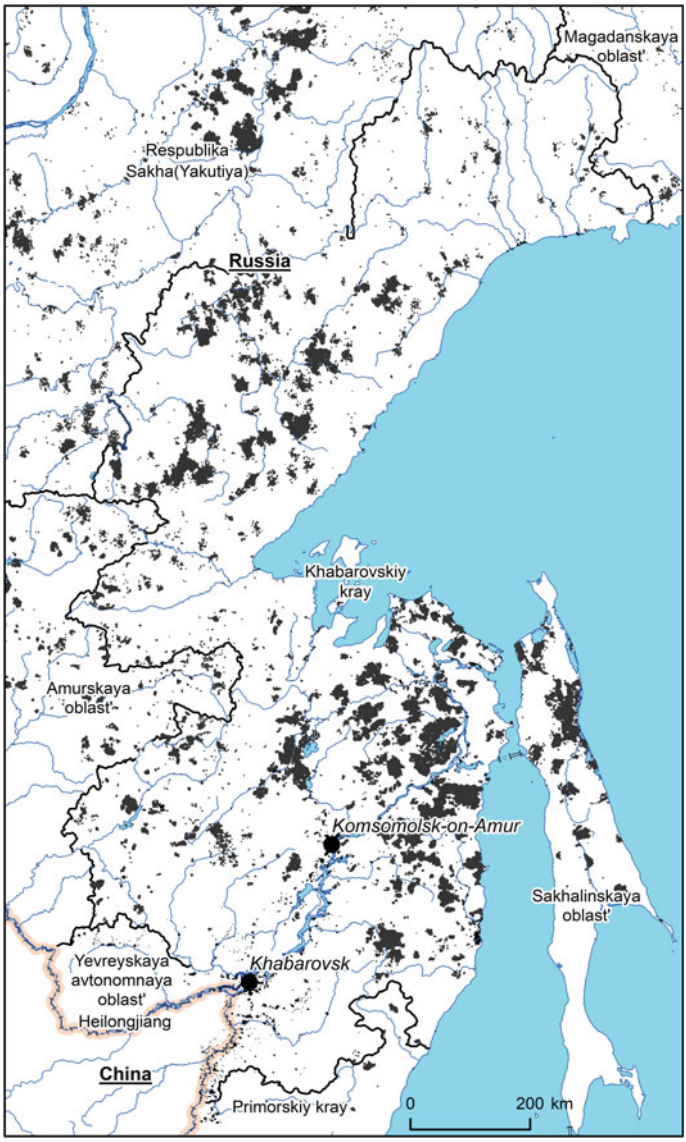

Fig. 2 The area of forests destroyed by the wildfire in Khabarovsk Kray (2016, SPOT 5 survey data). Data source https://earth.esa.int/eogateway/search?text=&category=Data&subFilter=data%20description&sortby=RELEVANCE&p_p_id=datasetlist_WAR_ospportlet&missions=SPOT. Accessed 26 Nov 2019

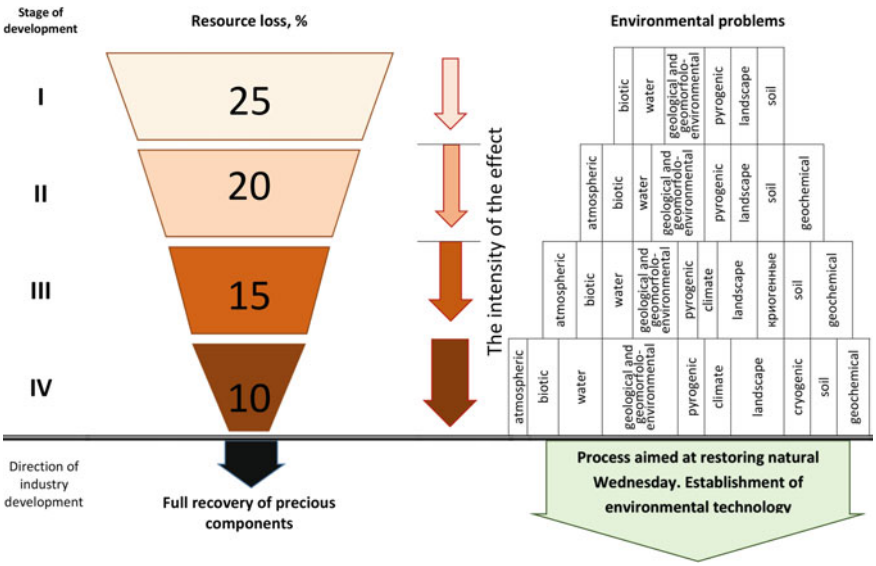

Fig. 3 Resource and ecological problems arising due to the development of placer gold deposits (Mirzekhanova et al. 2014)

self-regulation of river basin geosystems and restoration is noted if the forest cover maintains at least 40–60%. However, the incomplete extraction of useful components leads to the aggravation of the environmental situation during the repeated mining of man-made placers.

Thus, as the regions are characterized by resource-oriented specialization this, on the one hand, determines their economic development, and on the other, contributes to a gradual increase in the depth and severity of environmental problems. The development of growth strategies that equally take into account environmental, economic and social priorities enables the planning of integrated development programs, including, along with the extraction and deep processing of raw materials based on the use of new technologies, conditions for the preservation, and restoration of landscapes.

6 Ecological Aspects of the Modern Development of the Regions of Pacific Russia

At the turn of the century, politicians and the scientific community of the world took place in developing social and environmental strategy for sustainable development. As a result, some international documents related to the conservation of the biosphere were adopted. Gorshkov's ideas became actual. According to his work (1995), sustainable development can be achieved without global transformation of the biosphere into the noosphere. It can be a result of a balanced combination in

the structure of the Earth's biosphere of both perfect in the socio-ecological aspect anthropogenic geosystems and natural landscapes that reliably guarantee the stability of the environment due to biosphere homeostasis.

As already has been noted, a new model of economic development is being implemented in the Russian Far East based on the intensification of economic activity in the territories of priority social and economic development. Current trends make corrections to the orientation of regional economic development related with resource and environmental conditions. The importance of environmental prerequisites for economic development in the face of global requirements is increasing (Mirzekhanova 2019).

The territories of priority social and economic development will be created and developed under the modern requirements of world development indicated by the "green economy" model. The model takes into account two important prerequisites: the limited resources of the "final" planet and the growing degradation of landscapes (Towards a Green Economy 2011). The implementation of this concept will make the base for changing the entire territorial and sectoral structure of resource regions, and contribute to solve environmental problems that have escalated in previous periods (Mirzekhanova 2018).

Currently, Pacific Russia's regions are developing according to strategic plans approved up to 2025. The documents declare a course towards the diversification of the economy and the development of innovative industries. However, their planned indicators are focused mainly on resource segments and the transportation of raw materials to the Asia-Pacific countries. Most of the territories of priority social and economic development are associated with the construction of mining and processing enterprises in Yakutia, Magadan, and Amur Oblasts. Linking this strategy to the principles of the green economy is quite problematic due to the initially negative environmental effect of the activities of such enterprises. In addition, the resource sectors in the model of the "green economy" are not presented as significant for obtaining the planned result, and in some sectors (for example, traditional energy, road construction, mining, etc.) are considered unacceptable. In this regard, the strategic development programs should be changed towards strengthens of the ecosystem organization essentialness for economic activity and environmental regulations (Mirzekhanova 2019). However, economic preferences are dominant in the territories of priority social and economic development and environmental aspects do not reflect the desire to approach the requirements of the "green economy" model.

Thus, it is still premature to make conclusions about the successes of a new model of economic development in Pacific Russia. There might be a steady trend in the transformation of the territorial and sectoral structure of the economy towards the creation of processing industries focused on the production of high value-added products. Hence, the reality of reducing the impact of the existing export raw material development model on the environmental situation in the region may be seen. Among the positive results are enterprises using resource-saving technologies in accordance with international requirements.

7 Integrative Goals of Territorial Development of Pacific Russia' Regions Based on Adaptive Landscape Positions (on the Case of Amurskaya Oblast)

The most part of the scientific community (Zolotokrylin 2003; Kondratyev 2004; Kalnay et al. 2006; Gorshkov 2007; and others) thinks that the main reason of climate changes is terrestrial abiotization leading to the redistribution of solar energy absorbed by the Earth from the biocircle sphere to the outer geocircle branch (Gorshkov 2010). But the environmental sustainability can be restored or maintained in local territories. It will help to maintain the potential of global environmental sustainability. This requires using adaptive landscape organization methods, which are implemented in many countries in the landscape planning (Council of Europe 2000; Turner and Gardner 2015; Miklos and Špinerova 2019).

Prerequisites for sustainable environmental development are different for each country and entire region. Russia and other countries of the world (5,4%) have good starting conditions due to the preservation of low developed territories. They provide national and global environmental safety by maintaining the mechanisms of biotic regulation of the environment (Gorshkov 2007, 2010). The ability to preserve these mechanisms is determined, first of all, by the methods of organizing economic activity in low developed areas. There is no other alternative to the development of the territory as an adaptive landscape organization. It is based on the study of the spatial distribution of natural territorial complexes of different ranks, their mechanism of functioning, and adaptation of economic objects to them. From these positions, integrative goals of territorial development are considered as a fundamental basis of anthropogenic activity, which allows to integrate the territorial–economic system into the geographic space, taking into account the ecological limitations and regularities of its landscape structure.

Integration of targets is carried out in the following sequence. At first, the biospheric restrictions associated with the energy cycle around the globe are accounted; further, landscape and biological diversities are considered at the typological level of the landscape organization of the territory; then, the potential sustainability of individual landscapes are accounted; and really, the functional, geochemical and visual (attractive) features of landscapes are considered at the level of the morphological parts of the landscape.

The preservation of geo-ecosystems in the state of self-restoration and their inherent invariants is a general goal of territorial development from the biospheric point of view. The categories of potential stability of a landscape, a degree of their rarity or typicality, and the level of biological diversity are used to set local goals for medium-scale planning. The potential sustainability of landscapes is defined as a total index based on the average value of dominant parameters and the relative contribution of additional parameters (Borisova 1998). The dominant parameters characterize external conditions of the landscape (characteristics of heat and moisture, seismicity). The additional parameters are internal conditions that determine the state of the landscape (lithologic-geomorphological, cryogenic, soil-biological and

geochemical characteristics). The degree of rarity or typicality of the landscape corresponds to the 3% distribution barrier in the region (Borisova 2016). The biodiversity level of a landscape is determined based on the analysis of data on species diversity of flora and fauna, the presence of rare, relict, endemic plant and animal species, taking into account the structural features of the vegetation and the composition of animal population and its dynamics. Landscapes are divided into five groups by the potential sustainability and into four groups by the landscape-biological diversity. Local targets, focused on the main objectives of the use of the territory in the context of equal priorities of maintaining ecological balance and sustainable socio-economic development, are reduced to five types.

Landscape assessment in the categories of the potential sustainability and landscape-biological diversity focuses on determination of the overall preferable usage of one or another landscape for the general conservation goal and local goals of sustainable and environmentally responsible development and usage (Table 3). A map scheme of the conceptual territorial development of Amurskaya Oblast from the adaptive landscape positions (Fig. 4) was designed as follows:

- to allocate areas recommended with no developing and any usage;

Table 3 Integrative goals of the adaptive landscape organization of the low developed area of the Amur Region with resource-based economy (Borisova 2019)

Preservation—a general goal		Landscape and biological diversities at the typological level of landscape organization of the territory			
Local goals		Rare landscapes with high biodiversity	Typical landscapes with high and medium biodiversity	Rare landscapes with medium and low biodiversity	Typical low biodiversity landscapes
Potential landscape stability	Highly unstable	C	DD	ED	ED
	Unstable	DD	DD	ED	ED
	Weakly stable	ED	ED	ED	ID
	Stable	ID	ID	ID	ID
	Highly stable	ID	ID	ID	ID
Highly developed landscapes		–	R	–	R

C—conservation and with no development; DD—conservation and development in a delicate regime of environmental usage; ED—conservation and extensive development from consideration of natural recovery potential; ID—conservation and intensive development on the principles of "green economy" and organic farming; R—landscape reconstruction, bioengineering, "green economy" and organic farming

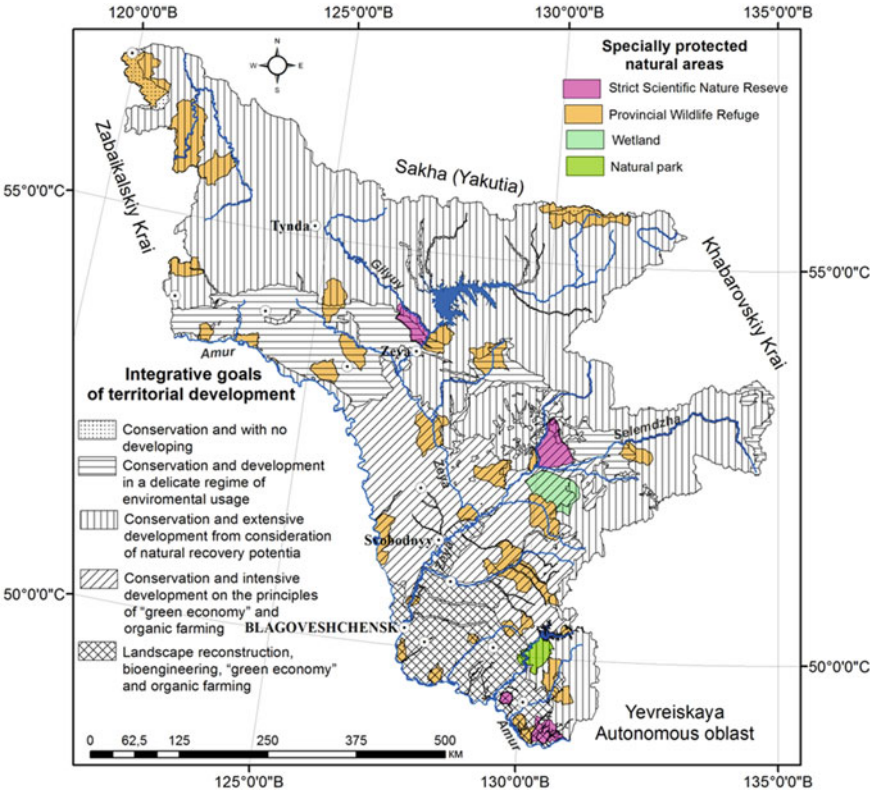

Fig. 4 Conceptual territorial development of Amurskaya Oblast based on adaptive landscape positions (Borisova 2019)

- to identify areas where their use can lead to degradation of the landscape and irreversible processes, so it is advisable to develop such activities that involve a delicate regime of using environmental usage;
- to designate areas where extensive development and usage is possible, but it is assumed that the landscape will be protected from negative influences, above all, on land cover, limited usage under conditions of self-restoration;
- to identify favorable areas in which there are high opportunities for self-restoration, and they are suitable for an intensive usage, but according to the principles of "green economy" and organic farming;
- to show highly developed areas where partial reconstruction of landscapes, the widespread implementation of bioengineering activities, the development of a green economy, and the modernization of the existing economy in the line with a "green economy" and organic farming are needed.

Protected areas and target ranges most often do not coincide. In these cases, then target installations are guided by the maximum preservation of geosystems. The territories of specially protected natural areas (11,4% of the oblast is area) are assigned unequivocally to the territories with no development or a delicate environmental regime.

In Amurskaya Oblast, the territory with no development is 0,8% of the oblast is area. The Strict Scientific Nature Reserves join them and their area is 1,1%. Territories with development in a delicate regime of environmental usage make up about 13%. The areas of Provincial Wildlife, Natural parks and Wetlands are listed on their balance sheet. Areas with extensive development occupy the largest areas (more than 50%). Intensive development extends to approximately 20% of the area and landscapes should be reconstructed on the area of 9%.

The need to develop integrated targets for new development processes, taking into account the adaptive-landscape organization of the territory, has not been officially recognized in a strategic development. Emerging new political approaches are integrated. Administrative structures of all economic levels need sufficient knowledge for territorial development from the ecological point of view.

Economy modernization is a complex process based on using of the best examples of modern technology and environmental management which are focused on the transition to sustainable development. According to Privalovskaya (2014, p. 19), nature use in a country with huge natural resource potential is becoming more complicated and long term. She notes the main issues of fundamental and applied geographical research that should be addressed to the country's development in current conditions:

- overcoming mainly the resource orientation of economy;
- limiting the colonization of new spaces by raw materials developing. Extracting country's resources with little number of labors;
- developing social and transport infrastructure in mining areas;
- minimizing the effects of natural and technological risks; and
- replacement of the resource management by ecosystem approach.

The concept of the territory organizing has in common with the green economy model. The "green" modernization of economies should be carried out in accordance with the principles of sustainable development, the commitment of which is demonstrated by most countries of the world, despite the varying geographical conditions and cultural traditions (The future we want 2012). The ability to maintain these mechanisms is determined, first of all, by the methods of organizing economic activity in underdeveloped territories.

8 Conclusion

During the whole 150-year period, Russia's development of the eastern outskirts lands is associated first of all with the need to solve geopolitical problems (border protection) and using of natural resources (soil, agro-climatic, mineral, forest, fish,

etc.). The development of agricultural land use was actual for the Amur Region of Pacific Russia at all stages of its development.

The periods and features of the formation of the modern demographic situation in the region over a long period of development have been identified. Pacific Russia has more than once become an arena for the implementation of a centralized resettlement policy which helped to develop of unsettled territories, their natural resources, cope geopolitical problems in the east of the country, and others. JAO is an example of large-scale settlement of Far Eastern lands. Nowadays, the restoration of the positive dynamics of the population becomes an urgent problem of state and regional policy.

The Amur Region joined Russia in the middle of the nineteenth century was not a territory with unchanged landscapes by human economic activity. The local population formed here focal agricultural and forestry land use with concomitant changes in the state of natural landscapes. With new population, the human pressure on natural landscapes intensified. Ecological problems such as wildfires, reduction of native forest vegetation with loss of biodiversity, long-term transformation of local geosystems in the areas of loose gold mining are inherited and are manifested in the region at all stages of its development.

At all stages of Pacific Russia development, the development of resource-extracting industries was based on the maximum use of natural resources with lower prices, using simple mining technologies, and ignoring environmental requirements.

Features of Pacific Russia as a raw material-oriented region make a print on the modern development of its territory. The possibility and focus of regional economic development are affected by resource and environmental conditions. Environmental arguments, combined with the developed guidelines for optimizing the land use, are a fundamental argument in adjusting the development of the region in the trend of world development requirements.

The implementation of the modern development model of the studied region is characterized by multidirectional business goals in resources using (making a profit) and preserving the landscape as a safe habitat for the population. The predominance in regional exports of raw materials and the resource interest of the countries of the Asia-Pacific region do not make it possible to transform radically strategic goals in order to reduce environmental pressures and threats.

Due to the underdeveloped territories of Pacific Russia in the northern hemisphere, national and global environmental safety is ensured on a global scale. In this regard, the practical implementation of spatial planning based on adaptive-landscape organization of the territory is relevant. The proposed scheme of the integrated goals for territorial development in order to preserve the potential for environmental sustainability and restore the natural environment uses the categories of potential landscape sustainability, their degree of rarity or typicality, and levels of biological diversity.

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Russia "Has Growing with Siberia": Soviet Power in the Battle Against Nature and Territory for Resources

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Abstract The conceptualization of industrialization of the northern territories was the core of primary resources development in the Siberian North. The industrial standard was best implemented in the North of Western Siberia to create the West Siberian oil-and-gas complex. By the beginning of the 1980s, 66% of oil and gas condensate production, and 63% of natural gas in the USSR. The North of Siberia's industrial development led to the expansion of the environment and reduced natural space. The paper analyzes land management in the Russian North in the late 1920s–mid-1930s. Land management was based on the class principle, and it acquired radical forms of land redistribution. By 1934, due to the poor peoples' resistance, collectivization was not successful. In 1934–1935, some modes for the Far North development were formed: the dominance of economic organizations, the main northern sea route (Gravsevmorput) creation, the deployment of a network of economic and industrial stations. The research shows that the socialist colonization under the Stalinist leadership was "reverse colonization." During this process, the authorities provided the territory of the region with cheap labor. The Stalinist regime managed to achieve such a structure of the population, where from 20 to 40% of the permanent personnel employed in the main sectors of the region's economy were special settlers. In comparison, the Gulag's prisoners who built the "Dead Road" accounted for more than 85% of the

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V. N. Bocharnikov and A. N. Steblyanskaya (eds.), *Humans in the Siberian Landscapes*, Springer Geography, https://doi.org/10.1007/978-3-030-90061-8_12

number of builders. The role of Dalstroy in the development of the North-East of Russia is also considered. Dalstroy operated on a huge territory of 2.8 million square kilometers. In 25 years, it has done a colossal amount of work—only their geological exploration covered more than 1.9 million square kilometers. The volume of state capital investments in Dalstroy for its activity from 1932 to 1956 amounted to 13.7 bil. rub in estimated prices. Thus, as the result of the abovementioned processes, significant social and economic infrastructure has been created in the North-East of the country.

Keywords Development of the North of Siberia in the XX century · Land management · GULAG · Dalstroy

Glossary

Dalstroy	Upper Kolyma area' state road and industrial construction trest.
GULAG	Main Administration of Camps.
Land Management	set of measures to manage land recourses, their rational usage and protection.
Kulak	previous reach pleasant who explore labor of the poor people.
Industrial Standard	reasonable control not only over social environment but over natural one, realization of scientific revolution, expansion of applied scientific researches, rational views of life distribution.
OGPU	Joint State Political Directorate.
NKVD of the Soviet Union	The People's Commissariat for Internal Affairs.
Labor settlers	one of the most massive categories of so-called Stalin's epoch's "special people", appeared as a result of repressive politics of raskulachivanie at the beginning of 1930, existing until the middle of 1950. The representatives of totally deported nations (German, Kalmyk etc.) were included in that category.
TsK VKP (b)	Central Committee of the Communist Party of the Soviet Union (Bolsheviks).

1 Industrial Standard of Raw Siberian North's Resources' Developing (1917–1991): From Nature to Environment

Consistent conceptualization of the idea of industrialization of the northern territories and its actual implementation in the region were the core of primary resources development in the Siberian North in the second half of the twentieth century. Consequently, everything that corresponded to the industrial development standard and worked for it was "positive", "with a plus sign", and everything that did not correspond to this standard and prevented its entrenchment in the North of Siberia, was considered "negative", "with a minus sign." The industrial standard for the development of a territory implies rational control over the social, and over the natural environment of people and scientific revolution, the expansion of applied scientific research and spread of a rational outlook on life. This standard became the embodiment of the paradigm of the "conquest of nature" that triumphed in the USSR, the regional version of which was "the attack on the North", "the conquest of the North", etc.

In the first half of the twentieth century, the North of the USSR was perceived as a single zone in economic and geographical terms. It was considered impractical to differentiate it according to specific natural and climatic characteristics, settlement conditions, capital intensity of production, living conditions of the population. The situation has changed dramatically since the mid-1960s due to the large-scale development of hydrocarbon raw materials in the North of Western Siberia and the increase in the volume of economic activity in the previously developed regions European North of the USSR. Differentiation has become necessary from an applied point of view, primarily an economic one.

The North of Western Siberia was especially prominent of the Siberian North. This is a region that in an unprecedentedly short time (mid-1960s–mid-1980s) has gone from focal development of the territory, where it was only necessary to control the production of certain resources, to continuous industrial development with the need to comprehensively ensure environmental protection. Here the industrial standard for the development of the territory was fully implemented (Mostovenko and Golobov 2016).

In a concise time, the West Siberian oil and gas complex was created on the region's territory, whose share by the beginning of the 1980s accounted for 66% of oil and gas condensate production, and 63% of natural gas in the USSR. In the development of biological resources, the "industrial standard" was expressed in the "socialist reconstruction" of the traditional economy of the indigenous peoples of the North. The reconstruction was based on the intensification of traditional industries in three main directions: carrying out cropping in optimal and tight time frame; implementation of a complex of biotechnical measures to improve the habitat of fish and game; the transition from extensive fishing and hunting to zoo- and aquaculture.

The "resource" approach to the North of Siberia became predominant and took the form of the supremacy of the mining and heavy industries's development. This required the active involvement of more and more resources into the stream of

commerce. The emphasis on industry, scientific and technical development of the region's natural resources on an industrial scale has led to the emergence and shift of a new border in the Siberian North, both in the symbolic and geographical space—between nature and the environment. Unlike nature, which does not need people, the environment exists only where and when people exist. This border between nature and environment is conceptual and historically determined (Golobov 2017a; Golobov 2020).

The North of Siberia's industrial development led to the expansion of the environment and the reduction of the natural space. The taiga zone of Western Siberia has become the human environment, the visible embodiment of the winning "industrial standard" for resource development. "Untrod", "wild", "untouched" taiga has turned into a territory with an "industrial landscape" of high-voltage power lines, oil and gas pipelines, industrial enterprises and cities with a significant (for northern conditions) permanent population. The taiga zone of Western Siberia has become the "near North". The scientific and popular science literature portrayed the North development as both everyday and heroic, in its routine, work of hundreds and hundreds of thousands of Soviet people. The image of the Soviet man was formed, and this man "more and more daringly, more and more massively penetrates into the thickness of the permafrost, covering more than half of the territory of Russia, into the centuries-old taiga jungle, the boundless blue of the ocean of air and the vastness of the Arctic. And he penetrates it not only as a pioneer, but also as a creator, building cities, constructing roads, mines, power plants. And in terms of the scale of time, and space, and resources and the rate of their development, and, finally, the scale of labor and the deeds of man, the North of the USSR has no equal on land." The nature has retreated, leaving room for the environment and the inevitable environmental problems associated with it. Minus turned to plus. But this "plus" turned out to be burdened with zones of ecological disaster and human-made disasters (Golobov 2017b; Golobov 2018).

2 Siberian Indigenous People and Land Management in the 1920—First Half 1930th Years

A new goal of adoption of the central authorities in remote regions of the Siberian tundra and a taiga where indigenous people lived became prevailing for the new authorities after Soviet State's formation. Land management works which were coordinated by special body of the Soviet government—Committee of assistance to nationalities of the northern outskirts (further—North Committee) became the paramount instrument of nationalization of those territories. Land management of Siberia had to become the basis for industrial development of resource richness of boundless edge (Golobov 2019; Ivanov 2015, 2016).

The North Committee proved land management of the northern outskirts with the connection of the indigenous nationalities. The joint with the nature was complemented with reasonings on special legal consciousness of the indigenous people on the territory, which regulated the social contacts on huge spaces including the relation of nationalities to the territory developed by them. That legal consciousness on the territory was considered to be the basis for future land management by North Committee. At the beginning of the activity in July 1924 the Committee of the North raised a question of definition and the reservation of the territory necessary for indigenous peoples of the North. In 1926, Presidium of VTsIK and SNK of RSFSR approved "Provisional regulations for management of native nationalities and tribes of the northern outskirts of RSFSR" which was drafted in Committee of the North. During the IV Enlarged Plenum of Committee in February–March, 1927 National commissariat of agriculture of RSFSR (further—People's Commissariat for Agriculture of RSFSR) was entrusted to develop the Provision on land of tundra and taiga management, foods and hunting grounds' management and also water management and organization of protection of fish resources and their correct usage. In 1928 during the Vth Plenum of Committee the Provision "About the Initial Land and Water Management" was accepted. According to the Provision the order of branch and fixing for labor usage of indigenous peoples of the North of land and water grounds with removal from the territories of newcomers and new settlements of self-settlers developed by natives was established. Practical works on land management started with that document. Land management had to give economic territories of Far North to the indigenous people. Actually, legitimization of the rights of indigenous people for the land was recognized as a task of land management works. However, there were many skeptics concerning land management of the Siberian indigenous people in the USSR's government. In particular, RSFSR People's Commissariat for Agriculture proceeded from understanding that northern territories belong to nobody and are not used in any way. Finally, the North Committee prepared the "Regulations on the Land and Water Management of the Working Population of the Northern Outskirts" project approved by VTsIK and SNK on September 10, 1930. Land management in 1927–1930 was planned by North Committee taking into account "natural", "historical" patrimonial, and hereditary distribution of lands among indigenous people. Lenin's national policy was proclaimed as the base of such scheme of land management. Land management works were aimed to liquidate the erupting ethnic conflicts for the Far East lands and approach to crafts of indigenous people after the revolution. Russians' migration to the north was explained by the fact that after coming to power of the Soviets, the Russian population found out not indigenous property, but nobody's one in Northern lands. They considered that property to be national one. The practice of self-settlement removal from the territories, developed by the indigenous people, was outlined within such land management. Since 1930 land management had gradually submitted to processes of collectivization in the system of socialist arrangement of the indigenous people. The change of identification strategy from ethnicity to classes at land management in a radical stage took shape of a land allotment in favor of poor people, middling persons, collective farms, and state farms.

The first in quality and convenient grounds on arrangement were allocated for collective farms and the simplest associations, and kulak farms at land management were allocated with the worst in quality lands. The constant conflicts of interests, changes of techniques, and the conceptual principles inevitably conducted to a failure of land management process. The target figures of land management on the Far North whole territory for January 1, 1933. Exactly one year prior to the planned completion of works, showed that from 798.0 million hectares of lands which were subject to the organization 263.3 million hectares were examined, and it is finished with the device—only 94.9 million hectares.

Thus, there was not a development of national cultures, but "nationalization of the people" of Far North, a sort of their transformation into the property of the state by means of land management. Since 1931 there were a dispossession of kulaks (previous rich peasant owner, exploiting the laborers) and zemleperedel as the basis of the collectivization process. By the end of the 1920th, the indigenous northern people remained excluded out of the system of the socialist state. The lands, they lived on, were managed by the traditional ethnic system. Therefore, the essence of land management works consisted not in land usage's rationalization, but in organization of the power and control over the population living on the uncontrollable territory, definition of its social borders and designing of new socialist identity in a national format. Far North's collectivization was a sort of transition from ethnic land management to class one. The discrimination of fists and shamans was interpreted as precisely the disguised attack on radical nationalities.

The problem of the labor population formation from representatives of the indigenous people for the fastest industrial Siberia's development was emphasized in the government. The increasing importance of industrial development was legislated in April, 1931 in the decision of the VIII Plenum of Committee of the North. The Plenum had to change their principles and actually recognize impossibility to resist to approach of the economic enterprises on the territory of Far North. Industrial development dictated new rules of the game to the Committee of the North, it led to an end of the first stage, withdrawal from land management on the basis of ethnic criteria and to judgment of departmental realities which received justification on the X Plenum of Committee of the North in April, 1934. They called to create a vast network consisting of 200 economic and trade or machines and trade stations on the territory of Far North. They were designed as the complex, taking into account all economic spheres, cultural bases of natives were also joined to their general network. Stations had to make "tightening of the scattered population into the central points, creation of points of settled life". The management of complex network was assigned to Head Department of the Northern Sea Route. Direct control over stations was offered to be ceded to the Central See Route (in Russian-Glavsevmorputi's) political department that was directly subordinated to the All-Union Communist Party Central Committee. Central see route was imputed the organization of territories, development of the North and development of its economy, beginning with the 62nd parallel. In 1935 the presence of new huge department, the evidence of self-liquidation of North Committee was proclaimed. New organizational forms of work with indigenous people and northern territories fitted into the following stage of the population

policy for the Far North indigenous people. As the result of that policy, endogenous people were ethnically and mentally changed. Domination of the economic organizations, powerful Central See Route's creation, expansion of network of economic and trade stations—those factors were laid as the base of a departmental paradigm of development of Far North and Siberia which was implemented by the government up to disintegration of the Soviet Union in 1991.

3 North-Western Siberia (1930–1950th)' Special Colonization

At the beginning of 1930, Heinrich Yagoda, on behalf of the management of OGPU, suggested "… to carry out colonization in a socialist way", having turned "the camps to kolonizatsionny settlements", in order to develop enormous natural wealth of the North. As a result of several waves of peasantry's deportations, carried out within Stalin's policy of collectivization and a dispossession of kulaks on the territory of Northwestern Siberia (modern Khanty-Mansi and Yamal-Nenets districts) had the status of special immigrants (from 1933 to 1944 also called trudposelenets). Their total number was more than 30 thousand exiled peasants, and it meant that approximately every third inhabitant of the region was a victim of political repression.

Places of settlements of exiled were called labor settlements (then "spetsposelki"). The peasants who did not have any wish to lead collective farms were "reforged by labour". Settlements with special regime were formed of special immigrants. Their inhabitants could not leave the specified settlement, were attached to the certain house inside of it. In the spring of 1930, the leaders of the Ural region (Northwest Siberia was a part of it then) discussed "the capital investments connected with colonization of the North". It was decided to build standard houses for so-called "colonists" (name given by officials). It was the so-called "Zyrianskiye izby". One "izba" of 29.25 square meters was given to a pair of families. Three square meters per a person was taken as a norm. All special immigrants were obliged to be engaged in "socially useful" labor. Each settlement was assigned to one or two organizations, and only those organizations could derive labor from it. In the studied region the National commissariat of agriculture (NKZem), the National commissariat of the forest industry (NKLes), and the National commissariat of fishing industry (NKRybprom) were such departments. As the commandants of OGPU (People's Commissariat for Internal Affairs and the Ministry of Internal Affairs) directing network of the commandant's offices which are specially created for supervision of exiled were chiefs over settlers, the contract on use of "rabsila" was signed with the retaliatory department which was "owner" and the supplier of human resources. As a result, such a system was created when the "colonists" living in rather isolated settlements, were in full power of commandants. To the middle of the 1930th the commandants provided not only realization of the regime, but also controlled all the spheres of life in the settlement, up to control over the household sphere, educational affairs, and even civil registration.

In December 1935, they lost their rights of intervention in affairs of the schools working in settlements, and in November 1938, the separate collective farms created for special settlers (which boards included the commandant), moved to the general bases. The authorities took that step obviously in order to make collective farms consisting of "colonists" provide not only their own existence, but also supply the surrounding "legal" population and government institutions, as it was in case with collective farm of "Perekovka", which was obliged to supply the population of the district center—Khanty-Mansiysk at the beginning of 1941. By the beginning of the war, the system of regime settlements absorbed almost all the territory of Northwest Siberia. For July 1, 1941, the system of labor settlements included 6 regional commandant's offices and 51 labor settlements. 23.5 thousand labor settlements lived under control of commandant's offices of Northwest Siberia. World War II introduced the amendments in development of a system of the special reference and "kolonizatsionny actions". Deportations based on ethnic features began to play the increasing value. In 1940–1941, a group of 1 thousand Polish citizens (so-called "refugees", mostly Jews) lived on the territory of the region (as special immigrants). They were transferred to the forest industry, but worked there not long as in August 1941 they were amnestied and struck off the register of the special settlement. The villages of special residence (spetsposelki) (see Fig. 1), created for the Polish citizens were occupied soon by new inhabitants. As a result of deportations of 1942 and 1944, more than 20 thousand ethnically deported citizens (the Germans, Kalmyks, Finns representatives of the western areas of the Ukraine, Belarus, and Moldova) and religious deported citizens (deported in 1944 "truly orthodox Christians") appeared on

Fig. 1 Children play in the village of special residence, Siberia. *Source* Open-access

the territory of Yugra and Yamal. All of them turned into special immigrants of the corresponding groups (German special immigrants, etc.).

By the end of the war a percentage of special immigrants among the general number of population of the region decreased to 20%. Post-war deportations and in particular arrival of ex-citizens of the Western Ukraine did not change the situation on the territory of the region. Moreover, the system of special settlements had also been changed greatly. War forced to settle the new contingents of special immigrants among the "legal" population. Having the sanction of commandant's office, they could work far outside places of the settlement.

At the same time the principles of distribution of labor changed: before the war exiled peasants were more or less evenly distributed between forest, fishing industries and collective farms (taking into account the fact that in process of advance to the north the share of exiled peasants, transferred to fishing industry, increased), during the war, on the basis of government's resolution issued in January 1942, more than 70% deported were in fishing industry which was recognized as a priority industry of the region. Special immigrants were transferred to the full order of directors of the enterprises. Employment contracts were not signed, and People's Commissariat for Internal Affairs monitored only the regime and minimum social needs' obeying. In separate fishing enterprises the percentage of special immigrant workers could exceed 40% of the whole staff.

Special colonization of the region was partially realized by attempts of prisoners of GULAG (see Fig. 2): since April 1947 works on a construction of Arctic railway line Chum (Komi ASSR)—Salekhard (Yamalo-Nenets Autonomous Okrug)—Igarka (Krasnoyarsk Krai) began. Working within socialist colonization, the government demanded to construct the port and the ship-repairing plant first of all and only then the inhabited settlement. Works were continued till March 1953. In 1953, they were contracted because of excessive cost intensity of the process of building according to L. P. Beria's position.

The border of the Ob camp, whose prisoners constructed the road, was determined in accordance with the essence of distribution of construction works and conditions of transportation and unloading of material resources along the road. At peak of construction works (February 1951), when the number of prisoners was maximum (68 thousand), it exceeded in number of the population of all Yamalo-Nenets Autonomous Area. The structure of the population of Northwest Siberia which total number was about 220 thousand people looked like that the free population—60%; prisoners—30%; special immigrants—10%.

There was "a colonization on the contrary". The special immigrants sent to the region for "colonization of the North", and called "colonists" were as the population of colony: isolated in the special labor zones, with no right to choose the place of employment, having no right to extra charges (up to 50% of a salary) for their work in the region of the Far North and also long-service bonuses, having no right to be a member of labor unions. The prisoners of GULAG opening the way to the north existed in even more severe conditions: they worked under constant surveillance of camp protection, 1 square meter per a person as living space, under the leadership of the administration which regretted that because of connection of Salekhard (the

Fig. 2 GULAG' prisoners build the road. *Source* Open-access

capital of the Yamalo-Nenets Autonomous Area) by the railroad with a railway system of the Soviet Union (1950), the territory of the region had stopped being "natural prison".

It should be noted that Stalin's regime managed to obtain such structure of the population. The authors calculated that from 20 to 40% of the constant work places occupied in the region's primary branches of economy (the fishing and forest industries and agriculture) were made by special immigrants. In the same way, GULAG's prisoners constructing "the dead road" died more than 85% of number of builders.

4 "The Dalstroy Phenomenon": Soviet Development of the Northeast of Russia in the 1930s–1950s

The gold industry's growth, which started in the late 1920s–early 1930s, resulted in such factors as the state investment program, the development of gold production by prospectors, and the increased share of gold ore deposits. Another critical factor was the discovery of large fields along the Kolyma River in the country's extreme northeast and the development of that area by the specialized government agency, Dalstroy (see Fig. 3), in the 1930s–1950s (Piliasov 1993; Batsaev 2002; Shirokov 2014; Zeliak 2015). Dalstroy was established in 1931 as the state road and industrial

Fig. 3 Nikishov I. F. (Head of Dalstroy) and Tsaregradskiy V. A. (head of the GRU DS) on the Kolyma highway, winter 1941. *Source* Open-access

construction trest in the Upper Kolyma area. In 1938, Dalstroy was handed over to the Soviet NKVD and transformed into the NKVD's Far North Construction Trest. The organization consisted of the central administration and production departments, including the Northeastern Labor Camp.

Dalstroy was operating on a vast territory of 2.8 million square kilometers and had performed a considerable amount of work within 25 years: geological survey was carried out across more than 1.9 million square kilometers. The government invested 13.7 billion rubles (in estimate prices) into Dalstroy during the period of 1932–1956. As many as 4,500 km of all roads were built in the country's North-East, including more than 1,000 km of the Kolyma highway. By the middle of the 1950s, Dalstroy had its fleet of river and sea vessels, 50 planes, 30 airports and airfields, 57 power plants, and seven factories. It had over 10,000 vehicles of all types by 1954. More than 100 schools, over 300 hospitals and first-aid stations, and about 250 clubs, cultural centers and libraries were opened in the North-East. A new town—Magadan—was built on the banks of the Okhotsk's Sea. It became the administrative center of the Magadan region established in December 1953 (Stas 2018).

Glavzoloto (renamed Glavspetstsvetmet in 1946) and Dalstroy mined 2,029.4 tons of gold during 20 seasons between 1931 and 1950, including 1,116.2 tons (about 55%) mined by Glavzoloto and 913.2 tons (about 45%) mined by Dalstroy (that was an impressive amount compared to the all-Union organization, Glavzoloto). Since the late 1930s Dalstroy's production's results were close to the indicators of Glavzoloto,

and the peak of Dalstroy's output—80th ton of gold—occurred in 1940. According to the table, Dalstroy played its role during the War. Dalstroy annually supplied approximately 70 tons of gold to the Glavzoloto; its produce totaled 290.7 tons in 1941–1944. During the war, the significance of Dalstroy was demonstrated by the visit of U.S. Vice-President Henry Wallace to Magadan and Dalstroy gold mining enterprises in May 1944. The purpose of the visit was to make sure of the gold mining capacities of the Soviet Union and to acquire information about the amount of gold production in the Soviet northeast Ivanov and Ierarhiia Spersposelenia (2018).

In the post-war economic reconstruction, the Soviet gold industry was put under the jurisdiction of the Interior Ministry in the fall of 1946. Based upon the substantial increase of gold production cost, the transformation of Glavzoloto into the Soviet Interior Ministry's Glavspetstsvetmet was an attempt to optimize the industry's economy through labor mobilization of prisoners, centralized management, and technical re-equipment. In the post-war period performance indicators of Dalstroy rapidly went down, while Glavzoloto increased production in 1946–1949. Over the 1940s Dalstroy mined 599 tons of gold or 85.6 tons more than Glavzoloto/Glavspetstsvetmet.

Labor productivity of Dalstroy gold mining enterprises was nearly twice higher than in Glavzoloto but 80–86% smaller than in the United States and Canada (including the production of placer gold) (Grebenyuk 2018). A comprehensive assessment of all parameters shows that labor productivity at placer gold deposits of Dalstroy (since 1957 People's Economy Council) was higher than labor productivity in most other Soviet regions. However, the main factor of higher labor productivity and lower gold production cost was the higher content of gold in the alluvial. Production cost of Dalstroy's gold was the lowest in the Soviet Union, but the gold content in the alluvial started reducing in 1943 and Dalstroy had to work harder to fulfill the annual plan and needed machines and equipment.

The remoteness and challenging working conditions of many fields and the depletion of once rich deposits increased production costs. The average production cost of Dalstroy gold grew from 6.55 rubles per gram in 1940 to 13.67 rubles in 1945, and amounted to at least 25 rubles per gram in 1947–1956. Dalstroy's gold output dropped from 52.4 tons in 1949 to 44 tons in 1955, what is more, tin production dropped 2.5 times in 1953–1957. In the first half of the 1950s, Dalstroy failed to maintain metal production at the previous levels. In 1954, the Dalstroy administration explained those facts by the events of 1953 and the loss of many skilled labor forces. In 1955, 25 out of 62 operating Dalstroy's enterprises failed to reach plan targets, and 32 out of 71 could not do that in 1956. Dalstroy was transformed into the People's Economy Council of the Magadan economic administrative area in 1957.

Over the period of its activity between 1932 and 1956, Dalstroy produced 1,187 tons of chemically pure gold; Dalstroy's gold production costs reached 19 billion rubles in 1932–1956, while the value of gold exceeded $1.3 billion. In 1932–1955, Dalstroy produced 58% of all gold in the country (excluding prospectors), and Glavzoloto mined the rest, 42%, which means that Dalstroy supplied slightly more than a half of all gold produced by state-run enterprises (Grebenyuk 2017).

Dalstroy achieved its results by developing rich placer gold deposits and using prisoners' labor. According to published data, prison camps on the Dalstroy territory took in 859,911 prisoners in the period from 1932 to 1954; 445,171 prisoners were released, 121,256 died, and 7,800 escaped. The most difficult for the prisoners of the north-eastern camps of Dalstroy and the GULAG were the war years. The Dalstroy administration directly linked the metal output to the number of prisoners; the labor of prospectors cost more, and the recruitment of contractors required a lot of investment in social infrastructure and daily life, in addition to recruitment and payroll expenses. Dalstroy was a part of the economic system of the NKVD-Ministry of Internal Affairs of the USSR, with all the specific features of the camp economy. The first Dalstroy administration of E. P. Berzin planned the eventual recruitment of contractors, but after E. P. Berzin was arrested in late 1937, Dalstroy was put under the jurisdiction of the Soviet NKVD, the administration was purged, and no such proposals were made in official documents of the later period.

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Socio-Economic and Demographic Transformations of Post-soviet Siberia

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Abstract Dramatic changes took place in the economic and demographic development of Siberia in the post-Soviet period, following the changes in the political and economic situation in the country. Geodemographic interactions with adjacent territories, due to the differences in respective potentials, changed the pattern of human settlement in Siberia. The quality and standard of the population living in Siberia is estimated using the human development index. We combined different

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territorial levels of the analysis to identify the features of socio-economic transformations, i.e., of the all-Siberian mega-region and individual subjects of the Federation. The issues of the development asymmetry in the Far North of Russia as key positions of the Russian economy, the importance of Arctic as a global environmental resource, strategic role of the North in ensuring national security and geopolitical interests of the state are identified. In the transboundary region of the Great Altai, we considered the interaction of the Altai Krai (Russia) and the East Kazakhstan Region (Kazakhstan) in detail. The transboundary development axis is designed to create a multiplier effect, an increase in employment and living standards, and an increase in competitiveness of products. We assess transformation processes in nomadic society as a result of the transition to market relations and changes in "feeding" landscape. In this research, exacerbating problems of alternation of the traditional methods of managing a nomad economy, increasing anthropogenic load on natural systems, are examined. The trends in the development of socio-economic and demographic processes in the context of globalization indicate an increase in transformation processes in Siberia and the Far East, and the development of integration processes in the economy.

Keywords Socio-economic transformation · Development asymmetry · Territorial structure · Demographic processes and structures · Human development index · Quality of life · "Feeding" landscape · Desertification

Glossary

Gross regional product (GRP)	is a monetary measure of the market value of all final goods and services produced in a region or subdivision of a country in a period (quarterly or yearly) of time.
Regional asymmetry	represents features of regional differentiation, objectively determined and stable in time and space, manifesting as inter-regional gaps (deviations) according to the most important socio-economic indicators.

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Human development index	is an integral indicator calculated for inter-regional comparison and measurement of living standard, literacy, education and longevity as the main characteristics of the human development of the territory under consideration.
Transboundary region	is the adjacent border territories of states characterized by a certain natural, economic, socio-cultural, ethnic unity.
The Mongolian Plateau	is a large subregion of Central Asia, the territory densely populated by the Mongolian ethnic group, including those living in the Russian Federation, and in the province of China—the Inner Mongolia Autonomous Region, the entire territory of Mongolia.
"feeding" landscape	is a place of residence for ethnic groups and landscapes that give it "food", as well as a designation of economic opportunities that exist in the natural conditions of the territory of the living ethnic group.
Desertification	is land degradation in arid, semi-arid, and dry humid areas as a result of various factors, including climate change and human impact.
Nomadic cattle breeding	was a harmonious system of nomadic animal husbandry, associated with the movement of the cattleman from place to place with livestock and all his property, when yurts of various sizes and purposes served as mobile housing.
Traditional nature management	is historically developed and non-exhaustive ways of using objects of the animal and plant world, land, and other natural resources.

1 Socio-Economic Features and Transformations of Territorial Structure of Siberian Economy at the Beginning of the Twenty-First Century

The Siberian-Far Eastern mega-region is essential for the country as a vast territorial base, as a global environmental resource, as a natural resource potential with significant oil and gas reserves, as a space for geopolitical maneuvers, as an economic corridor with the Transsiberian railway, and as a residence of 30 million people. The geographical assessment of changes in the Siberian economy and population at the beginning of the twenty-first century was carried out both in general and in detail

(Bezrukov and Vorobyev 2011; Plyusnin 2014; Kotlyakov and Korytnyy 2020). This section provides a brief description and assessment of the current socio-economic status of the region.

The comparison of the share of Siberia and the Far East in the population of the Russian Federation and the gross regional product (GRP) shows that the mega-region, which has 19.8% of the Russian population, produces 24.8% of Russia's GRP. However, this situation is due to the ultra-high (9% of the country's GRP) share of the Tyumen oblast due to the high cost of oil and gas compared to other types of economic activity.

The levels of economic development of the RF subjects, characterized by gross regional product per capita, differ several times (Fig. 1). The maximum level of the GRP per capita reached in the Yamalo-Nenets (YaNAO) (RUB3.4 mln), Khanty-Mansi (KhMAO) (RUB1.9 mln), Sakhalin oblast (RUB1.7 mln), and Chukotka AO (RUB1.3 mln)—mining regions. High incomes in these regions are largely eliminated by the influence of harsh northern conditions. The minimum levels are registered in the Republics of Tyva (RUB150 thou) and Altai (RUB195 thou), where the processing industries and energy are poorly developed.

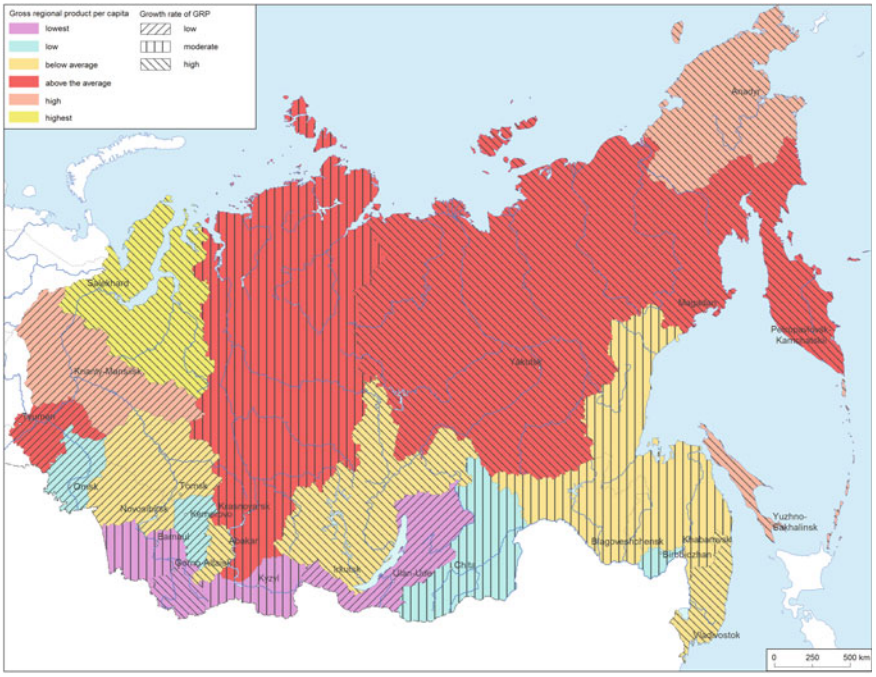

Fig. 1 Gross regional product per capita (RUB/person) by region relative to the average. *Source* Regions of Russia. Socio-Economic Indicators (2005–2019)

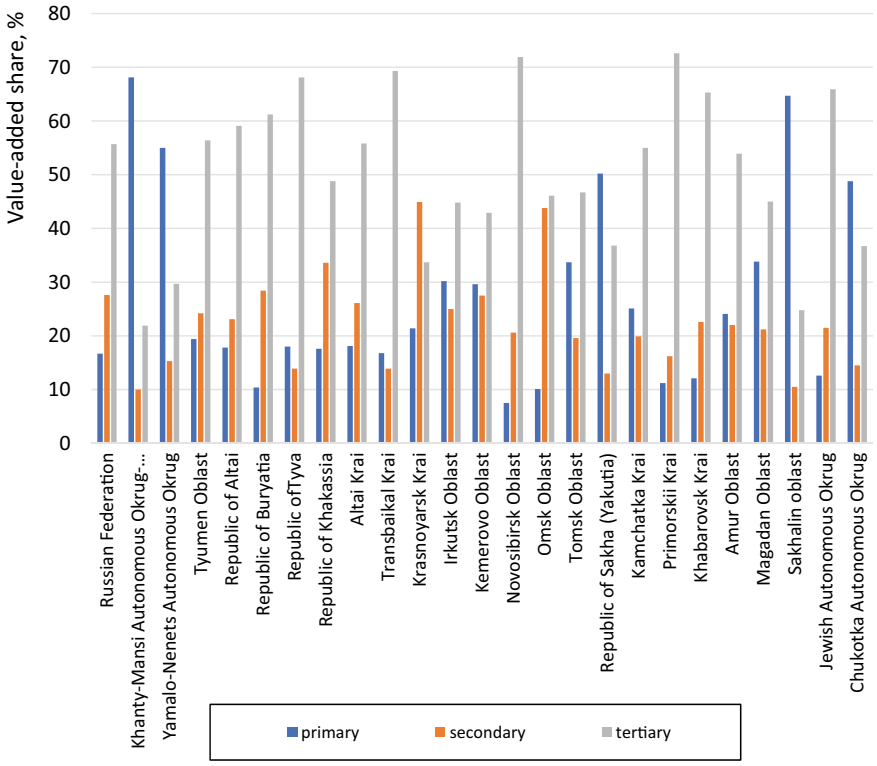

Fig. 2 Structure of value added by economy sectors in the regions of Siberia (2015, in %). *Source* Regions of Russia. Socio-Economic Indicators (2005–2019)

The modern structure of the economy is represented by the following sectors: primary, associated with the use of natural resources; secondary, engaged in the manufacture of goods from raw materials; and tertiary—service provider (Fig. 2).

Khanty-Mansi, Yamalo-Nenets, Chukotka Autonomous Okrugs (AO), Republic of Sakha (Yakutia), and the Sakhalin Oblast are highlighted by the development of the primary sector (more than 50% of the GRP), according to the value of the secondary sector (more than 40%) the Krasnoyarsk Krai and Omsk Oblast and according to the value of the tertiary sector the Novosibirsk Oblast, Primorskii Krai, the Jewish Autonomous Oblast and Republic of Tyva. The remaining regions have an economic structure close to the average for the Russian Federation.

Employment structure by economic activities in Siberia differentiates from the all-Russian in a higher share of extractive industries, agriculture, and transport with a reduced share of manufacturing, trade, and real estate transactions. There is a high proportion of mining, transport, and construction in the Tyumen oblast. Thus, in the Khanty-Mansi Autonomous okrug and the Yamalo-Nenets Autonomous okrug, the share of mining is 20% of all employment, even though in Russia this figure is only 1.6%.

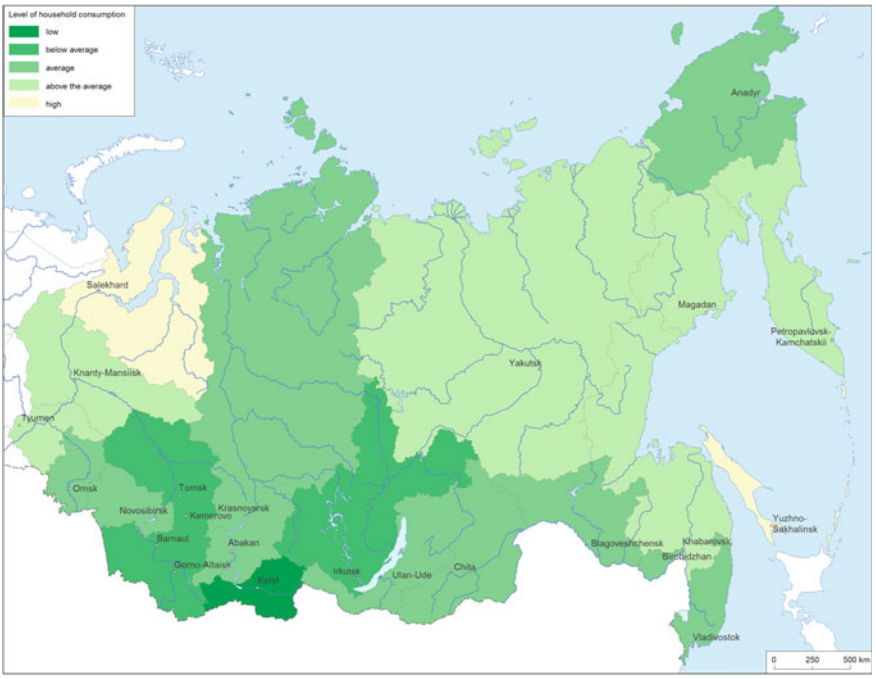

Fig. 3 Actual final consumption of households relative to the average Russian level in 2015. *Source* Regions of Russia. Socio-Economic Indicators (2005–2019)

The level of household consumption differs between the extreme regions (YANAO and Tyva) more than three times (Fig. 3). Regions with a large share of extractive industries are leading in household consumption.

Households consume goods and services from their revenues, as well as non-market services of state and non-profit organizations in the form of transfers in kind. The household consumption indicator is vital concerning the formation of population's welfare level.

The socio-economic transformations of the Soviet legacy of planned economy, taking place in a sparsely populated region, with natural resource potential in harsh natural conditions with a high cost of living for the population caused various effects in the economy, employment, consumption, lifestyle, and human settlement.

2 Demographic Processes, Settlement, Population Reproduction

Dramatic changes took place in the economic and demographic development of Siberia **in the post-Soviet period**, following the changes in the political and

Table 1 Dynamics of the population of Siberia and the Far East

Region	Population, thou people				Population growth, thou people/%		
	1992	2002	2010	2019	1992–2002	2002–2010	2010–2018
Siberian FD*	21,148.9	20,062.9	19,254.3	19,222.3	−1086.0 −5.1	−808.6 −4.1	−32.0 −0.2
Tyumen oblast	3150.0	3264.8	3395.2	3724.0	114.8 3.6	130.4 4.0	328.8 9.7
Western Siberia	15,103.6	14,791.8	14,473.0	14,764.9	−311.8 −2.1	−318.8 −2.2	291.9 2.0
Eastern Siberia	9195.3	8535.9	8176.5	8181.4	−659.4 −7.2	−359.5 −4.2	4.9 0.1
Far Eastern FD*	8011.7	6692.9	6293.1	6139.5	−1318.8 −16.5	−399.8 −6.0	−153.6 −2.4
Siberia and the Far East	32,310.6	30,070.6	28,942.6	29,085.8	-2240.0 -6.9	-1128.0 -3.8	143.2 +0.5

* FD—federal district (within the bounds until 3.11.2018)

Source Regions of Russia. Socio-Economic Indicators (2005–2019)

economic situation in the country. For Russia, the demographic significance of Siberia has decreased; only in the last ten years the population of Siberia began to increase again (Table 1).

The demographic mass has dramatically decreased (by 3.3 mln people) for 1992–2010 in Siberia, which exceeds the population of the largest cities in the mega-region—Novosibirsk and Omsk. Demographic changes are noticeable in the regional context: depression covers most of Siberia and the entire Far East; population growth trends cover a smaller part of the territories. They are especially pronounced in the Khanty-Mansi Autonomous Okrug.

Uneven population of the territory increases. In terms of the average population density, Siberia and the Far East (2.1 pers/km^2) are inferior to the European part of Russia (33 pers/km^2) 16 times, and to the average world indicator (55 pers/km^2)—26 times.

Population density varies from 0.07 pers/km^2 in the Chukotka AO up to 28.2 pers/km^2 in the Kemerovo Oblast. The most densely populated strip is located in the South Siberian regions from the Tyumen Oblast to Khakassia. The population is concentrated in the central settlement zone along the Transsiberian railway, in the largest cities Tyumen, Omsk, Novosibirsk, Krasnoyarsk, Irkutsk, Ulan-Ude, Chita, Khabarovsk, Vladivostok, and also in some southern territories (Altai and Kuzbass) (Transsib Zone as the Eurasian Economic Corridor 2016).

The focal settlement zone is located to the north of the central settlement zone, and occupies 2/3 of the territory in taiga, forest-tundra and tundra zones with harsh natural conditions. The average population density here is significantly less than 1 pers/km^2 and most of the territory is uninhabited.

The low population density of a large part of the territory is one of the severe problems that impede the intensification of socio-economic relations and, ultimately, the development of the Siberian mega-region.

Demographic processes at the beginning of the twenty-first century are characterized by low birth rates, caused by the dominance of the modern model of a small family; decrease in the absolute number of reproductive contingents of women; postponing or refusing to give birth to children due to socio-economic instability.

In the 1990s, there was a sharp decline in the birth rate (to 9.5‰ in 1999) and an increase in mortality (to 15‰). After 2000, an increase in the birth rate is observed, which is partly due to the entry into the fertile age of numerous women born in the mid-1980s. The potential of the age structure was of short duration and declined after 2015. On the post-war demographic wave, the third minimum of birth rate is expected after 2020, after the minimum of 1970 and 1995.

The central Siberian birth rate is equal to 13.8‰, the birth dispersion is wide: from 23.2‰ in Tyva to 12.1‰ in the Altai Krai and the Kemerovo Oblast. Most regions have narrowed reproduction of the population, and only the republics (Yakutia, Tyva, and Altai) with a high proportion of the titular ethnic group in the population are allocated to the extended ones.

It can be concluded that if the natural decline and aging of the population are the consequences of narrowed reproduction, inherent in developed societies, then the high mortality rate of the working age, low life expectancy are the consequences of the low quality of life in Siberia.

Migration in Siberia was formed under the simultaneous influence of heterogeneous and multidirectional economic, demographic, socio-cultural, political, environmental, and other factors of population movement, with the dominant force of regional development (Vorobyev 2001).

The results of migration were negative for Siberia in the last twenty years, while the northeast regions suffered hefty losses. Thus, most regions of Western Siberia had an influx, and most regions of Eastern Siberia and all regions of the Far East had an outflow of population. The Novosibirsk and Tyumen Oblasts are among the most migratory-favorable regions of Russia.

Tyva, as the pole of "isolation", where 66.5% of migrations take place within the republic, and YaNAO, as the pole of "openness", where internal displacements constitute less than 30% of migrations, are distinguished among the Siberian regions.

In general, the situation is characterized by a progressive migration outflow with a consistent (from west to east) increase in relative migration loss. Losses are aggravated by unfavorable structural features of the outflow due to young and educated groups of people.

Identification of population dynamics types about a combination of natural and migratory components allows mapping and identifying territorial communities of the population according to demographic characteristics (Fig. 4).

All four republics (Altai, Buryatia, Tyva, and Yakutia) had dynamics type I (population growth when natural increase exceeds migration decline). Typology of the dynamics shows the superposition of two features of the population of this

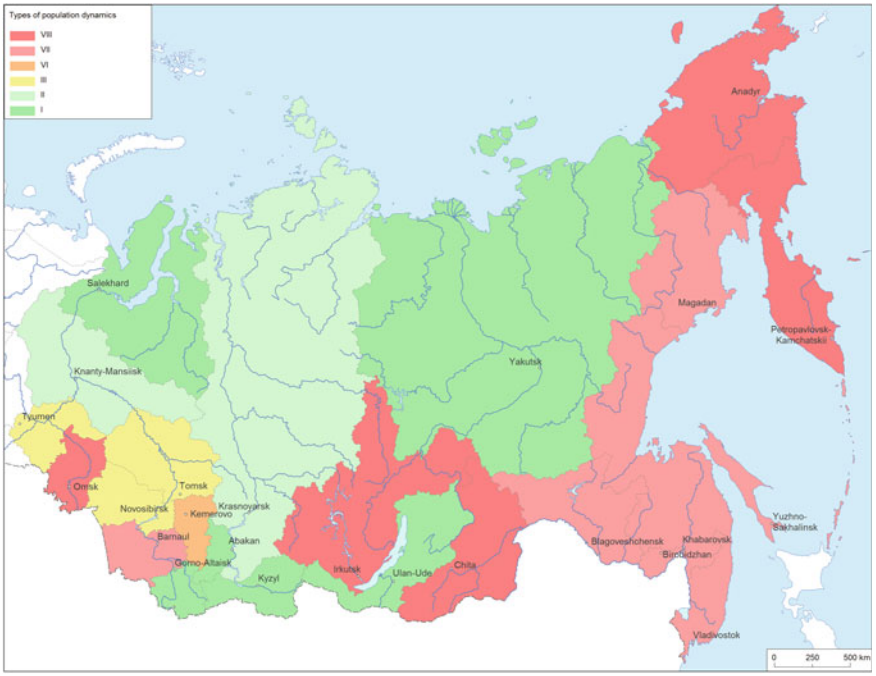

Fig. 4 Types of population dynamics in the regions of Asian Russia in 2011–2017. Legend: I—Population growth: natural growth exceeds migration decline; II—Population growth: natural increase exceeds migration increase; III—Population growth: migration increase exceeds natural increase; IV—Population growth: migration increase exceeds natural decline; V—Population loss: natural loss exceeds migration increase; VI—Population loss: natural loss exceeds migration decline; VII—Population loss: migration loss exceeds natural loss; VIII—Population loss: migration decline exceeds natural growth (For regions IV and V types in the period 2011–2017 were not noted)

mega-region: natural increase in national regions and migration outflow from east to west.

The current state of the population represents the following:

- "Siberian" specificity of a sparsely populated, harsh region with a high cost of living for the population, a supercontinental one with a predominance of the natural resource component of economy;
- transforming a legacy of the Soviet planned economy and settlement, which reduces the employment opportunities and causes migratory movements of the population, under the influence of market shifts in competitiveness;
- irregular course of Russian demographic processes, which determines the alternation of the ups and downs of the demographic parameters with a time interval in the length of a generation of people;

– geo-economic and geodemographic interactions with neighboring regions and countries, which change the pattern of settlement, due to differences in the respective potentials.

3 Quality and Standard of Living of the Population

The Human Development Index (HDI) is one of the most crucial indicators characterizing quality and standard of living of the population of countries and regions (http://hdr.undp.org/en/humandev; Bobylev Grigoriev 2017; Radnaev and Mikheeva 2011). The HDI is calculated by Russian regions with the support of the Government of the Russian Federation for the Reports of the United Nations Development Program on Human Development since 1997 (Bobylev Grigoriev 2017). HDI is an integral indicator calculated annually for inter-regional comparison and assessment of changes in living standards, education, and longevity as the main characteristics of human potential. The HDI includes three components: health, calculated as life expectancy at birth, incomes, measured by gross regional product per capita based on purchasing power parity; education, measured by adult literacy and the cumulative gross enrollment ratio.

Life expectancy is one of the most essential demographic indicators characterizing the mortality rate of the population. The average Russian life expectancy in 2015 was 71.9 years, while the life expectancy of women 10.5 years longer than that of men (77.1 and 66.5, respectively). In the regions of Siberia, there is a significant territorial differentiation of life expectancy. The leading regions for the research period remain the Tyumen Oblast, the Yamalo-Nenets, and the Khanty-Mansi Autonomous Okrugs, their values are close to the average for Russia. The Republic of Tyva takes the last place in life expectancy (women—68.3 years and men—58.1) not only among Siberian regions, but also in the country. From 2000 to 2015 in all regions, there is a tendency to increase life expectancy gradually. However, the low life expectancy of men remains one of the main problems, most often associated with early cardiovascular diseases, as well as with insufficient funding of medical institutions and, as a result, the low quality of medical services.

Education represents the qualitative characteristics of the population. In the constituent entities of the Russian Federation, a relatively high education index has been observed during 2000–2015. Omsk and Tomsk Oblasts have the highest rates among the eastern regions of the country (0.958 and 0.956), while the Jewish Autonomous Oblast, the Republic of Khakassia, the Sakhalin Oblast and Primorskii Krai take the last positions in the rating (0.910, 0.922, and 0.925, respectively). Intellectual potential plays a vital role in the perspective of socio-economic development of the regions and the country as a whole. Currently, one of the acute problems, primarily for the Asian regions, is the outflow of young people to the European part of the country or abroad in order to get an education and well-paid work, thereby the regions lose qualified specialists. Therefore, it is necessary to maintain and develop scientific and educational structure, both at the state and regional levels.

Gross regional product per capita based on purchasing power parity is the primary measure of living standards in assessing human development, and serves as an integral indicator of the region's economic activity, which characterizes the process of goods and services production. Over the years, the northern regions remain the leaders in terms of income index: the Tyumen Oblast and its autonomous Okrugs, the Sakhalin Oblast, the Chukotka Autonomous Okrug, the Republic of Sakha (Yakutia), and the Magadan Oblast, which have a high potential of natural resources, and specialize in oil and gas, mining, forest, and fishing industry. The Krasnoyarsk Krai and the Irkutsk Oblast, which take 8th and 14th places in the ranking of the constituent entities of the Russian Federation, respectively, and exceed the national average (0.912) in 2015, also have high GRP. The outsider regions include the republics of Tyva, Altai, and Buryatia, whose income index is below 0.800, which is 1.3 times lower than the national average. Such a gap in territorial differentiation has been observed throughout the period under consideration.

Purchasing power of the average cash income per capita, calculated as the ratio of money income to the minimum subsistence level, characterizes the potential possibilities of the population to acquire the necessary goods and services. From 2000 to 2015 in all regions of Siberia, the subsistence minimum increased by more than 3 times. The monetary incomes increased by 4 times. However, there is a significant regional differentiation of purchasing power among the regions of eastern Russia. The purchasing power of the population in the Republic of Tyva is 2.4 times lower than in the Yamalo-Nenets Autonomous Okrug. This indicates the direct dependence of the population's welfare of the state of the regional economy. A population with incomes below the subsistence minimum relative to the total population shows the level of poverty. From 2000 to 2015 in the Russian Federation, the poverty rate decreased by more than 2 times (13.3%). In the eastern regions, the indicator is lower than the national average only in the Khanty-Mansi, Yamalo-Nenets, and Chukotka Autonomous Okrugs and Sakhalin Oblast (12.7, 7.5, 9, and 9.7%, respectively). The Republic of Tyva remains an outsider region in terms of poverty. However, it should be noted that during the period under review, the indicator of poverty decreased by 2 times (from 77.9 to 38.2%). Also, a high level of poverty was registered in the Jewish Autonomous oblast (24.4%), the Republic of Altai (24.3%), the Transbaikal Krai (20.4%), and the Irkutsk Oblast (20.0%).

At the beginning of the twenty-first century, the HDI had a positive trend and most regions switched from an index level equal to 0.7 to an index level exceeding the value of 0.8 (Fig. 5) (Valeeva 2019).

The HDI higher than the average Russian value (0.875) in 2015 among the regions of Siberia and the Far East was recorded in the Tyumen Oblast with its autonomous okrugs, the Republic of Yakutia, the Tomsk, Sakhalin, Magadan Oblasts, and the Krasnoyarsk Krai due to high rates of income index. The outsider with a noticeable margin from other regions is the Republic of Tyva (0.776), which takes the last places in the ratings for all indicators, as well as the Jewish Autonomous Oblast (0.794), the Republic of Altai (0.812), and the Transbaikal Krai (0.816). From 2000 to 2015 there is a noticeable performance improvement, but these regions consistently take

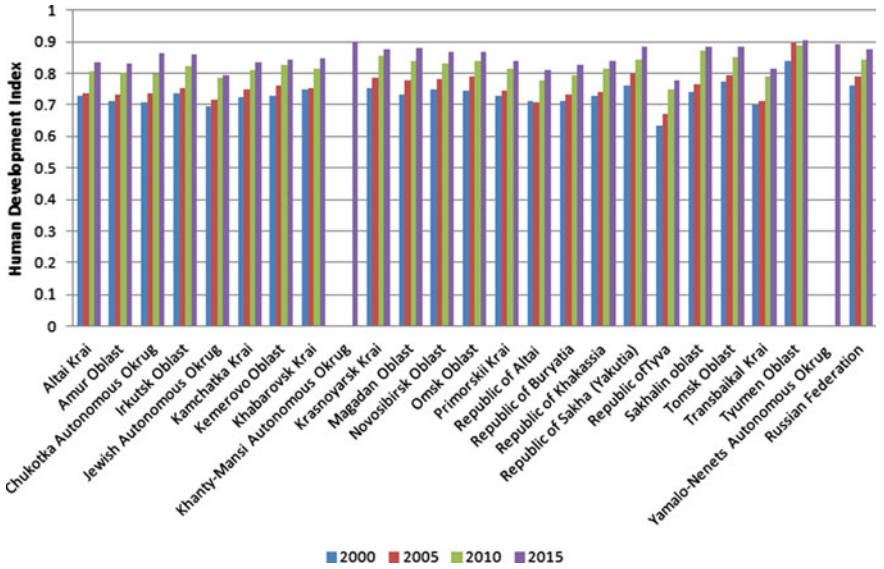

Fig. 5 Dynamics of the human development index in the regions of Siberia and the Far East from 2000 to 2015. *Source* Bobylev Grigoriev (2017)

low positions in terms of human potential caused by the rapid economic growth of other regions due to industrial development.

4 Asymmetry of Social and Economic Development of Regions of the Far North

Regional asymmetry is characterized by territorial differences in levels of economic development and life quality. Several indicators are used to assess asymmetry: gross regional product at purchasing power parity (GRP PPP) per capita, investment in fixed capital per capita, level of working population, employment indicators, money incomes, various material benefits (housing, etc.), and demographic indicators (Skufyina 2006, p. 37).

The analysis of one of the main indicators for assessing social asymmetry, the average cash income per capita of the population over a long period shows the following: in 1970, the asymmetry range between regions of Russia was 5.1 times, and in 1985—3.9 (Granberg 2020, p. 50). Table 1 shows the differences between the extreme subjects of Russia for this indicator were only 2.7 times (Moscow and the Republic of Dagestan) by 1990 (Table 2). That was largely the result of state regulation of wages, pensions, and benefits. It was of particular importance for the northern regions. In the 1990s, characterized by a long-term systemic crisis and economic stagnation, the range of asymmetry in monetary incomes per capita

Table 2 Magnitude of asymmetry (MA) dynamics in the regions of the Far North for average cash income per capita (ACIpC) (1990–2016)

Regions	1990 (rub.)	1995 (th. rub.)	2000 (rub.)	2011 (rub.)	2016 (rub.)
1	2	3	4	5	6
Per capita cash income (CI)					
Russia	217	516	2281	20,780	30,744
Regions with max CI	Moscow 347	Moscow 1710	Moscow 7998	Moscow 47,319	YaNAO 67,521
To-average ratio in Russia	>1,6	>3,3	>3,5	>2,3	>2,2
Regions with min CI	Dagestan 129	Ingushetia 123	Ingushetia 587	Kalmykia 8829	Tyva 14,107
To-average ratio in Russia	<1,7	<4,2	<3,9	<5,4	<2,2
Magnitude of asymmetry (MA)	2,7	13,9	13,6	5,4	4,0
Regions of the Far North East of the RF					
YaNAO: ACIpC RUB	334**	1085**	7563	46,785	67,521
MA to the average in the RF	>1,5	>2,1	>3,3	>2,2	>2,2
MA to min (Tyva)	>2,0	>3,4	>6,5	>4,3	>4,8
KhMAO: ACIpC RUB	334**	1085**	6627	33,926	44,162
MA to the average in the RF	>1,5	>2,1	>2,8	>1,6	>1,4
MA to min (Tyva)	>2,0	>3,4	>5,7	>3,1	>3,1
Republic of Sakha (Yakutia): ACIpC RUB	351	957	3968	25,617	38,933
MA to the average in the RF	>1,5	>1,9	>1,7	>1,2	>1,3
MA to min (Tyva)	>1,1	>3,0	>3,4	>2,3	>2,7
Chukotka AO: ACIpC RUB	…	1131	4732	43,049	63,909

(continued)

Table 2 (continued)

Regions	1990 (rub.)	1995 (th. rub.)	2000 (rub.)	2011 (rub.)	2016 (rub.)
MA to the average in the RF	…	>2,2	>2,7	>2,1	>2,1
MA to min (Tyva)	…	>3,5	>4,5	>3,9	>4,5
1	2	3	4	5	6
Magadan Oblast: ACIpC RUB	631	1019	3725	30,452	50,753
MA to the average in the RF	>2,9	>2,0	>1,4	>1,5	>1,6
MA to min (Tyva)	>3,9	>3,2	>3,2	>2,9	>3,6
Kamchatka Krai: ACIpC RUB	396	957	3452	28,965	41,054
MA to the average in the RF	>1,8	>1,8	>1,5	>1,4	>1,3
MA to min (Tyva)	>1,2	>3,0	>2,9	>2,7	>2,9
Sakhalin Oblast: ACIpC RUB	328	689	2792	30,727	49,599
MA to the average in the RF	>1,5	>1,3	>1,2	>1,5	>1,3
MA to min (Tyva)	>2,0	>2,1	>2,4	>2,9	>2,9
Republic Tyva ACIpC RUB*	162	319	1168	10,963	14,107
MA to the average in the RF	<1,3	<1,6	<1,9	<2,0	<2,2
MA to min (Tyva)	1	1	1	1	1

* *Areas, equated to the Far North*
** *Data for the Tyumen oblast*
Source Economic and Social Indicators of the Regions of the Far North and Equated Localities (2018)

increased significantly, reaching in 1995—13.9 times, and practically did not change until 2000—13.6 times. This can be explained by the following reasons. Firstly, the regions showed very different adaptability to market conditions, sharply divided by competitive advantages and disadvantages. Secondly, state regulation of regional development has significantly weakened. Thirdly, relations between the subjects of the Federation and the center were differentiated, and some of them received additional advantages. Then, from 2000 to 2016, there was a sharp reduction in the gap, up to 4 times (YaNAO and Tyva). There was a significant correlation between groups of leaders and backward regions for GRP per capita and average cash income per capita, which confirms the direct link between economic and social asymmetry (Skufyina 2006).

Despite the "external well-being" demonstrated by official statistics, the Far North of Russia is not attractive for permanent residence (Table 3).

Extreme indicators: population of Sakha (Yakutia) decreased by 1.15 times by 2016 compared to 1990, and of Chukotka by 3.1 times. At the same time, if in

Table 3 Dynamics of the number and rate of migration increase of the regions of the Far North (1990–2016)

Regions	Population size as of December 31 (thou) Migration growth rate (per 10,000 people)				
	1990	1995	2000	2011	2016
Russia	148,273.7	148,291.6	146,303.6	143,056.4	146,804.4
	19	44	25	22	18
Yamalo-Nenets Autonomous Okrug	489.2	478.0	496.3	524.9	534.1
	−143	120	−22	118	−65
Khanty-Mansi Autonomous Okrug-Yugra	1267.0	1293.0	1359.6	1537.1	1626.8
	−26	46	129	57	24
Republic of Sakha (Yakutia)	1111.5	1037.2	962.5	958.3	959.7
	−60	−129	−92	−102	−43
Chukotka Autonomous Okrug	162.2	95.9	61.6	50.3	50.2
	−355	−1269	−704	102	−103
Magadan Oblast	390.3	266.9	202.0	156.5	146.3
	−229	−1024	−384	−118	−51
Kamchatka Krai	476.9	421.6	372.3	321.7	316.1
	−27	−346	−143	−51	−57
Sakhalin Oblast	714.0	659.4	569.2	496.7	487.3
	−41	−374	−121	−4	−10
Republic Tyva*	312.6	303.5	306.2	308.2	315.6
	−440	−19	−37	−125	−42

* Areas, equated to the Far North

Source Regions of Russia/Rosstat 1999–2017 (Regions of Russia. Socio-Economic Indicators 2005–2019)

general Russia remained a country with a positive migration growth rate (18—in 2016), then in the regions of the northern part of the Far East, during the considered period, it reached hundreds of units with a negative sign. In 1995, Chukotka was characterized by a migration rate equal to 1269.

Prospective developments on the problems of the North in concepts, strategies, or programs of socio-economic development should indicate actions that ensure the real ability of the regions to attract human capital. An analysis of the development and the current socio-economic situation, understood as starting conditions for decision-making, is insufficient. It is necessary to focus efforts on raising social standards of life in conditions of extremely unfavorable climate. The State program "Socio-economic development of the Far East and the Baikal region" focuses the macro-region not only on the large investment projects covering the mineral resource complex, but also the development of fishing and tourism industry (http://www.consultant.ru/document/cons_do_LAW_96571).

The North, including the regions of the Far North of Russia, is the key position of the Russian economy; it is the significant role of the Russian Arctic in the world, its global strategic role in ensuring national security and the geopolitical interests of the state, and its global environmental resource. The search for unconventional approaches and specific tools for development of this unique territory remains acutely debatable.

5 Transboundary Region of the Great Altai: Concepts and Prospects for Its Development

The territory of the Great Altai (or a territory within the Altai Mountains), including the border regions of Russia, Kazakhstan, China, and Mongolia, in the context of international cooperation that takes place within the interstate program "Our Common Home—Altai", can be defined as a complex of several large transboundary regions, and its modern management tools should be specific. First of all, this is due to the era of the information society, intensifying the trends of globalization and regionalization, when the border regions, integrating both spontaneously and purposefully, seek additional competitive advantages, providing them with a more rapid and integrated development of economies.

We interpret a transboundary region as contiguous border territories of states characterized by a certain natural, economic, socio-cultural, and ethnic unity (Border and transboundary territories of Asian Russia and neighboring countries: (problems and prerequisites for sustainable development) 2010).

From the Russian Federation, the territory of the Great Altai includes the Altai Krai and the Altai Republic. In this study, a region of Russia—the Altai Krai and the neighboring region of Kazakhstan—the East Kazakhstan region (East Kazakhstan) are considered as an example of the transboundary development of border regions of the Great Altai.

The dynamism of the integration processes in Russia and Kazakhstan is largely caused by historical prerequisites; some can be singled out, i.e., a huge territory and the longest administrative border in the world; the closest connection of the economies that were formed as a whole during the Soviet period; cooperation of scientific and technical institutions; great opportunities for the development of agriculture. Considering the globalization trends, as well as strategic goals of the state policy of Russia, creation of the Eurasian Economic Unions (EAEU) is the most important stage of economic integration and has a direct impact on the development of national economies.

At the same time, the Altai Krai, occupying a large area on the Eurasian continent as part of Russia, creates a special geopolitical position, connecting Europe, which is actively integrating, and the rapidly developing countries of the Asian-Pacific region. A comprehensive analysis of the economy of the Altai Krai with the prospect of using the potential of adjacent territories of the East Kazakhstan showed that a transboundary region can be practically and comprehensively resource-secured and self-sufficient for any production, provided its competitive advantages of natural, labor, industrial, and innovation potential. The industries and sub-sectors of the Altai Territory and East Kazakhstan region may be are developed to be complementary in many sectors (metallurgy, energy, engineering, agriculture).

We suggest the methodology of transboundary growth poles and transboundary development axes for studying the potential of socio-economic development of border regions and the integrated planning of their regional economies.

Agricultural engineering can be distinguished as a **propulsion industry** within the border agro-industrial region of the Altai Krai and the adjacent territory. An analysis of agro-industrial complex showed that agricultural machinery industry in the Altai Krai has a number of problems impeding the increase in the competitiveness of agricultural production. Positions in production of assortment groups of sophisticated technological equipment with high cost, such as tractors and combines, have been lost in the province, and cheaper mounted and trailed equipment is introduced to the market. Without a corresponding synergy between technologically related productions, it is difficult to compete with the leading exporting countries of this commodity group.

The transboundary axis of agricultural machinery industry of the Great Altai, which unites the transboundary growth poles during the production process, includes, from the Russian side, enterprises of Barnaul, Biysk, and Rubtsovsk, from the Kazakh side, enterprises of Pavlodar, Semipalatinsk, and Ust-Kamenogorsk.

The algorithm for creating the transboundary development axis includes three main stages:

1. Preparation stage: the analysis of compliance of border regions and cities located on their territory with growth poles criteria; selection of cities; assessment of industrial potential of transboundary growth poles in order to identify the propulsion industry.
2. Formation stage: the choice of enterprises that form the industrial production, research, financial core of the propulsion industry as part of the transboundary

development axis, with the distribution of specialization and cooperative ties, and the range of products.

3. Stage of management: the choice of organizational-legal form of enterprises as a single corporation; financing the creation and operation of the project, determination of the socio-economic effect (Sycheva et al. 2016).

The transboundary development axis is designed to create a multiplicative effect throughout the region, to promote employment growth and raise the standard of living of the population, and to increase the competitiveness of products.

6 Assessment of Transformation Processes in Nomadic Society as a Result of Transition to Market Relations and Changes in the "Feeding" Landscape of the Mongolian Plateau

The current transformational processes on the Mongolian Plateau are happening due to the interaction of climatic, socio-economic, and geopolitical factors, which is reflected in the publications of the researchers of the Institute of Geography and Geoecology of Academy of Sciences of Mongolia (ASM), the Mongolian State University, and the Baikal Institute of Nature Management of the Siberian Branch of Russian Academy of Sciences (BINM SB RAS) in research projects of the Basic Research Program of Russian Academy of Sciences in different years (Batomunkuev et al. 2012; Darbalaeva et al. 2016; Oyunbaatar et al. 2008; Regions of Russia. Socio-Economic Indicators 2005–2019; Tulokhonov et al. 2014).

Climate change is a significant factor determining the transformation processes in the nomadic economy of the Mongolian Plateau. The research in Transbaikalia (Republic of Buryatia and Transbaikal Krai) allowed making a forecast that in the first quarter of the twenty-first-century temperature will increase by 1.0–1.5 °C, amount of precipitation will increase in winter by 7–10%, in summer by 0–2% (Oyunbaatar et al. 2008).

According to A. T. Naprasnikov et al. "… the powerful heat potential in the regions of Central Asia, even when it is reduced, "eats" additional influx of precipitation amounts. Therefore, in these climatic conditions we should expect a subsequent climate aridization, which may be somewhat elevated, but common for this continental region of Asia" (Naprasnikov et al. 2010).

The results of studies on Transbaikalia and in Central Asia as a whole, obtained by Russian scientists are quite comparable with the predictions of climate change in Mongolia given in the articles by D. Oyunbaatar et al. (Meshcherskaya et al. 2009), P. Gomboluudav (Gomboluudev et al. 2010), and L. Natsagdorzh (Batima et al. 2005). In their works, it is noted that by 2080 winter air temperature will increase by 3.4 °C, and precipitation amount will increase by 13.9 mm, in summer by 23.9 mm compared with the climatic norm of 1961–1990. The change in the type of precipitation and an

increase of 18–20% of short-term rain showers affected soil moistening and level of groundwater, which reduced water availability for the nomadic economy.

Analysis of agrarian nature management identifies the similar structure in the farms of Mongolia and Transbaikalia. However, over the years of market transformations, significant differences have emerged due to the multidirectional business processes. As exemplified by decrease of crop area per capita in 1990–2017: in the Republic of Buryatia by 3.5 times (from 0.7 to 0.2 ha/person), in the Transbaikal Krai by 6 times (from 1.2 to 0.2 ha/person). In Mongolia, the area under crops was halved over the same period (from 0.4 ha/person to 0.2 ha/person), having equaled with the Russian regions.

Over the period 1990–2017, in Mongolia the livestock population increased 2.6 times (from 25.9 to 66.2 million heads). In Russian regions, livestock numbers have declined: in Buryatia by 2.6 times and in Transbaikal Krai by 4.2 times. Therefore, the most intensive economic activity on the Mongolian Plateau is observed in Mongolia, which entails various negative consequences.

Socio-economic factors of the current transformation processes of nomadic society are caused, first of all, by the pasture livestock management, which was formed as a result of a unique centuries-old culture of nomadic pasture and saves the natural resource potential (Regdel et al. 2012).

However, as a result of market reforms, there have been negative trends in the state of natural ecosystems occurring because of the changes in the sectoral and territorial structure of economy. In the new context of the transition to market relations, as well as under the influence of globalization processes, traditional way of life is changing in Mongolia, and transformation of the "feeding" landscape is the main resource of nomadic economy.

Pasture livestock farming is performed mainly by families; they breed cattle of the local Mongolian breed for year-round pasture keeping using seasonal migrations. Livestock is represented by sheep, cattle, goats, camels, and herd horse breeding (Fig. 6). Changes in the established way of nomadic society, i.e., transition from four-season to two-season migrations of Mongolian arts results in an unregulated, chaotic movement of livestock producers over long distances and dislocation of camps in certain territories for a long period. Overgrazing in grazing conditions is an aggressive factor in land degradation. Typical manifestation of degradation of pasture vegetation is observed around wells, where the species composition is replaced and the grass feeding value is reduced.

A well-balanced structure of nomad livestock from five types of cattle was the basis of traditional nature management for many years. The increase in prices for wool and goat fluff led to an increase in demand for them, which affected the structure of the livestock population, in particular, the share of goats in total population increased from 19.8 to 41.3%. The change in the traditional balance also steadily leads to an increase in the load and change in pasture ecosystems.

The functioning market infrastructure for serving the demand and supply of livestock products lags far behind the real requirements, does not meet modern quality standards and sanitary and hygienic standards for certification of production and products.

Fig. 6 Camels. Aimag Umnegovi, Mongolia, 2012 (photo Zhamyanov D.Ts.-D.)

Desertification problem is clearly manifested as a result of the climate change and agrarian nature management, which exacerbates the negative impact on natural complexes. The comparison of areas prone to desertification revealed that the area of these lands increased almost three times as compared with 1990. The areas with strong and very strong desertification changed, new territories with a high degree of desertification, with focal forms, have been formed.

The main social and economic consequences of desertification are unemployment and poverty, negative trends in agrarian economy, including reduced gross yield of crop production, reduced livestock and livestock productivity, reduced export potential, reduced food and light industry development, and reduced tax revenues.

One of the factors of changes in the "feeding" landscape of the Mongolian Plateau is the activity of mining enterprises, accompanied by a large number of overburden and waste, accumulated in tailing dumps (Fig. 7). As mining industry develops, there is a high concentration of population, transport, and infrastructure. The consequences of mining industry development are the removal of agricultural land from circulation, increased anthropogenic impact on natural ecosystems and living conditions, and pollution of surface and groundwater.

New market trends of transformation processes in the social environment of Mongolia are characterized by the increased migration processes and, as a result, by increasing labor migrant flow from Mongolia in various countries of the world, by creation of the new mechanisms in global financial flows, where a more significant place is occupied by remittances of individuals. External educational migration is increasing. Thus, between 2010 and 2017 the growth in number of Mongolian

Fig. 7 Abandoned coal mine. Aimag Dundgovi, Mongolia, 2011 (photo Sanzheev E.D.)

students in Russia was 22 times (for the school year 2016/2017—2200 people), in Korea—4 times (6768 people), and in China—2 times (7428 people).

The dynamics of remittances of individuals to Mongolia is ambiguous. Between 2011 and 2017 there is an increase in the share of remittances from Korea from 16.9 to 52.1% (USD 37.1 k and USD 109.7 k, respectively). The level of remittances from the United State of America (USA) is stable, and from the rest of the countries, in particular China and the Russian Federation, a decrease is observed. In general, the share of remittances of individuals to Mongolia's Gross Domestic Product (GDP) for the period in question decreased from 2.1 to 1.6%.

Thus, the trends in socio-economic processes and environmental conditions in the context of globalization indicate increased transformation processes in nomadic society, smoothing differences in indicators of the level and quality of life of urban and rural populations, convergence and further development of integration processes in economy. Traditional methods of managing a nomadic economy are changing, anthropogenic load on natural systems is increasing, negative processes of spatial differentiation of the economy of modern Mongolia are intensified.

7 Conclusions

The features of socio-economic transformations are revealed at two complementary territorial levels of analysis: common in the Siberian mega-region and particular in individual regions of the Federation.

Geodemographic interactions with contiguous territories, due to the difference in the corresponding potentials change the settlement picture in Siberia: compression of demographic mass, polarization between regional centers and periphery, concentration of population within the Transsibirian economic corridor. The regions are divided into highly developed, higher than the average Russian level, average, and underdeveloped using the human development index.

The issues of a drastic regional asymmetry in development of the Far North of Russia as a key position of the Russian economy are revealed. The role of the North is estimated as strategic in ensuring national security and the geopolitical interests of the state.

In the transboundary region of the Great Altai, in cooperation with the Altai krai (Russia) and the East Kazakhstan region (Kazakhstan), a "transboundary development axis" arises, designed to create a multiplier effect, to increase employment and standard of living, and to increase the competitiveness of products.

Evaluation of the transformation processes in nomadic society as a result of transition to market relations and changes in the "feeding" landscape reveals the growing problems of changing traditional ways of nomad farming and increasing the anthropogenic load on natural systems.

The development trends of socio-economic and demographic processes in the context of globalization indicate an increase in the transformation processes in Siberia, development of integration processes in economy of the mega-region and transboundary interactions with neighboring countries.

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Landscape and Ecological Transformations of Siberia: Spatial Projection

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Abstract Siberia is a current research area with a relatively well-preserved natural environment, indigenous structures of geosystems, but also with a high number of anthropogenic disturbances and great prospects for economic development of natural resources. Long history of development of modern landscapes in Siberia has left its footprint in the composition of modern natural complexes. Siberia is the result of a unique combination of natural-geographical, historical, and socio-economic factors. The results of human activity impact on the environment constitute the main factor in the formation of modern landscape structure of Siberia. The consequences of the 400-year period of intensive economic development of the natural-resource potential (since the arrival of Russian population to the region) are manifested in the dynamics of geosystems, expressed in the replacement of natural state complexes with the transformed complexes.

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V. N. Bocharnikov and A. N. Steblyanskaya (eds.), *Humans in the Siberian Landscapes*, Springer Geography, https://doi.org/10.1007/978-3-030-90061-8_14

Keywords Social space transformation · Traditional nature management · Industrial development · Anthropogenic factors of transformation · Environmental pollution · Landscape structure · Relics · Vegetation transformation

Glossary

EANET	international network for monitoring acid deposition in East Asia
EMEP	co-operative programme for monitoring and evaluation of the long-range transmission of air pollutants in Europe

Siberia is one of the most important macro-regions of Russia and the planet. It is the largest landmass on Earth, and the most part is distinguished by the natural and climatic inclemency, poor development and low population, but at the same time has unique territorial and raw material resources.

Siberia appears to be an extremely vast (6.61 million km^2, or 38.6% of the territory of the Russian Federation, 4.4% of the land area of the entire planet), but relatively sparsely populated macroregion (23 million people approximately, or 15.7% of the population of Russia). Siberia is an essential part of the world. For this reason alone, the role of Siberia in world and natural and economic processes is very significant. It is important to emphasize that the overwhelming part of this area is occupied by low-disturbed lands.

Siberia has long been inhabited by aboriginal peoples. Its active development by the Russian Pomors began 450–500 years ago (the emergence of Mangazeya and other northern trading posts), then, within the framework of Russian statehood, it continued with the campaigns of the Cossacks (Yermak in the 1580s) and other earliest explorers.

Geographical factors, cultural traditions have an important role in shaping the territorial economic activity of indigenous peoples of Siberia.

1 Traditional Use of Natural Resources. On the Question of Transformation Impact on the Ethno-Ecological Calendar of the Barguzin Evenks

The concept of "traditional use of natural resources" refers to the historically developed and inexhaustible ways of using objects of flora and fauna, land and other natural resources. When we talk about the traditional use of natural resources in Siberia, we imagine the peoples for whom the northern tundra, taiga, mountains, and steppes are their native environment with the measured life, honoring the experience

and paths of their ancestors. Traditional use of natural resources—hunting, animal husbandry, including reindeer herding, collecting plants, and fishing—corresponds to the ecological conditions of the territory. It provides people with everything necessary, but produces almost no marketable products, maintaining a balance between man and the environment.

Traditional use of natural resources is associated with the Siberian aborigines. Long-term friendly, family, and neighborly ties have formed a special social environment in Siberia, where ethnicity is not always put in the first place, but often a common territory, territorial identity prevails. This social environment of the old-timers is distinguished by the similarity of culture, dialects, traditions and methods of economy. And yet the specificity of the ethnic economy is alive, manifesting itself somewhere stronger, and somewhere weaker. Tradition does not remain frozen, it inevitably includes innovations, and some traditions completely give way to them.

The ethno-ecological calendar of the Evenk population combines the results of traditional knowledge of cause-effect relationships in the natural environment, reflects the practices of life support of habitable space. The key role of territorial economic activity of the Barguzin Evenks belongs to geographical factors, cultural traditions, and traditional environmental management.

Barguzinskoe Cisbaikalia is a territory in the northeast of the Republic of Buryatia, with a combination of various traditional types of nature management within a closed intermountain basin among the mountain taiga, steppe, and forest-steppe spaces. Geographical conditions have formed a knowledge base of local communities about landscape, expressed in cultural traditions.

A significant factor in transformation of traditional ethno-ecological calendar of the Barguzin Evenks in the research area is the social organization of ethnic communities since the beginning of its development. Evenk reindeer herders migrated to the Barguzinskaya depression from the headstream of the Anagara in the second half of the seventeenth century. Small families of the genus Nyakugir settled on the northeast coast of Lake Baikal, in the mouth of the Barguzin river—Namyasinets (Namegir) and Pochegor. At the beginning of the eighteenth century a so-called group of "Munghal outcryers" arrived in Barguzin—Galdegir, Tchongolir, and Asivagat. The beginning of the nineteenth century is considered as the time of formalization of the Barguzin Evenk horse breeders (Murchen) as an independent territorial group. This process is accompanied by a decrease in contacts with neighboring groups of Evenk reindeer herders and the preservation of relative cultural homogeneity. The main range of the Evenk nomads was located in the lower reaches of the Barguzin, near the rivers and streams of Bodon, Tukala, Kungurga, Onkuli, Ina, Alamburga, and Podkhrebetnyi. Here, families spent most of the winter period, closer to the Russian villages. Due to mobility of ethnic groups, new inter-ethnic contacts emerged. The calendar of local ethnic groups recorded traditions associated with tillage (April–May) and fishing (September–October). The Evenks had cattle, small vegetable gardens; there was a decline in the role of hunting as the main source of food. In the densely populated areas, there was a noticeable impact of agricultural product demand; under the influence on market and because of the desire to improve their well-being, part of the Evenks transferred to the economic system peculiar to Russian peasantry. Thus, in

the structure of the economic cycle, there is a decrease in the role of nomadic periods and an increase in the periods of settled life, during which the Evenks lead a lifestyle similar to Russian peasants.

For the local Evenks, the greatest variety of branches in the household is characteristic. In these groups, the skills of nomadic nature management and hunting have not yet disappeared, and Evenk hunters remained mined and relatively independent of market conditions, and at the same time, intensive farming and gardening techniques is taking place.

Another range of nomads, covering the upper reaches of the Barguzin (stows of Taz, Dzhirga, Samakhai, Entykhek), was inhabited by a smaller group of Evenks. This area is characterized by territorial isolation from Russian villages and proximity to the Buryat uluses. There are no migratory trades. Mountain taiga conditions, absence of significant trade communications with other ethnic groups, and importance of self-reliance strategies lead to the fact that the traditional Evenk nomadic type of nature management is almost completely preserved in this ethnocultural landscape, and all three cycles of nomadic period and three periods of seasonal sedentism are manifested in household economy.

The Evenks of Barguzin headwaters differ in their mobile habitat development. At the same time, semi-settled cattle breeding, which is quite harmoniously combined with hunting is included in the economic model of the Evenks under the influence of contacts with Buryats. The requirements of cattle breeding lead to decrease in their mobility and hunting in the economic cycle, which contributes to the fact that migrations take place over shorter distances. Ethno-ecological traditions recorded in the calendar of Evenks are mainly connected with hunting (September—February) and strict observance of its terms, i.e., with a ban on shooting animals in spring mating season.

Thus, the main components in formation of ethno-ecological calendar of the Barguzin Evenks (Murchen) were ethnocultural traditions, closely related to the economic development of the region. The modern ethno-ecological calendar of the Evenks contains seasonal family-clan rituals and rules for observing hunting periods, bans on water pollution during grazing, as well as bans on swearing and all sorts of punishments for domestic animals. Thus, the ethno-ecological traditions recorded in the calendar reflect the historical path of transformation in nature management and ethno-cultural development of local landscapes.

The traditional use of natural resources in modern Siberia is very diverse. It reflects the diversity of nature with which the Siberian peoples are associated, contains traces of Soviet and post-Soviet transformations, features of industrial development, and relationships with neighboring peoples. Developing, future-oriented communities are combined with highly problematic areas where people have to survive. The key issue is the preservation of traditional nature management as a cultural value: after all, the experience of many generations of northerners and Siberians is concentrated in it, and their relationship with the Earth is reflected.

2 Natural Transformation of Modern Landscapes of the South of Eastern Siberia: Elements of the Past and Environmental Consequences of Climate Fluctuations

The Siberian region possesses huge reserves of various natural resources. Their industrial development is steadily increasing, while creating complex environmental problems. The low potential for the stability of these geosystems to anthropogenic disturbances, slow self-healing processes, determined by the severity of natural conditions, create many environmental restrictions in the field of nature management associated with the quality of the environment and the ecological safety of the population, with the preservation of biological diversity, as well as with the formation of the foundations of their sustainable ecological economic development (Ecological 2015; Vladimirov 2018).

The vegetation of geosystems plays a leading role, sometimes a critical one, being the main producer of organic matter. An important function of vegetation (especially coniferous forests) is filtering: purifying and disinfecting the atmosphere. The wide distribution and "familiarity" of plants for humans creates the feeling that the vegetation cover is something unshakable and permanent. Of course, this is not at all the case. Land cover disturbance, especially up to its complete degradation (without the possibility of restoration), entails the destruction of the natural system as a whole. Changes in the vegetation cover can be caused by both natural and anthropogenic influences, and often, these two types of factors act together.

The long history of the development of modern landscapes in Siberia influenced the composition of modern natural complexes and contributed to the appearance of various relict components. These structural components are observed in the territory of the south of Eastern Siberia as part of a wide variety of landscapes: taiga, steppe, etc. The nature of relic elements is also different. In conditions of Eastern Siberia, relicts are most often included in typical geosystems, but in some cases they play a role of edificators.

2.1 The State of Relict Geosystems

Relict living species, as a rule, live in refugia—original shelters where living organisms have survived or are still experiencing unfavorable periods for them. At present, relict species are represented in Eastern Siberia by populations of geographic isolates with a significant separation from the main ranges. As a rule, populations are small and very sensitive to external influences, including anthropogenic influences (Pleshanov 1997).

In the south of Eastern Siberia, several groups of land and water refugia are distinguished, most of them, in turn, are divided into subgroups depending on landscape and climatic features. Refugia of nemoral relics are clearly expressed. Such refugia were

preserved as traces of once continuous transpalearctic strike of deciduous forests, when climate differed from the modern one with higher heat and moisture supply and low continentality (Pleshanov et al. 2002; Pleshanov and Tachteev, 2008).

One of the most striking refugia of nemoral relics is the northern macroslope of the Khamar-Daban ridge with the adjacent foothill part, which was shown by Epova (1956) still in the middle of the twentieth century. Here, due to the particular mesoclimate, favorable conditions for the conservation of coniferous-deciduous forests that were widespread in the past in the territory of Baikal Siberia have developed. Most of these species live in fir and cedar-fir forests and thickets of riverbed shrubs in humid and productive conditions. There are *Dryopteris filix-mas, Circaea caulescens, Corydalis bracteata, Waldsteinia ternatea, Anemone baicalensis, Anemone baicalensis, Cypripedium calceolus,* C. *guttatum,* C. *macranthon,* and other species.

In the alpine belt in the subalpine high-grass meadows and nival meadows under the more extreme conditions *Fornicium carthamoides, Epilobium montanum, Poa remota, Chrysosplenium baicalense* can be found (Vegetation of the Khamar-Daban Range 1988). In the valley of the Snezhnaya River, that is the largest (on the macroslope) and rich in relics, 19 relics have been found, but the valleys of the rivers Utulik and Babkha are the most diverse (14 species) (Chepinoga et al. 2017).

Five species (*Acontium sukaczevii, Aegopodium latifolium, Carex hancockiana, Circaea caulescens, and Galium paradoxum*) are concentrated around the westernmost microrefugium in the valleys of the Utulik and Babha rivers. Most of these species are found both in the forest and in the subalpine zone. The species of *Brachypodium sylvaticum*, *Eutrema cordifolium,* and *Galium odoratum* are confined almost exclusively to the lower part of the forest belt of the valley of the Snezhnaya River (Chepinoga et al. 2016).

Apart from the presence of relic elements in the composition of widespread geosystems, in the south of Eastern Siberia there are a number of cenoses formed by relict tree and shrub species. These include *Ulmus japonica, Armeniaca sibirica* communities (Fig. 1a), and *Amygdalus pedunculata* (Fig. 1b).

Fig. 1 Communities: **a** *Armeniaca sibirica* in the stow of Shara-Tepseg, Rep. Buryatia; **b** *Amygdalus pedunculata* near the settlement Kudara-Somon, Rep. Buryatia. Photo credit A.P. Sofronov

Japanese elm—cenoses in Baikal Siberia are concentrated on the extreme north-eastern spurs of the Khamar-Daban ridge in the lower reaches of the Selenga, excluding the delta part. Here the Japanese elm forms small forests or groves, which are refugia of nemoral biota. It should be noted that these refugia significantly differ in species composition from the Khamar-Daban. The main range of *U. japonica* begins in the Transbaikal Territory, with the greatest distribution in the Russian and foreign Far East. Japanese elm—forest is represented by near-channel mesophilic communities and, recently discovered, by rare xerophilous cenoses (Pleshanov and Pleshanova 1997; Sofronova and Sofronov 2018).

Armeniaca sibirica communities in the Baikal region are located in the basin of the Selenga in the foothills of the mid-mountain ridges. The communities are represented by small cenoses significantly distant from each other, which occupy the southern slopes at altitudes from 600 to 900 m above sea level. The area of *Armeniaca sibirica* is sharply disjunctive; its Selenga populations within Buryatia represent their extreme northwestern fragments (Namzalov et al. 2012; Kholboeva et al. 2015). The main area is located to the east: the southeastern part of the Transbaikal Territory and the Primorskii Territory of the Russian Federation. Outside Russia, it grows in northern, eastern, and southeastern Mongolia, in northeastern China (Red Data Book of the Republic of Buryatia 2013).

Amygdalus pedunculata is also located in the Baikal region on the northern limit of its distribution, occupying similar habitats. Its main range is Central Asia; in Siberia, it grows only in Buryatia at several points on the southern stony and gravelly steppe slopes of the ridges. Together with *Armeniaca sibirica*, *Amygdalus pedunculata* can be found on the spurs of the Borgoi Range, where they act as co-dominants in the shrub community (Red Book of the Republic of Buryatia 2013; Kholboeva et al. 2015).

In Eastern Siberia, the refugia of stepppe relics are also well known. They mostly occupy landscapes with maximum heat supply (Irkutsk-Balagan steppes, Selenginskaya Dauria, Barguzinskaya depression, etc.). However, a subgroup of steppe relics—psychrophiles, which are most characteristic of petrophitic steppes of Olkhon Island, where the heat supply is much lower, is distinguished here. The refugia of steppe relics—halophiles occupy territories with saline soils—separate sections of the Olkhon steppes, the Barguzinskaya depression, etc. In the refugia of steppe relics, there are species thriving in Mongolia, Northern China, and some species in the mountain steppes of Central Asia (Pleshanov et al. 2002; Korotkii, 1912; Naidanov, 2010).

Reliable evidence of development stages of landscapes in the Baikal region are communities that exist under the influence of thermal springs and contain relict organisms in their composition. Currently, in the Baikal region there are about 100 thermal springs with water temperature of 20 °C and more. Hot springs (or hydrotherms) are of considerable interest not only to identify modern biodiversity, but also to identify the stages of development of natural complexes in the geological past.

A large number of hydrotherms is found in the Tunkinskaya depression. Most of them have been used by the population for balneological purposes for decades,

Fig. 2 *Pycreus nilagiricus.* Photo A.P. Sofronov

thereby the springs are surrounded by various buildings, and the territories around them have long lost their original appearance.

Northern Cisbaikalia is of great interest, where there are about 15 thermal springs located in different parts of the Severobaikalskaya and Verkhneangarskaya depressions. Currently, in the vegetation cover of the northern Cisbaikalia, 7 plant species have been identified, which, by their "relictism", can be attributed to different periods of the past. These species are *Elymus caninus, Lythrum intermedium, Thelypteris palustris,* and others. *Pycreus nilagiricus* is referred to pre-tertiary relics and occurs in Siberia only near the thermal source Dzelinda (Fig. 2) in the northern Cisbaikalia (Sofronov et al. 2016).

One of the most interesting inhabitants of the thermal springs is *Orthetrum albistylum*, which is found near 16 hot springs of the Baikal rift zone from the North-Eastern Baikal region in the south-west to the Charskaya depression in the north-east. These are the most northern and isolated findings of this species. The nearest location of this plant is located in Northern China at a distance of more than 700 km from Siberian habitats (Borisov and Borisov 2017).

These data emphasize the important role of refugia in the formation and preservation of biodiversity of the region, and also serve as evidence of the close genetic relationship of the south of Eastern Siberia with the adjacent territories of both the Far East and Europe, and its "nodal" role.

The main threat to the existence of refugial systems is the anthropogenic pressure on the habitats of relict species. Of greatest concern are refugia associated with hydrotherms. The communities around the hot springs of the Tunkinskaya depression (South-Western Cisbaikalia) were almost completely changed, and the study of these habitats is extremely difficult, and the relict organisms that lived there probably

did not suffer anthropogenic pressure. Almost all thermal springs are used for recreational purposes, and require control for their preservation and prevention of destruction. The refugia of steppe relics suffer from varying degrees of plowing, grazing, building roads, and fires. The least transformed among the considered ecosystems is the Khamar-Daban refugium, where recreation is fairly moderate, there is a lack of agricultural load and favorable natural conditions (one of the humid places in Baikal Siberia), probability of fires is insignificant, but destructive processes are also noted there.

2.2 Transformation of Geosystems Under the Influence of Natural Factors

The presence of a significant number of relic components in the composition of geosystems or the relic geosystems themselves indicates a long and complex evolution of natural complexes in the south of Eastern Siberia, as well as a high diversity of the geographical conditions of the region.

Under the global climate fluctuations, various transformational changes are observed in the structure of these geographical systems, both negative and positive, complicated by the influence of anthropogenic factors. There are no pronounced degradation processes in the relic geosystems themselves or relic components, however, in the geosystems last decade, however, cedar and fir stands have dried out on the territory of southern Cisbaikalia.

It should be noted that forest destruction is becoming an increasingly urgent problem of our time. The deterioration of the tree condition and forest dieback is observed throughout the world and is attracting increasing attention. Forest dieback is caused by numerous factors, namely climate fluctuations (especially dry periods), reproduction of dendrophagous insects and pathogenic organisms.

Degradation of dark-coniferous forests of Cisbaikalia has been observed since the early 1980s of twentieth century. In the early stages, the cause of this process was attributed to chemical damage from emissions of the Baikal pulp and paper plant (Voronin 1989; Voronin and Sokov 2005, and others). Later it turned out that in most cases the immediate cause of tree crown degradation in the region is not chemical poisoning, but massive fungal epiphytotics and increase in the number of insect pests (Pleshanov and Morozova 2009). In recent years, the picture has become even more complicated due to the discovery of large foci of coniferous bacteriosis in the region (Voronin et al. 2013). Over the past few years, there has been a steady deterioration in the state of dark-coniferous forests of Cisbaikalia (Fig. 3).

The magnitude of the phenomenon is very significant and the account goes to tens of thousands of hectares. Most likely, the identified damage to dark-coniferous forests in the Irkutsk region and Buryatia is the primary cause of the exacerbation of the chronic course of coniferous bacterial diseases, which were not previously noted in this region. At present, it is already possible to speak with confidence about

Fig. 3 Drying Siberian cedar forests of the Khamar-Daban range. Photo A.P. Sofronov

the decay of cedar-fir tree stands in the middle part of the mountain-taiga belt of Khamar-Daban.

Foci of dark-coniferous forest dieback are noted in other areas of southern regions of East Siberia outside of Khamar-Daban. For a more reliable analysis of the state of dark-coniferous forests in the region, a systematic and widespread examination for identification of unfavorable trends and development of recommendations to minimize damage to the forests of the region is required.

3 Anthropogenic Factors, Causes, and Main Consequences of Ecological Transformation of Landscapes of Siberia

Further expansion and amplification of nature management in Siberia actualizes, first of all, the problem of environmental risk of economic activity, which has a direct or indirect impact on the natural environment. The concept of environmental risk in nature management is largely associated with the possibility of negative consequences for the environment and humans as a result of ill-considered or insufficiently substantiated economic actions. This also includes the risk of natural emergencies (floods, earthquakes, avalanches, landslides, mudflows, etc.) or man-made (industrial disasters, destruction, fires, chemical contamination of the area, etc.).

There are several main anthropogenic impacts that have negative consequences on the components of the landscapes of Siberia.

3.1 Change in Ambient Air

The main sources of air pollution are thermal power plants, heating plants, road transport, ferrous and non-ferrous metallurgy, engineering, chemical production, pulp and paper industry, mining and processing of mineral raw materials, and open mining sources (agricultural production, construction) (Limanova 2005).

Since 2000, 4 stations of the International Acid Precipitation Monitoring Network in East Asia (EANET) are permanently operating in Siberia: three in the Lake Baikal region—Irkutsk (city), Listvyanka (regional) and Mondy (background); one in the Primorskii Territory—Primorskaya (regional) (State Report 2018). According to the measurements of EANET station, which provide the results of regular monitoring of content of pollutants in the atmosphere outside the cities in the Asian territory of Russia, a low content of gas impurities in the air was observed at the Primorskaya and Mondy stations. The average concentrations of sulfur dioxide (SO_2) at the Listvyanka station continue to increase (Fig. 4). At the Primorskaya station, there is a significant decrease in the content of nitrogen and sulfur-containing substances in recent years. It was established that at all EANET stations, the highest concentrations in the composition of suspended particles are characteristic for sulfates—from 40 to 60% of the composition of atmospheric aerosols, with the highest values typical of the territory of Primorskii Territory (Table 1). In the Baikal region, the content of almost all the main ions in air aerosols was halved, but atmospheric pollution at station Listvyanka is 5 or more times higher than the pollution levels at station Mondy. Sulfate and ammonium concentrations in aerosols in the Primorskii Territory remain significantly higher than in the Baikal region.

Fig. 4 Emissions from boiler on the shore of Lake Baikal (Listvyanka). Photo I. B. Vorobyeva

Table 1 Comparison of total sulfur and nitrogen deposition with precipitation at EANET stations and critical loads used in EMEP* (g/m^2/year), 2008–2017

Station	Wet deposition (numerator—in units of the element, denominator—the average for 9 years)			Critical loads (EMEP)	
	S (SO_4)	N (NO_3)	N (NH_4)	S_{CL}	N_{CL}
Listvyanka	0.09–0.34 0.22	0.032–0.10 0.073	0.034–0.16 0.095	1.6–2.4	0.56–0.98
Mondy	<0.01–0.051 0.031	<0.001–0.022 0.015	<0.001–0.04 0.020	0.32–0.64	<0.28
Primorskaya	0.44–0.051 0.62	0.087–0.41 0.24	0.31–0.58 0.39	1.6–2.4	0.56–0.98

Note *EMEP is a co-operative programme for monitoring and evaluation of the long-range transmission of air pollutants in Europe; according to Roshydromet

Dynamics of emissions from stationary sources showed a positive direction: emissions of solids decreased by 50%, sulfur dioxide by 30%, carbon monoxide by 29%, emissions of volatile organic compounds by 49%; the exception was nitrogen oxide emissions, which increased by 2%. The main emission suppliers from stationary sources are HC production enterprises, as well as gas and by-products transportation through pipelines and metallurgical production.

The share of population living in adverse conditions for air pollution is about 42%. The Priority list compiled by Roshydromet, includes 5 cities with ferrous and non-ferrous metallurgy, 7—mechanical engineering, 9—timber and woodworking industry, 3—coal industry, 4—mining and pulp and paper industry, 6—chemical and petrochemical industry, with the highest level of air pollution, as well as 5 cities, where the main sources of emissions are enterprises of fuel and energy complex. All cities of the Priority List are located in Siberia, with meteorological conditions that are especially unfavorable for dispersion of impurities, powerful surface inversions, air stagnation, and fogs that contribute to the accumulation of impurities near the surface of the earth, which leads to an increase in air pollution.

3.2 Surface and Groundwater Changes

Water pollution is more dangerous than air pollution, since the processes of regeneration, or self-purification, are much slower in the aquatic environment than in the air, and the sources of water pollution are more diverse. The main sources of natural water pollution are atmospheric waters, municipal wastewaters, which include mainly domestic wastewaters containing feces, detergents, microorganisms, including pathogenic, as well as industrial wastewaters.

The quality of surface waters is formed under the influence of many factors of natural and anthropogenic origin. It has been established that water quality of the Ob' river has changed insignificantly, and of the Novosibirsk reservoir near the city of Novosibirsk has improved. Water quality of the Irtysh river on the border

Table 2 Extremely high (EHP) and high pollution (HP) of the surface waters of Siberia

River basins	Number of cases			Subjects of the Russian Federation*
	HP	EHP	Sum	
Ob'	606	245	851	Novosibirsk, Omsk, Sverdlovsk, Kurgan, Tyumen, Chelyabinsk Regions, Krasnoyarsk Territory, Khanty-Mansi Autonomous Area
Amur	204	66	270	Amur Region, Primorskii, and Khabarovsk Territories
Yenisei	87	6	93	Irkutsk Region
Lena	16	0	16	Irkutsk Region
Total	913	317	1230	

Note *Subjects of the Russian Federation where the number of cases of HP and EHP is more than 10; according to Roshydromet

of the Russian Federation with the Republic of Kazakhstan improved slightly. The water of the Yenisei River in the Krasnoyarsk Territory, the Republics of Tyva and Khakassia was characterized as "polluted". The water of the Bratsk and Ust'-Ilimsk reservoirs was estimated to be of good quality for many years. Recently, pollutants of the Lena River and its basin were organic substances and phenols, in the Kolyma river basin—compounds of iron, copper, manganese, lead, at times—phenols and petroleum products. By chemical composition, all surface waters of the Kamchatka Territory belonged to "soft" and low-mineralized with pollution by oil products, copper, iron compounds and phenols. Cases of high and extremely high water pollution in the Amur river by compounds of aluminum, copper, zinc, and iron, which may be due to both natural and anthropogenic factors (Table 2).

Anthropogenic activity leads to pollution of groundwater sources. It was found that the waters of the main aquifers and complexes on the territory of Siberia in their natural state do not meet the regulatory requirements for drinking water in terms of mineralization and total hardness, iron, manganese, sulfates, chlorides, less often of silicon, lithium, barium, bromine, and strontium. Fluorine content is almost everywhere below normal. In the Far East, there are hydrogeochemical zones and areas with substandard natural groundwater with a high content of iron, manganese, and silicon, which are confined to river valleys within the artesian basins.

In considering the formation of hydrochemical composition of groundwater, it is difficult to separate the influence of natural and man-made factors on them in most cases. This is especially clearly manifested in areas with intensive exploitation of groundwater, which is manifested in pulling substandard waters into productive horizons (complexes) from adjacent aquifers and contributes to the deterioration of the quality of produced water. The pollution impact on water bodies is manifested in changes in the state of aquatic ecosystems as pollution loads increase.

3.3 Soil Cover Transformation

Soil degradation is a loss of fertility, acquiring the character of emergency and environmental disaster. Under the influence of technogenesis on the territory of Siberia, as well as on the territory of Russia as a whole, land degradation is observed, i.e., water erosion, deflation (wind erosion), salinization processes, and desertification. Direction and intensity of these processes are determined by the action of both natural and anthropogenic factors and has regional specificity.

In western Siberia, the maximum load on natural components, including the soil cover, is caused by industrial pollution of land, as a result of industrialization (Fig. 5). In the north, there is a degradation of ecosystems which are poorly resistant to the effects of tundra in the process of gas and oil production. In the south and east, the natural factor has the greatest impact, in the Kemerovo, Tyumen, and Novosibirsk regions—bogging of land, salinization, and alkalinity, in the Transbaikal Territory and the Republic of Buryatia—development of erosion processes.

The lands of Western Siberia, namely the south of the Omsk and Novosibirsk regions and the southwest of the Altai Territory are subject to wind erosion on light soils. Deflation exceeds 50t/ha, but due to flat-cut cultivation of arable lands, the mass development of deflation is unlikely. Eastern Siberia due to forestation is protected from the damaging effects of winds and has a low deflation potential. Yet their development is possible in the Minusinskaya and Barguzinskaya depressions, where light soils are widespread. In addition, the processes of wind erosion are dangerous for the right bank of the Selenga, where light chestnut soils are common.

In addition to wind erosion, water erosion is of great harm to the soil cover. Due to dissection of the relief and sharply continental climate, the phenomenon of the washout of organogenic horizon is widespread, with the result that the territory of Siberia is in first place in the area of strongly washed soils.

Desertification is an intensive and widespread process in the arid areas of southern Siberia, where grasslands lose productivity, and soils are eroded. Desertification

Fig. 5 Changes in vegetation and ground cover due to emissions from the Sayanogorsk Aluminum Smelter. Photo I. B. Vorobyeva

Fig. 6 Salinization of the shoreline of a salt lake (Tazheranskaya steppe). Photo I. B. Vorobyeva

processes are intensively manifested in the Altai Territory, the Omsk Region, the Republics of Tyva, Khakassia, and Buryatia.

Soil salinization is observed in the south of Siberia. Mainly salt marshes and salt licks are concentrated in the forest-steppe and steppe zones (Fig. 6). They account for 21% of all saline soils in Russia, which brings it to second place after the North Caucasus.

The main causes of land degradation are related to socio-economic, organizational, economic and natural factors: underestimation of agrotechnical, agrochemical, land-improvement and anti-erosion measures in increasing land productivity, environmental sustainability and productive longevity of natural systems; the lack of an adaptive landscape approach to the organization of land use (environmental management) with scientifically based restrictions on anthropogenic pressure; lack of information and analytical support for the use of land resources.

3.4 Vegetation Cover Transformation

Siberia, due to its position and wide taiga landscapes, has the highest level of forest cover, where coniferous species prevail in the structure—25,330.71 million m^3, and 22.78% of the total area belongs to reserve forests. The forest area on the lands of the Siberian forest fund in 2017 increased by 34.5% compared with 2010. Ripe and overmature forests (18,643.69 million m^3) prevail, and young stock is low.

According to the forest registry, the area of dead forests in 2017 amounted to 195.3 thou ha. Since 2010, this indicator has decreased by 561.3 thou ha (74.2%), and compared to 2016 by 74.883 thou ha (27.7%) (Table 3). The main causes of forest loss are fires, insect damage, soil and climatic factors, and diseases. Western territories suffer from radionuclide contamination.

Large forest fires are the main factor in transformation of Siberian vegetation, the number of fires in 2017 amounted to 689 units. Forest fires covered 581,833 ha. The

Table 3 Conservation and reproduction of forest resources in 2017

Subject of the Russian Federation	Total area of lost forest stands, ha	Forest restoration area, ha	Current costs of forest reproduction and afforestation, thou RUB
Altai Republic	735.00	2030.10	20,787.70
Republic of Buryatia	6603.10	29,445.10	406,501.60
Republic of Tyva	4444.50	6064.00	21,022.90
Republic of Khakassia	231.70	4054.90	26,759.80
Altai Territory	459.00	11,113.80	354,011.10
Transbaikal Territory	24,021.00	14,399.90	62,137.40
Krasnoyarsk Territory	47,687.10	58,928.50	299,265.00
Irkutsk region	18,705.50	130,948.30	1,536,226.10
Kemerovo region	131.97	461.30	101,014.90
Novosibirsk region	1151.10	5228.70	270,355.00
Omsk region	384.90	4509.60	60,507.50
Tomsk region	6217.30	24,565.00	81,508.80
Tyumen region (without autonomous districts)	434.60	7219.30	117,090.50
Khanty-Mansi Autonomous Area-Yugra	3039.80	20,452.10	271,452.10
Yamalo-Nenets Autonomous District	4914.90	500.00	4940.00

largest area in 2017 belonged to the Irkutsk Region—917,380 ha, to the Yamalo-Nenets Autonomous District—165,401 ha; and the smallest belonged to the Tyumen region (without autonomous districts) (573 ha), and the Kemerovo region (28 ha) (Fig. 7).

Besides the fires, Siberian forests suffer from diseases. In 2017, the area exposed to foci of pests and diseases reached 1567.7 thou ha, which shows a reduction in the area and a decrease in the incidence of diseases by 264.6 thou ha. Reducing the

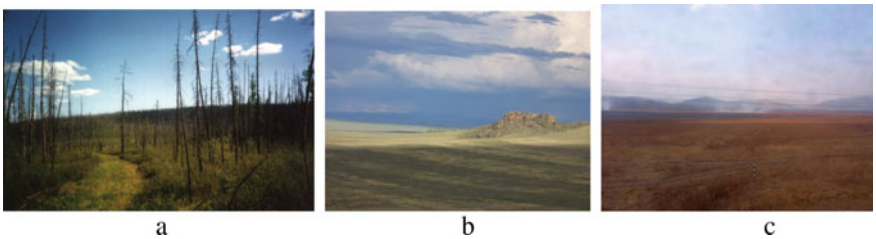

Fig. 7 Consequences of fires, **a** northern taiga, **b** agrolandscapes of the Tyva Republic, **c** forest-steppe of the Transbaikalia. Photo N. V. Vlasova, I. B. Vorobyeva

incidence of disease contributes to the implementation of measures for the care of forest plantations - reforestation, sanitary felling, cleaning from littering on an area of 298,749.3 ha. Despite the ongoing activities, the main percentage in reforestation is self-healing—86.17%.

One of the main factors of the change and degradation of forests in Siberia are wood cuttings. According to the data of timber harvesting, the most widespread wood cuttings are carried out in Siberia; logging volumes reach 75,846.50 thou m^3.

Thus, all the main features and manifestations of global environmental crisis in the ecological situation in Siberia in the 21st were revealed. Recently, anthropogenic environment pollution exceeds permissible levels. It is manifested in rapid and depleting use of non-renewable natural resources (minerals), consumption of renewable resources (lands, plants and animals, etc.), exceeding possibilities of their natural recovery and reproduction, as also production of waste, emissions/discharges of pollutants in volumes exceeding the assimilation potential of the environment. All this does not only environmental, but also economic damage, which is manifested in the cost losses of natural resources and the costs of society to eliminate the negative environmental consequences of human activities.

4 Modern Landscapes of the South of Eastern Siberia as a Reflection of the Centuries-Old History of Economic Development

The result of the economic impact on the environment is the main factor in formation of modern landscape structure in the south of Eastern Siberia; the southern territories here are the oldest developed regions. The consequences of the more than 350-year period of intensive economic development of the natural-resource potential (since the Russians came to the region in the seventeenth century) are manifested in geosystem dynamics, expressed in alternation of natural complexes in transformed complexes.

The main criterion of anthropogenic transformation is the transformation degree of biotic component of geosystems, namely, vegetation as the best indicator of fluctuations of natural regimes (Sochava 1980). We carried out cartographic assessment of anthropogenic disturbance of vegetation for most of the territory of the south of Eastern Siberia, and determined the degree according to the criteria of deviation of composition and structure of plant communities from their indigenous state (Fig. 8). The vegetation disturbance of the geosystems of the south of Eastern Siberia is determined by using its industrial and agricultural resources. Timber-harvesting activity leads to alternation of indigenous coniferous forest plantations to secondary small-leaved, less valuable for forestry. Accessible light coniferous forests are mainly exposed to cuttings, after which only low-quality raw materials and felling trash remain, which leads to an increase in fire and entomological danger.

Every year the forests are exposed to fires that damage not only forest communities, but also other types of vegetation—mountain tundra, subgolets creeping pine

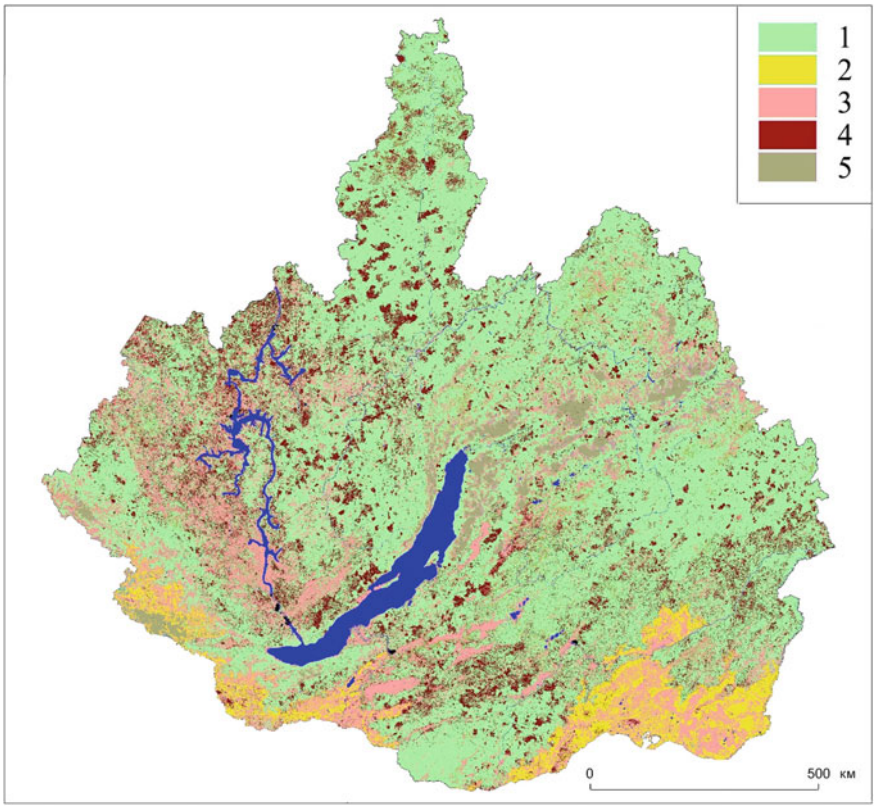

Fig. 8 Disturbance of vegetation cover of geosystems: 1—nominally primary, 2—weakly disturbed, 3—moderately disturbed, 4—severely disturbed, 5—lack of vegetation (goletz, etc.)

forests, yerniks, steppes, etc. All this leads to an increase in burning areas, replacement of natural forests with secondary forests, disturbance not only in vegetation but also in the animal world, destruction of soil cover, development of erosion, desertification of territories (Ecological 2015), and as a result, a complete restructuring of geosystems.

The magnitude of landscape structure transformation during the long-term forest industry development is demonstrated in materials of current state of geosystems of taiga areas in the Lena-Angara interfluve within the southwest of the Kachugskii district of the Irkutsk region. Since the founding of settlements by Cossacks on the banks of the Lena River and its tributaries in the middle of the seventeenth century, a priority in the economic structure was the maintenance of Lena shipping, developing parallel to agriculture here. Therefore, until the beginning of the twentieth century, the main occupation of the Russian population was arable farming. Besides, peasants were engaged in cattle breeding, hunting, gathering, and crafts. By the first half

of the nineteenth century the indigenous population—the Evenks and Buryats—had moved away from the nomadic economy and, along with hunting, began to master new sedentary occupations—domestic animal husbandry and farming. As a result, the beginning of the twentieth century was marked by the emergence of a complex environmental management, combining agricultural and forest management of natural potential (Yulinov 1991).

Since the development of collective forms of management in the 1930s, agricultural lands and hayfields are expanded (Irkutsk Oblast 1941). However, the main occupation of local population was forestry. In the 1950s, fur trade in the economy of the area was a priority (Eastern Siberia 1963). Moreover, in the dark-coniferous forests of Cislena area, pine nuts were harvested and supplied to the food industry. As a result of the above-mentioned activities, hunting grounds were connected by a dense network of forest roads.

The current period of nature management is characterized by a decrease in dimensions of economic development of the Lena-Angara interfluve. Here, in 1973, the Magdanskii state nature reserve of regional level was established, with restrictions on several activities, including harvesting of wild-growing, amateur fishing, and also wood cutting in places of capercaillie display places (Kalikhman et al. 2012). However, the taiga forests are at high risk of fires, most of which are associated with human activities. By the middle of the nineteenth century, small-leaved derivative forests became widespread here, formed due to the development of slash-and-burn farming, as well as logging through fires (Tomin 1909; Furyaev et al. 2015).

The centuries-old history of economic development of forest resources of the Lena-Angara interfluve is reflected in the modern landscape differentiation of geosystems, with both natural and transformed taiga biocenoses (Fig. 9).

Legend to landscape schematics of the key area of the Lena-Angara interfluve.

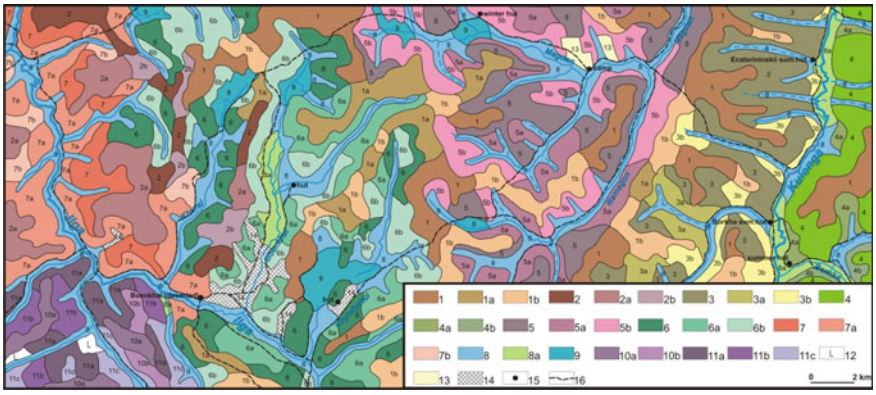

Fig. 9 Landscape schematic of the key area of the Lena-Angara interfluve

NORTH-ASIAN TAIGA GEOSYSTEMS

MOUNTAIN-TAIGA BAIKAL-DZHUGDZHUR GEOMS

Mountain-taiga larch class of facies

1. Of watershed areas, larch (with the inclusion of spruce and Siberian stone pine) subshrub-grass-moss
   - 1a. Of watershed areas, birch-spruce-larch (with singly occurring Siberian stone pine trees) grass-subshrub-moss
   - 1b. Of watershed areas, spruce-larch-birch (with the inclusion of aspen, and with Siberian stone pine and larch in the young growth) subshrub-forb, occasionally grass-subshrub-moss, in the place of burns.
2. Of watershed areas, larch (with the inclusion of pine) true moss-grass
   - 2a. Of watershed areas, larch-pine (with the inclusion of birch, and with singly occurring spruce trees) grass-moss
   - 2b. Of watershed areas, larch-birch (with the inclusion of pine, and with sparsely occurring aspen trees) grass, in the place of burns
3. Slope (largely eastern) spruce-larch grass-subshrub
   - 3a. Slope birch-spruce-larch (with the inclusion of aspen) grass-moss-subshrub
   - 3b. Slope aspen-larch-birch (with singly occurring spruce trees) subshrub-grass, in the place of burns
4. Slope larch (with the inclusion of spruce and Siberian stone pine) subshrub-grass-moss
   - 4a. Slope birch-larch (with singly occurring spruce trees) subshrub-grass-moss
   - 4b. Slope larch-birch (with the inclusion of spruce) grass-subshrub, in the place of burns
5. Slope Siberian stone pine-spruce-larch subshrub-sedge-moss
   - 5a. Slope spruce-larch (with the inclusion of birch, and with singly occurring Siberian stone pine trees and aspen) subshrub-moss-grass
   - 5b. Slope larch-birch (with the inclusion of aspen, and with singly occurring spruce trees) moss-subshrub-grass, in the place of burns

6. Slope (largely northern and western) spruce-larch (with the inclusion of Siberian stone pine and, more rarely, fir) sedge-subshrub-moss
   - 6a. Slope spruce-birch-larch (with sparsely occurring aspen trees) grass-moss-subshrub
   - 6b. Slope larch-birch (with singly occurring spruce trees) subshrub-grass, in the place of burns
7. Slope pine-larch subshrub-grass
   - 7a. Slope larch-pine (with the inclusion of birch) subshrub-forb
   - 7b. Slope pine-larch-birch forb, in the place of burns

Taiga larch class of facies of intermontane depressions and valleys

8. Valley yernik (with singly occurring larch and spruce trees) sedge-moss
   - 8a. Valley meadow (forb-grass)
9. Of bottoms and smooth slopes of valleys, meadow (sedge-grass) heavily waterlogged (with yernik vegetation, and with singly occurring spruce and larch trees)

MOUNTAIN-TAIGA SOUTHERN-SIBERIAN GEOMS

Mountain-taiga dark-coniferous class of facies

10. Of watershed areas, siberian stone pine (with the inclusion of larch and fir) grass-subshrub-moss
    - 10a. Of watershed areas, larch-birch-pine subshrub-forb-true moss
    - 10b. Of watershed areas, pine-larch-birch (with singly occurring larch trees) subshrub-forb, in the place of burns
11. Slope Siberian stone pine (with spruce, fir, and larch) sedge-subshrub-true moss
    - 11a. Slope pine-larch (with singly occurring Siberian stone pine trees) subshrub-grass-true moss
    - 11b. Slope birch-larch-pine true moss-grass
    - 11c. Slope larch-birch (with the inclusion of aspen and singly occurring Siberian stone pine trees) subshrub-forb, in the place of burns

Anthropogenically altered complexes

12. Burns (young birch vegetation with forb meadows, and with singly occurring larch and spruce trees)

Agricultural lands.

13. Arable lands
14. Hayfields

Residential territories and transport infrastructure facilities.

15. Seasonal settlements
16. Forest roads

Within the limits of the entire key area, due to low population density, anthropogenically modified complexes (agricultural land, residential and transport facilities, as well as logging) are represented in a small volume—about 1.5% of the area. Forest fires cause predominance of transformed geosystems, resulted in development of derivative coniferous-small-leaved forests, which occupy almost half (47.7%) of the area being mapped (Atutova 2015).

Considering the current focus of the region, it can be assumed that the historically established complex of forest management activities (point cuts, gathering wild-growings, hunting) remain in the population's economic structure within the mountain-taiga larch geosystems, which occupy most of the area under consideration. The seeming smallness of these impacts is compensated for by a high risk of fires. As a result, the share of geosystems that retain the features of natural complexes will tend to a constant decrease. Over the last century, the period of nature management within the entire area of the Lena-Angara interfluve, the area of natural geosystems has decreased by more than a quarter. However, the small population of the territory, most of which is located within the Magdanskii reserve, gives reason to hope that the pyrogenic danger in this case will be minimal.

Analysis of the landscape structure of the southern section of the Lena-Angara Plateau revealed a significant anthropogenic transformation of the mountain-taiga geosystems.

The transformation of natural appearance was promoted by the implementation of agricultural and forestry measures which have led to fires over the past hundred years. As a result, the pyrogenic factor becomes dominant in the causes of increasing territorial landscape differentiation, manifested in the combination of natural geosystems and geosystems that are at different stages of reforestation.

Nevertheless, despite the constant increase in the proportion of transformed landscape complexes, observed until recently, the lack of large fire spots in recent decades gives grounds for a positive prediction for this trend.

Landscape studies taking into account peculiarities of economic development of the territories are necessary for the development of recommendations for production activities aimed at reducing or preventing adverse environmental consequences.

Recommended economic measures should be aimed at maximum restoration of primary structure of geosystems, but anthropogenic pressures should not interfere with its natural dynamics.

Thus, the landscape structure of Siberia is characterized by complexity both in the diversity of natural complexes and in the degree of their contrast. The structure of Siberian landscapes has undergone significant changes over the past decades. An ever more intense anthropogenic and economic impact has been changing the appearance of the Siberian taiga over vast territories.

5 Conclusion

The analysis makes it possible to assess the acuity of the ecological problems and the transformation of landscapes in Siberia. This assessment covers both natural changes in the natural environment and anthropogenic in the old-developed areas and the transformation of the environment in the places of new development, which causes deterioration of normal living conditions and human health, depletion or loss of natural resources, decrease or loss of the environment and resource-forming properties of geosystems.

One of the features of Siberia is the fact that the overwhelming part of its territory is located in the taiga zone—a type of landscape with a predominance of coniferous forests, which stretches from its western to eastern borders. Latitudinal zones of arctic deserts, tundra, and forest-tundra are located northward of the taiga, and to the south—zones of forest-steppe and steppe. Landscapes, the formation of which is associated with altitudinal zonality, are typical of mountainous areas.

The main criterion for anthropogenic transformation is the degree of transformation of the biotic component of geosystems, namely vegetation as the best indicator of natural regime fluctuations. A significant number of relict components in the composition of geosystems or the relict geosystems themselves testify to the long and complex evolution of Siberian natural complexes, as well as to the high diversity of the geographic conditions of the region.

By producing oxygen and absorbing carbon dioxide, Siberian lands, primarily taiga, in fact largely ensure the stability of the composition of the planet's atmosphere, thus being its "environmental donor".

The famous Siberian writer V. G. Rasputin spoke about Siberia: "For an outsider who knows about Siberia only by hearsay, this is a huge, harsh and rich land—everything seems to be in cosmic proportions, including cosmic coldness and hostility" (Rasputin 1991, p. 24). Siberia is really a huge region in the east of the country. Regarding the severity of the climate, we note that Siberia is extremely heterogeneous in natural and economic terms, and therefore it is impossible to "attribute" extreme indicators to its entire territory as they are characteristic only of the Far North. The territory of southern Siberia is quite suitable for normal and comfortable life, which is shown by the centuries-old history of Siberia.

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Hunting in Siberia: Between Subsistence Practices and Natural Resource Management

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Abstract The chapter focuses on an interdisciplinary understanding of the role of hunting for different actors: the state, hunting enterprises, local communities and indigenous peoples. It provides a short overview of studies of hunting and their specifics in Siberia, examines the history of the state management of hunting in Siberia. Based on example of Tofalaria, it illustrates how during the XX–XXI centuries the hunting industry experienced growth and decline as a result of increasing and decreasing amount of investments in hunting as an industry. Another example, mobility of Evenkis, is used to show the extraction of resources as a wide diversity of movements and human existence in continually changing environment. The wide variety of contexts and perspectives allows to conclude that hunting is far more than merely subsistence practice or an industry. The studies of hunting are instrumental for understanding of human–environment relations that are currently undergoing rapid change due to climate, infrastructure, technology and societal transformations.

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V. N. Bocharnikov and A. N. Steblyanskaya (eds.), *Humans in the Siberian Landscapes*, Springer Geography, https://doi.org/10.1007/978-3-030-90061-8_15

Keywords Hunting · Informal land use · Local and indigenous knowledge · Resources · Infrastructure

Glossary

Informal land use	The field of the land use predominantly regulated informally, includes activities that for various reasons (non-monetary exchange, unrecognized, illegal, etc.) are not included in official reports and statistical data.
Socio-ecological system	A complex adaptive system consisting of a set of human and non-human entities interacting with each other (in accordance with the definition of the Stockholm Resilience Center).
Tofalars	Turkic-speaking group of indigenous people living in the Nizhneudinsky district of the Irkutsk region and leading traditional way of life consisted of reindeer herding, hunting and gathering. The number of Tofalars, according to the results of the 2010 Census, was 837 people.
Local and indigenous knowledge	Specific environmental knowledge shared by residents of a specific local community or Indigenous people, based on individual or collective experience, long-term observations, and stories transmitted mostly orally from generation to generation

1 Introduction

Siberia is perhaps the most ideal place in the world where hunting serves as a subsistence, pleasure or defense from predators, source of income, and, as it is getting more manifested among leisure hunters, as a symbol of power. This wide variety of functions and images of hunting depends on the context, place and specific groups one takes into account. The word “hunting” itself came into use in Russian only in the 16th century, with the beginning of active penetration of Russians into Siberia, while in the European part of Russia hunting animals was still called “catching” (Erofeeva and Bocharnikov 2018).

Due to significant Soviet efforts to develop infrastructure and build cities and towns in remote regions traditionally settled by indigenous peoples, Siberia has the unprecedented number of population living in harsh (Arctic and Subarctic) climate conditions. However, the density of population is so low, that in some regions there is hardly one settlement in a diameter of hundreds of kilometers. There are simply no sufficient state resources to control such vast territories and resources available there. Local hunters in this situation have served and remained local and often indigenous knowledge holders for control and monitoring of wildlife and landscapes. While the latter are increasingly monitored with the use of remote sensing technologies, the animal population is the area of expertise of hunters and hunting enterprises. As was the case with trophy hunting (Dickman et al. 2019), hunting may become a kind of not only extractive industry, but also wildlife management.

Hunting for fur animals served as one of the main factors for colonization of Siberia and one of the first resources of the Russian export. Sometimes unlimited, the pursuit of profit in extracting this resource led to the verge of its destruction. Meanwhile, recognizing the importance of nature in general and hunting in particular not only as a resource, but also as part of more complex human relationships is embedded in cultures of indigenous peoples. The revival of these cultures, not only for the sustainability of socio-ecological systems, but also for humanistic purposes involves the combination of local and indigenous knowledge and scientific systematization.

The chapter focuses on an interdisciplinary understanding of the role of hunting for different actors: the state, hunting enterprises, local communities and indigenous peoples. The first section provides a short overview of studies of hunting and their specifics in Siberia. Next section examines the history of the state management of hunting in Siberia and numerous problems the state faced in its efforts to establish control over the remote territories traditionally used by indigenous peoples. In particular, the example of Tofalaria illustrates how during the XX–XXI centuries the hunting industry experienced growth and decline as a result of increasing and decreasing amount of investments in hunting as an industry. The second example, mobility of Evenkis, shows the extraction of resources as a result of an intuitive process by demonstrating the wide diversity of movements and human existence is continually changing environment that stretches far beyond of somewhat reductive methods of the state control and perception of hunting merely as an industry.

2 Hunting, Culture and Siberia

Understanding the role of hunting for people and their cultures has changed significantly from the ways of mastering the nature and extracting its resources to the appreciation of intimate ties between humans and nature developed in indigenous cultures (Ingold 1987). In the earlier European writings, hunter either, as described by Schopenhauer (1970), applied his strong will, aggression and efforts to conquer and overcome nature, or as proposed by Rousseau (1761), returns to nature while hunting in the pursuit of happiness.

When applied to colonized territories, hunting and the following fur trade as part of the staple economy led to devastating effects on colonized people, their cultures and territories (Innis 1977). Despite its declining role in global and state economies, it still plays a vital role in some regions and local communities both as a branch of economy (Prelovskiy et al. 2018) and for indigenous people—part of subsistence cultures and reciprocal relations with nature (Kwon 1998; Laletin and Bocharnikov 2015). Researchers note the impact of different factors on subsistence hunting, such as climate change (Hastrup 2009; Brinkman et al. 2016), fuel costs (Brinkman et al. 2014), road network development (Espinosa et al. 2014) and industrial activities (Leontiev 2013). Another direction is formed by discussions of the impact of human population growth on hunting-induced decreased wildlife population (Benítez-López et al. 2017; Peres 2000), the role of hunting in sustaining biodiversity (Dickman et al. 2019; Graham-Rowe 2011). However, more fruitful considerations are related to taking into account both hunters and biodiversity concerns and finding solutions for the sustainability of social-ecological systems (Lovvorn et al. 2018).

While hunting itself is not in the focus of the research, its studies contributed to the development of diverse knowledge fields. In particular, hunting statistics has been an essential source of information for studies of climate fluctuations (Vibe 1967). Interviews with hunters serve as an important source of information of studies of animal population and environmental changes (Leontiev 2011). Hunting practices and cultures have been considered as evidence of inherent connections of indigenous people with landscapes (Krupnik and Jolly 2002; Louis 2007; Cruikshank 2005), climate change (Ignatowski and Rosales 2013; Safronov 2016) or "sacred ecology" (Berkes 2012). Moreover, the authors of Convention on biodiversity (Diaz et al. 2018) offered to assess nature's contribution to people—a new approach for understanding the links between people and nature to incorporate into policy and practice context-specific indigenous and local knowledge together with calculated ecosystem services that include different kinds of hunting.

Besides, the current development of science and technologies is realized in a variety of forms, from such as a set of tools and means of game hunting, processing and manufacturing of its products to building an infrastructure for more comfortable life while still being "in nature" with following its representations and discussions in social media (such as networks, forums or blogs). Hunting as a form of social activity allows humans to form collective identities and actions (Erofeeva and Bocharnikov 2018).

3 Hunting as a Form of Extractive Industry

Hunting resources, namely, fur animals, were one of the main factors of the Siberian colonization. In essence, the logic of resource extraction maintains its leading position in discussions about the prospects of Siberian development. This specific feature of hunting allowed some researchers to consider it to be the first type of extractive industry (Graybill 2009). With the colonization of Siberia, sable became an exchange

Fig. 1 Battue of roe deer by Buryat hunters in the 17th century. Painting by I. Ides, 1690s (from: Alekseev 1941, pp 522)

currency practically: thanks to it, indigenous people were first designated as hunters with established yasak (compulsory fur tribute), then received the specialization in the fur production (Slezkin 2008). Such specialization partly allowed indigenous people to maintain traditional ways of life without significant interference into customary law until the early XX century (Dameshek and Remnev 2007). Therefore, the transformation of hunting as one of the first types of resource use in Siberia is important for understanding the further development of the resource use discourse.

Highly diversified and sophisticated subsistence activities of indigenous people were simplified and focused on the fur animals only. In particular, Buryats traditionally more occupied in cattle breeding had to engage in hunting (Fig. 1).

In addition, incoming settlers, Cossacks and peasants, also actively engaged in fur hunting as it proved to be the most profitable activity, especially in comparison with less suitable for the harsh taiga conditions agriculture and cattle breeding. They learnt hunting methods from indigenous peoples and eventually had similar hunting practices (Fig. 2). So very soon the focus of the Russian government on the fur taxation and profits the individual hunters received from fur trade reached its limits and game resources were depleted. While in 1650–1680s the yasak was paid by sable only, by 1838–1850s it was received by squirrel fur from Evenks and only Tofalars (Karagas) supplied the state with sables (Ragulina 2000).

Fig. 2 Typical Siberian hunter of the early 1930s in a dog skin coat with a husky and a gun, the village of Nizhne-Karelin (River Lower Tunguska, Ust-Kut district, Irkutsk Region)

4 Siberian Hunting as a Form of Natural Resource Management

With colonization and development of extractive industries there is a constant increase in the number of various land users and intensity of the land use, especially at the territories of traditional land use (Fig. 3). Currently there are some areas, where traditional land users share their hunting grounds with forestry and extractive companies simultaneously (Kuklina et al. 2020).

More sustainable hunting management was introduced in the European part of Russia in the second half of the 19th century with establishment of the Moscow Hunting Society and the Imperial Hunting Society (Kaledin 2010). In 1892, Emperor Alexander III signed the first national law "On Hunting", which to a small extent reduced the destructive impact of hunting management in the European part of Russia. However, this law did not stop the exhaustive processes in the hunting industry of Siberia where it was kept up to the early XX century. Changes in understanding of sustainable hunting management and regulation started in 1911–1916, when the Department of Land Use was established. The prerequisites for such work were laid by Sabaneev (1871–1898 years of work) and Silantyev (1897–1918). The students of

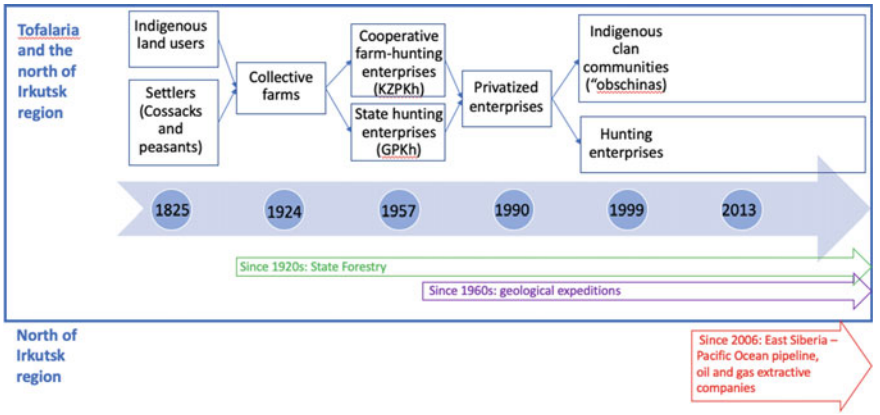


Fig. 3 Timeline of the land users involved in hunting and other kinds of land use in the territories of traditional land use of indigenous people in Irkutsk region

the latter continued and developed the principles of proper hunting. Among them were Solov'ev (1913–1929), Doppel'mair (1912–1940), Dorogostaiskii (1906–1935).

Institutional changes in transition of hunting from extractive economy to the organized natural resource management started with establishment of the All-Union Cooperative Hunting Union (Vsekokhotsoyuz) (1924–1933). The Higher hunting courses at the Irkutsk State University (1927–1930) had a great influence on this process, which overgrew in 3 years to the establishment of Fur—Extractive Institute) (Kambalin 2016, 2017). The 1934–1948s are characterized as a period of "lull" which began in Siberian game management: the state government relocated the institute to Moscow and eliminated Vsekokhotsoyuz. Almost at the same time, in 1935, the recovery period of the hunting industry began. Regional game experts have received from the Government of the USSR adoption of the Decree on the five-year ban on the procurement, manufacture and sale of sable skins. Since 1950 their efforts got more institutionalized with Professor Vasily Skalon who established a hunting department at the Irkutsk Agricultural Institute to start training of specialists in hunting as a part of agricultural education.

Since 1957, hunting was managed and regulated as a solid part of "rational industrial development". In three years, 94 cooperative animal farms (KZPH) have already started to operate with a permanent staff of 8.5 thousand people in the Rospotrebsoiuz system. From 1957 to the 1980s, hundreds of cooperative (KZPKh) and state (GPKh) hunting farms were created. They involved tens of thousands of indigenous peoples, thousands of citizens from the republics of the Soviet Union came to these enterprises for seasonal work. Developed as industrial farms the hunting enterprises diversified their production, embracing large array of activities, from the agricultural sector to the efforts to develop the tourist services. For example, in 1964–1966 the national economy of Russia received from the KZPKh and GPKh, on average, about 2 billion rubles including profits for hunting fur (in comparable purchase prices in 2019), 103

thousand upland game birds, 6250 tons of pine nuts, 4500 tons of fresh berries, 1600 tons of honey from their own apiaries and other products. Such diversification also allowed to keep more or less stable population of game animals.

Especially important these measures were for the population of sable, which remains one of the most expensive and most sought after in international trade. According to various estimates, the extraction of sable gives up to 90% of the total income of the fur industry. Collective prices for global auctions are reflected in local sable harvesting with the limits based on the number of hunting licenses that the hunters must obtain. In particular, in 1977 at the peak performance of the KZPKh and GPKh, Russia exported 110 thousand sable furs (with the average price around $230) at the world auctions and kept 30% for domestic consumption. All the sable furs were strictly controlled by the state, and poachers and other law violators were prosecuted. All the received by the state fur sale profit that reached $25.9 million dollars was directed back to the hunting industry.

The Tofalarsky KZPKh was formed in 1971 on a basis of merging Alygdzhersky and Verkhne-Gutarsky industrial farms. The new founded enterprise covered variety of activities, including hunting and farming fur animals, production of meat of wild animals, upland game birds and fishing. Second, they harvested pine nuts, berries, medicinal and technical raw materials (deer musk, picking medicinal herbs, gums, chaga, etc.). In addition, they were engaged in forestry: processing of timber, lumber, firewood, household goods and souvenirs production. Finally, some employees were occupied in agricultural production—reindeer and horse breeding (Kruzhkov and Vashukevich 2015). According to the Report of the Irkutsk Trust of Kooopzveropromkhoz, the value of the gross output of the Tofalarskii KZPKh in 1971 was 1,418 thousand rubles, which is 9.2 times more than the similar figure of 1967. The area of hunting grounds in the period of the activity of the cooperative of the cooperative expanded, and by the year 1990 it was already 2,646.7 thousand hectares. Reindeer and horse breeding, traditional for the locals, developed as auxiliary to meet the needs of the local population in transport and food.

The territory of the farm was assigned to six production sites, which, in turn, were divided into 35 brigade hunting sites. Hunting areas were assigned to the hunters "historically", brigades and units were created on the basis of kinship. From 229 to 262 hunters participated in the hunting season, of which 20 were regular employees. Employees of the industrial farm independently carried out protection of land: for these purposes, the staff included three huntsmen and 10 public inspectors. In addition, 9.3% of the entire territory of hunting grounds (24.8 thousand hectares) was allotted for the reproductive area (reserve) to preserve populations of red deer, wild boar and ibex. In order to preserve the number of wild and domestic ungulates, the company regularly conducted measures to regulate the number of wolves: in the early 1990s, up to 45 wolves were harvested annually, mainly through destruction of the wolf cubs in the dens.

By 1990, the infrastructure of hunting grounds included 617 hunting huts, 28 bathhouses, 58 helicopter pads, Karat and Angara radio stations and a transport fleet: 11 trucks (GAZ-66), 19 tractors, 6 snowmobiles, 1 motorboat and 87 horses.

The hunting industry, traditionally carried out with the use of hunting dogs, was preserved in spite of the fact that the farm was well supplied with traps, which, as it was believed, in the mountainous taiga area significantly reduced labor costs. Also, hunters made their own skis, used their own deer or horses for hunting. Deer were sometimes leased, for which the enterprise paid owners from 0.2 to 9.5 thousand rubles a season (Kruzhkov and Vashukevich 2015). For the arrival and delivery of equipment, the hunters used deer and horses, and only on hunting areas No. 1 "Ulka" and No. 12 "Kazyr" the hunters were brought in by helicopter. Nevertheless, all the hunters involved in the extraction of hoofed animals (230 people) were provided with rifle weapons (carabines with 7.62 mm caliber) and small-bore rifle barrels.

Despite substantial investments in the hunting enterprise, the harvest service and the prediction of pre-field conditions were not sufficiently organized. Separate data on the number of squirrels came from pine nut pickers. Each year, a report was prepared on the status of the post-harvest number of the main animal species, which varied depending on many factors.

Another area less controlled by the state authorities was in the field of hunting musk deer due to the growing demand for jets of musk deer, and the issuance by the executive committees of musk deer hunting permits for private use to indigenous people. All this, taking into account the possibility of poaching (shooting several animals in the summer for one license), undermined the reproductive potential of the population. The sable hunting was also reaching the reproductive potential of the population, and in some years it even surpassed them (taking into account the release of sable skins to the black market, which was up to 30%).

Finally, the enterprise suffered some industrial loss because processing of furs was carried out by the hunters themselves at the procurement centers. There were no degreasing drums, significant losses were borne by the economy of disposable quality defects: salinity, bloodiness, poor degreasing, bald patches.

However, the farm had a sustainable animal population and showed some progress of development. For example, in 1989, the population of the main commercial species was: sable—2,370 individuals, squirrel—14,000, ermine—2,800, white hare—3,700, 350 columns, mink—400, otter—40. By ungulates the situation was as follows: 3,000 individuals of red deer, 650—wild reindeer, 300 elks, 200 wild boars, 900 individuals of musk deer. According to the development plan of 1989, the gross turnover of the farm was 1,820,000 rubles, of which hunting products amounted to 267,700 rubles (14.7% of revenue).

With the end of the planning economy, both the level of production and number of employed in hunting enterprises decreased more than 15 times, and about half of the hunting enterprises went bankrupt. The KZPKhs and GPKhs were reorganized into closed joint-stock companies.

5 Hunting as a Market-Regulated Activity and Changes in Population of Game Animals

Since the collapse of Soviet economy, hunting as a business activity has become much less regulated and focused on fur hunting only. For example, from 2000 to 2013 authorities increased the number of issued hunting licenses two times (347.7 and 600 thousand sable skins, respectively). In 2018–2019 the fur auctions in Russia received fur sable worth of 2,7 billion rubles (priced by hunting enterprises) in the amount far exceeding the one of the Soviet time. Increased supply of sable together with global trends of growing competition from animal farming enterprises and fading demand for fur led to significant drop in the value of sable fur (with average $85 dollars at the 24–25 April 2018). The profit of fur trade is privately distributed with estimated only about 20% to be received by the state and more than 50%—by the middlemen. The hunting enterprises are left with low profits that are not sufficient for the proper management of hunting areas (monitoring, management, investments, control of animal population, etc.) (Ponomarev and Kambalin 2016).

While the animal population looks more or less stable (Fig. 4), the methods of monitoring are questionable. In 2008 the responsibilities to monitor the animal population were transferred to the hunting areas renters that negatively affected the industry. According to Tsentrokhotcontrol (the main state body controlling the hunting industry), the data about animal population has poor quality due to absence of standards for estimations of game population, the hunting land users' bias in receiving

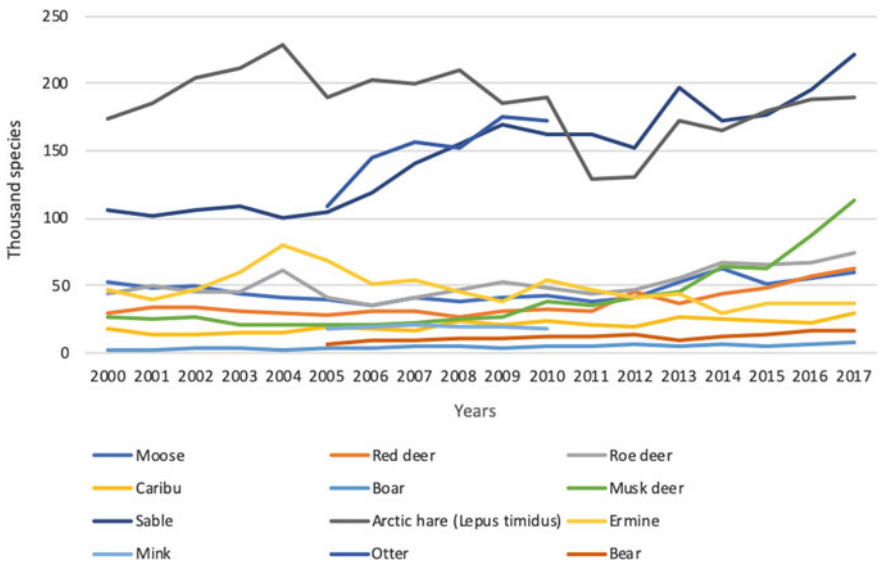


Fig. 4 Dynamics of population of selected games in Irkutsk region (Rossiskii pushno-mekhovoi soiuz 2016)

higher hunting quotas and lack of expertise among them (Rossiskii pushno-mekhovoi soiuz 2016). All these trends contribute to development of "grey economy". For example, according to Braden (2014), illegal recreational hunting reached catastrophic proportions in Russia. The assessment is based on official reports showing that in 2012 in Russia monetary value of poached wildlife exceeded legitimate hunting profits (18 billion rubles and 16.2 billion rubles respectively) (Smolyakova 2013). Therefore, the threat of depletion of hunting resources is increasing.

There are significant differences in availability of game animals across different regions of Siberia (Fig. 5).

6 Hunting as a Subsistence Activity

The main document that recognized traditional land use practices and introduced specific norms of taxation depending on the traditional way of life is 1822 Statute of Alien Administration compiled by Mikhail Speranskii (Dameshek and Remnev 2007). Before this law adoption, the land use in general and hunting in particular were rather chaotic. Our studies in the Irkutsk region and with representatives of non-numerous indigenous people—Evenks and Tofalars, illustrate transformations in the composition of the land users in Siberia.

According to numerous ethnographical studies, up to the early XX century the Evenki and Tofalars identified themselves with particular clans (Sirina 2002; Rassadin 2005). The latter used particular territories for hunting and subsistence activities according to customary norms (Fondahl 2018). In the analysis of spatial changes in the ethnic territories of Native Siberians from the late nineteenth century to the early twenty-first century Sablin and Savelyeva (2011) note increasing density of Russian population as the main reason of cultural assimilation of indigenous people, more pronounced in more densely populated regions and less—in such remote regions, as the mountainous and northern territories distant from the major river routes. In addition, one should note that the relationship between infrastructural development and hunting has always been complicated. Most of the current roads, including winter roads, have been laid along the old hunting trails (Kopylov et al. 2009). On another side, infrastructural development in Siberia has always been the main impetus for diversification of economy and its industrialization (Dameshek and Remnev 2007).

During collectivization, the Soviet government outlawed the ancestral hunting grounds of indigenous hunters, and implemented the principles of collective-farm labor in agriculture and hunting. Only in 1999 with the development of the number of Federal laws recognizing the rights of indigenous people for traditional land use was the new form of hunting enterprise formed—family-clan and neighboring communities (obchshinas). While obshchinas have been dedicated to restoration of the traditional ways of life of indigenous people and include a list of other allowed activities, most of the profit is still obtained with hunting. Another benefit of registering hunting enterprise as an obchshina appeared in the North of Irkutsk region during the 2000s,

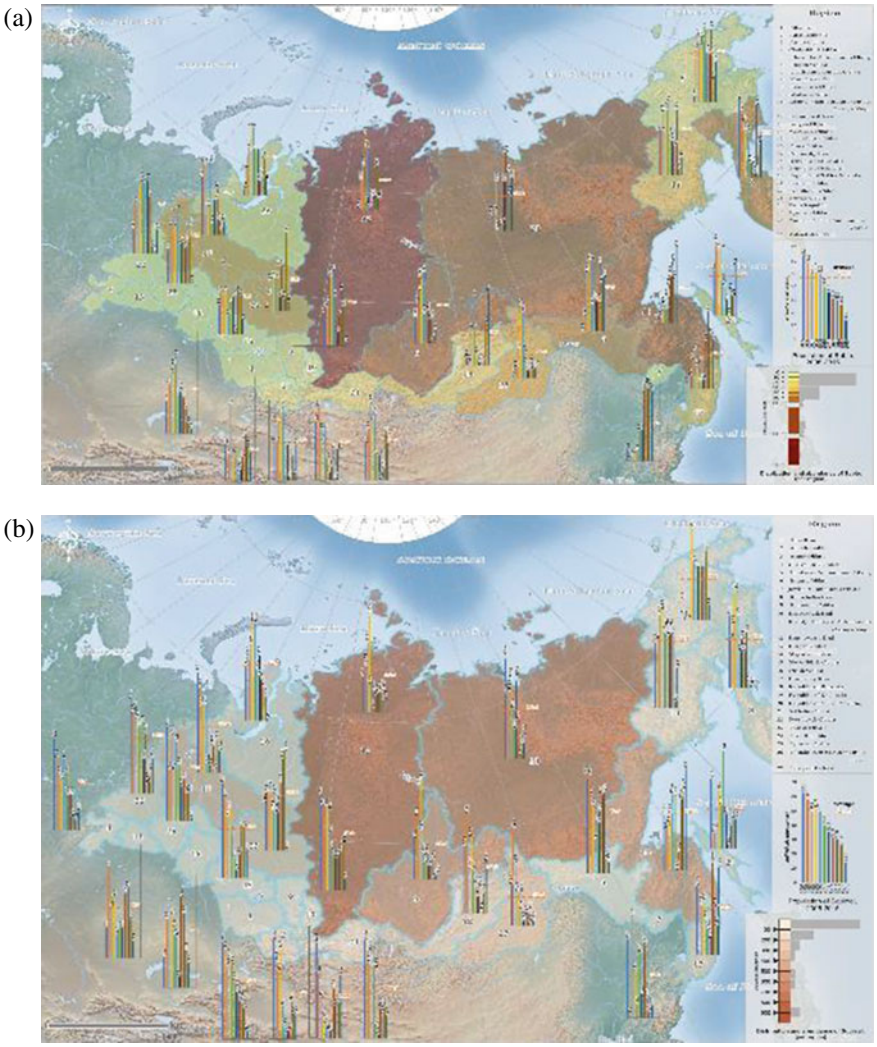
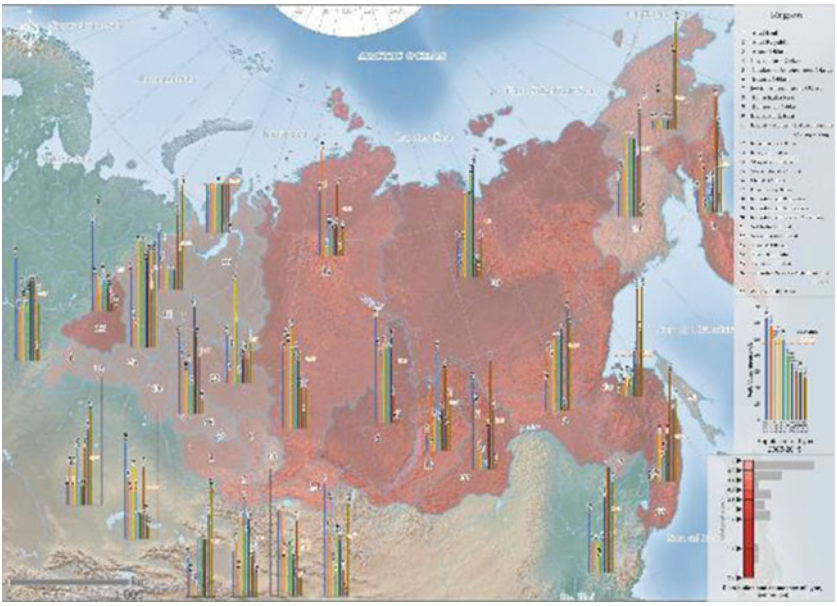


Fig. 5 Dynamics of distribution of game animals in the regions of Siberia. **a** sable; **b** squirrel; **c** linx; **d** marten; **e** ermine; **f** beaver. *Source* Rossiskii pushno-mekhovoi soiuz (2016)

with active development of natural resources, subsidies and compensations for which were more generous to obschinas than to other hunting enterprises. In accordance with land and forest laws and the law of the animal world, land plots are assigned to them for a long-term lease on a priority and free basis. However, if obschina fails to manage its territory, the rights for the land may be withdrawn. The rights of the members of obschinas for subsistence hunting remain highly contested and subject to legal disputes (Golubkova 2019).

(c)



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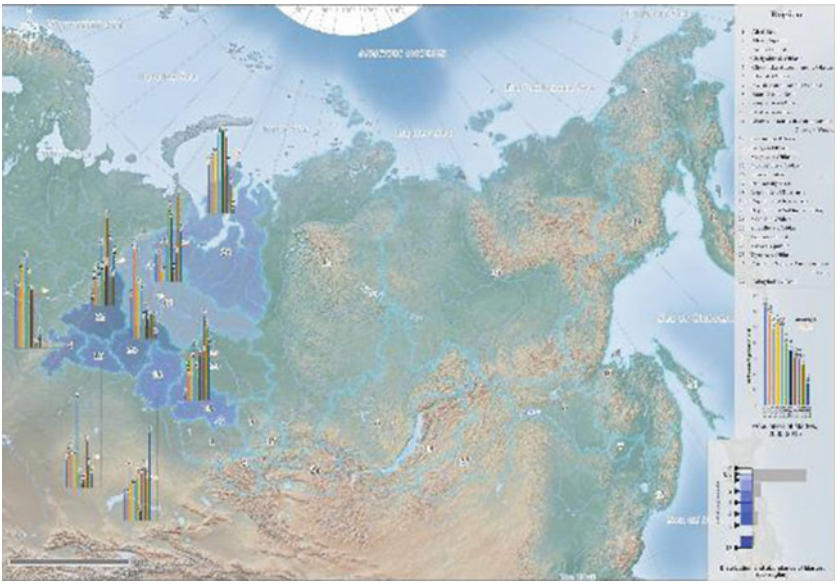

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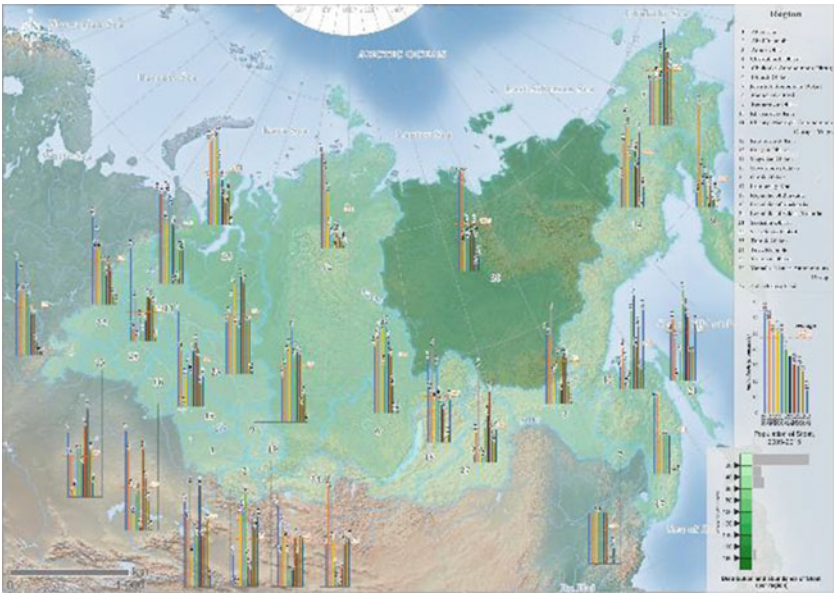

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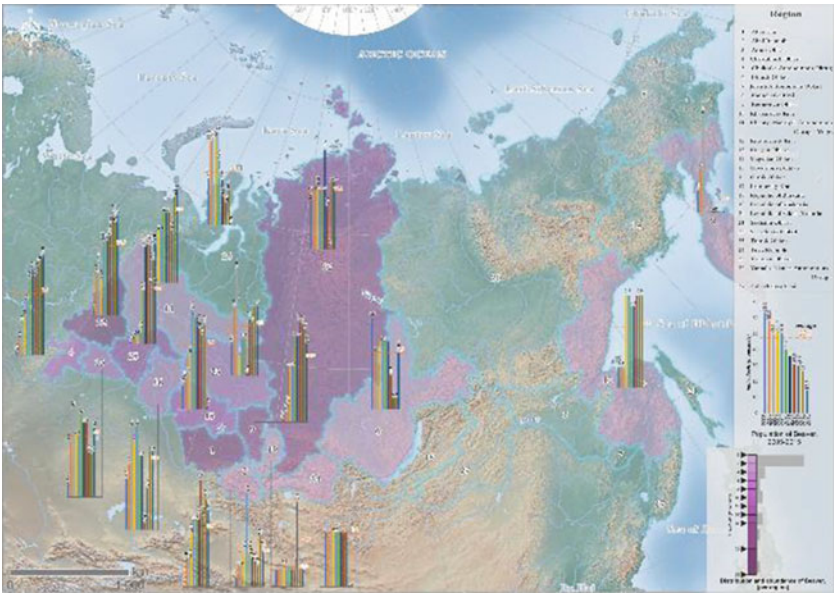

Fig. 5 (continued)

The hunting economy in Tofalaria is perhaps one of the most illustrative examples of the changing role of the state in the local economy from the Soviet to the Post-Soviet time. For many indigenous minorities of Siberia, hunting has been one of the main sources of income. Thus, the revival of the best hunting traditions of Tofalars, their adaptation to modern conditions of biosphere management is one of the possible ways to preserve this least numerous group of indigenous people in Russia (762 individuals identified themselves as Tofalars at the Census-2010). Withdrawal of the state from hunting resource management left small hunting communities coping for survival. Among the three settlements of the traditional residence of the Tofalars, Alygdzher with population of 557 people is the largest and the center of the Tofalar municipality (the other two are Verkhniaia Gutara and Nerkha) in the Nizhneudinskii district of the Irkutsk region. With dissolution of the state hunting enterprise the unemployment rate reaches up to 70%.

According to the social survey conducted in 2012 among hunters of the village Alygdzher (Bogdanov and Vashukevich 2012), hunting remains the main or significant source of livelihood and income in the village. The total income from the taiga hunting can be 200–300 thousand rubles a year per household, but significantly depends on external demand for local products. On average, the proceeds from the sale of products of the fur trade for people living in hunting amounted to about 70 thousand rubles (80% of which are sable skins), jets of musk deer and bear bile up to 140 thousand rubles, wild-growing (mostly pine nuts)—50 thousand rubles. The received money covered food expenses—40%, clothes and shoes—20%, utility payments and expenses—10%, equipment maintenance (including fuel and lubricants)—10%, medical care—10%, communications, etc.—10%.

Due to limited transport accessibility, the cost of food in local stores may exceed by 40% the average prices in the region. Some families grow vegetables and berries in the garden, but the harvest is difficult to preserve because of the sudden changes in the weather—hail in summer, or snow in the mountains, and frosts. In the forest they pick berries (lingonberries, cranberries, blueberries, currants, sometimes blueberries, honeysuckle), mushrooms (russula, milk mushrooms, boletus mushrooms, boletus mushrooms), medicinal herbs (maral root, golden root).

The main difficulties with hunting the respondents relate with its organization and regulation which include insufficient number of hunting permits, unattainable requirements for storage and use of hunting weapons, difficulties in exporting hunting products. With the collapse of industrial farming, they note the lack of resources to control the population of wild animals such as wolves, which, in turn, is considered the main reason for the decline in the number of ungulates. The absence of necessary permits does not stop them from hunting but leave with necessity to trade hunting products illegally at low prices to buyers who regularly come to the village at the end of each hunting season. Unlike hunters, the latter have enough power to solve problems with illegally obtained products using corruption schemes.

Another factor affecting the hunting industry: geological exploration of the Zashikhinsky deposit of rare metals located 60–65 km from Alygdzher, in the hunting area of one of the locals. The equipment and workers are delivered by a service road built from the Tulunsky district, while the village of Alygdzher is cut off by two

mountain rivers and a mountain pass that makes it difficult to drive even cross-country vehicles. Therefore, residents of the neighboring villages of the Tulun district (Ikei, Ishidei, Arshan) are hired as handymen, and qualified specialists mostly come from bigger cities. Thus, the impact on the local population is associated only with the risks of environmental pollution and poaching in the event of further development of the enterprise.

Finally, during the last decades there is increasing demand for trophy hunting which remains mostly unaccounted. Usually it is carried out by outsiders who are interested in hunting for red deer, moose and rarely—bear. The local hunters are sometimes hired as guides who help to trace animals, cook and organize accommodations in the hunting huts. In return, they receive payments far exceeding the profits from fur hunting and remains of the killed animals which the recreational hunters don't need.

In addition to economic and governance issues, one should note **social factors affecting hunting activities**. Since the Soviet time, as in many other regions of Russia (Povoroznyuk et al. 2010), there have been no women among hunters—during the Soviet time they were allowed to work only as "chumrabotnitsy". As for the male hunters, there are generational differences: a generation is the one hit hard by the transition period of the 1990s. Often, they dropped out of school and went off to hunt, but lacked skills and knowledge. The latter includes the education and care of a good hunting dog, hunting with her, and not "just trapping", on a small radius. The old men who are unable to move for a considerable distance trap by one installation of traps. The young people who grew up in the 2000s turned out to be more adapted to modern conditions: they start hunting from the age of 12, reaching the age of 16 they build their own huts and hunt on their own. Often, they live in big cities, studying in universities or working, but regularly visit home during the summer and winter holidays in order to engage in hunting. Thus, more successful hunters who can move long distances are male hunters of the age 40–50-year-olds and under 30.

A brief insight into the history of Soviet and post-Soviet hunting among Evenki and Tofalar indigenous people demonstrates the continuing important role of subsistence hunting in the local economy and in individual households. In addition to the changing demand for furs in the world fur auctions, Chinese demand is added for a jet of musk deer and other products of hunting used for medical purposes. The loss of control over the wildlife population by local residents, together with the lack of planning opportunities for the further development of traditional environmental management in general and hunting in particular, lead to overexploitation of the most popular in the market sable and musk deer. There is no doubt that the integrated development of participatory scientifically based and controlled use of hunting resources in the territory, involving local people, is vital for the industry, and in general, to preserve local socio-ecological systems.

7 Hunting and Mobility: The Use of Resources by Evenkis in the Context of Socio-Economic Change[1]

Hunting as a form of extractive industry implies constant mobility and use of infrastructure. This paragraph analyzes how the transformation of Evenki hunters' and reindeer herders' movements in the context of the recent socio-economic change had affected hunting. Mobility of Evenkis can be seen as a reflexive and creative process, based on the processing of a big quantity of constantly updated information on the environment, weather conditions, movements of people, equipment, as well as wild and domestic animals. It can be approached as a synthesis of traditional technologies and innovations. Historically Evenkis appropriated space by the use of temporary bases, which they employed as points of constant return.

Physical mobility is a prerequisite for northern hunters and trappers (Oswalt 1999: 279), and it is a necessity for reindeer herders (Konstantinov 2009). In this sense, mobile structures such as a conical skin or bark lodge should be analyzed together with reindeer herders' and hunters' patterns of movement across the land (Anderson 2007). Principally, they establish "a relationship with a set of places" through movement (Rapoport 1978: 233). Furthermore, the motion of Evenki hunters and reindeer herders is never chaotic; it includes the intensive use of places connected by a path. Moreover, they usually establish their camps in the same places year after year (Tuan 1977: 182) and also travel along the same routes (Sirina 2002: 112). Evenkis maintain a certain regularity and continuity in their use of the places. That is why in many places in the taiga, they started using stationary structures such as winter log cabins (*zimov'ia*).

Administrative practice inevitably divided space into a center and a periphery (Kempton and Terry 2002), but Evenkis adapted to the new logistical schemes, which were based on new spatial logic and combined the use of multiple bases both in the forest and settlements. However, life in the settlement and life in the taiga should be seen not as contrasting ones but rather as complementary experiences, which together constitute a strong sense of locality and represent the "way of life" (Blaser 2004: 63) of Evenkis. Labelling contemporary Evenkis either as "taiga dwellers" or "sedentary villagers" reduces their practices to an asymmetrical view representing hegemony of the forest or the settlement over their daily experience. Therefore, their mobility patterns should be analyzed through the prism of everyday practices that imply movements through the village and a large number of surrounding places.

The way of life of Evenki hunters and reindeer herders demonstrates a certain continuity. These people always combined the use of stationary and mobile architecture as well as movements of different length with their daily tasks. They managed to incorporate numerous innovations and development projects by means of movements and for the purpose of movements. Ingold and Hallam (2007) approach mobility as a field for cultural improvisation. Hence, movements of Evenkis can be interpreted as a creative process which serves as an expression of their own intentions and

[1] The research was supported by the Russian Science Foundation (project No. 18–18-00,309).

views. In other to interpret the use of resources by Evenkis one needs to shift from a "static perspective" where local people's spatial practices were analyzed through the prism of their relationship to a particular stationary structure, such as a settlement or a hunter's base to a dynamic one where a structure is interpreted as embedded in a complex network of movements connecting a number of locations. Scientists have widely criticized such dualism, which makes a strong division between the settlement and the outdoors (Ingold 2000; Whiteridge 2004). The houses, tents or hunting log cabins that Evenkis use within their routine do not exist separately from other places. Therefore, Evenkis can be seen as people settled neither in the village nor in the forest, but rather as people moving in-between structures, which are not necessarily concentrated in one particular place.

Eastern Siberia has long been the focus of extractive industry and intensive development projects. Even though newcomers became proponents of the policy of "sedentarisation", they employed both Evenki knowledge and movements in their projects. Evenkis became incorporated into these projects through employment and the intensive relations with newcomers. Despite the fact that newcomers gradually introduced new architecture as well as administrative units in the region, Evenkis adjusted all these innovations to the modes and trajectories of their movements. In this context, their periodic visits to newcomers' structures cannot be seen just as a factor which was imposed by the state. They became the places where these people exchanged not only commodities and resources but also knowledge. Evenki reindeer porters (*kaiury*), provided numerous geological parties with transport, helped them to find mineral deposits, and participated in the mapping of the territory in the remote places in the taiga (Davydov 2013).

Joint movements with reindeer, as well as environmental knowledge and skills, gave Evenkis the possibility of a relatively autonomous existence. The emergence of new centers for the redistribution of resources inevitably entailed a change in the strategies employed by Evenkis and affected the change in the degree of their autonomy from the state institutions. As a result of the establishment of a public supply system and the construction of infrastructure, it gradually decreased. A distinctive feature of these changes is an increase of the pendulum movements between the intensively used places.

The implementation of industrial development projects was accompanied by the establishment of new transport infrastructure. In many places, Evenkis used the regular commuter trips of shift transport to reduce the expenses of transporting people and supplies to hunting territories and bases. Thus, hunters and reindeer herders of the northern Baikal and Zabaikal regions frequently use a shift transport provided by the ore-dressing and processing, gold mining and other extractive industry enterprises to get to their bases and hunting territories and to return to the settlements.

Infrastructure that emerged within the industrial development projects, as well as the policy of transition to a settled way of life, was pragmatically incorporated by hunters and reindeer herders to help organize their daily tasks: searching for building materials, fuel, places to stay overnight, keeping things and managing mobility. The use of infrastructure by Evenkis rationalizes their mobility and extraction of resources

and can be seen as a result of a reflexive process which does not clearly define the boundaries between the natural and anthropogenic landscape.

8 Conclusions

In this chapter, we have discussed the changing role of hunting in Siberia. As the analysis of literature has shown, the studies of hunting practices and cultures remain relevant both by themselves and as supporting other essential challenges of the global changes related to changing economic, social, climatic, environmental conditions. Studies of hunting in Siberia illustrate that its transformations have been non-linear. Hunting as a kind of extractive industry was widely practiced during the Siberian colonization and in some forms still persists. However, new challenges and opportunities of hunting arise from the development of recreational and trophy hunting. While there is much ambivalence in their relation, there is evidence of their support of biodiversity preservation (Dickman et al. 2019) and in supporting remote communities' economies in Siberia.

From another side, there is a renewed role of hunting as a subsistence activity; partly it is related to the abandonment of remote communities by the state infrastructure and partly—with the revival of indigenous movements. Studies of hunting-related mobility among Evenkis demonstrate high resilience of indigenous people and their abilities to adapt new available technologies and infrastructure for subsistence activities as well as to adapt to new socio-economic and environmental conditions. Therefore, studies of hunting play an essential role in increasing interdisciplinary research. They are vital in Siberia where hunting remains a crucial part of indigenous cultures, but also serves for subsistence purposes of others. Moreover, studies of hunting are instrumental for understanding of human–environment relations that are currently undergoing rapid change due to climate, infrastructure, technology and societal transformations.

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Economic Development of Siberia: From Nonlinear Presence to an Indefinite Future

Anastasia V. Myadzelets and Lilia F. Lubenets

Abstract Fundamental differences in geographical conditions, historical and contemporary economic, social and cultural peculiarities of various territories show significant heterogeneity, inequality and nonlinearity of spatial–temporal development districts, regions, states other territorial formations including vast parts of Siberia. A deeper understanding of local internal and global external conditions impacts on forming stages, trends and different vectors of territorial development is achieved by considering environmental factors in these processes The research analyzes not only economic and investment processes and resource cycles but also shifts in cultural and social values. The chapter illustrates the opportunities of theoretical-mathematical approaches and models and qualitative comparative-geographical methods for studying the geocultural development heterogeneity and nonlinearity of Siberia. The methods reveal stagnant and active states of socio-economic systems, their stereotypic and innovative behavior models, different cyclic and fluctuation processes and give them geographical and historical definition. A fundamental factor of heterogeneity forming and nonlinear development is an activity that is demonstrated with the example of different nature-economic complexes and differentiation of territorial management modes in Siberia. Herewith the role of natural and geographical as well as geohistorical development factors remains leading. The same factors are essential for the organization of ethnical nature management for indigenous population that is shown as the example of a local community lifestyle at the Uimonskaya depression. In current conditions, nonlinear and heterogenic territorial development character allows both to different ethnos keeping their traditions and modern postindustrial economic society to coexist harmoniously. However, it does not bring any distinctness in the economic modes of different territorial systems. The result showed that different territories are at different economic development stages in terms of their types such as resource economy, investment economy and innovation economy. Several economic behavior trends of regional

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V. N. Bocharnikov and A. N. Steblyanskaya (eds.), *Humans in the Siberian Landscapes*,
Springer Geography, https://doi.org/10.1007/978-3-030-90061-8_16

economics are determined according to the types. It is mainly raw (resource) and transitional behavior types for the Siberian regions. They are associated with a certain stereotypical way of conducting economic activity when even creating technical, technological, infrastructural and other conditions is not enough to factor for the successful implementation of innovations.

Keywords Regional heterogeneity · Investment process · Investment cycle · Economic age · Ethnogeosystem · Ethno-nature management

Glossary

Regional heterogeneity	differences in the character of spatial–temporal socio-economic development of territories of the same hierarchical level (regions, states, etc.) that connected with geographical, historical, economic, cultural and other factors of environment.
Mountain ethnogeosystem	a type of territorial social systems, representing a part of the geographical environment formed as a result of the interaction of natural and socio-ethnic subsystems. Mountain geosystems are the natural subsystem, and the ethnosystem is the social-ethnic one. The contact zone of the subsystems determines the features of nature management system (Klimov 2006; Lubenets 2010; Zavyalova 2004).
Geosystem	a special kind of material system consisting of interdependent geographical components interrelated in their location and developing in time as a part of the whole (Isachenko 1980; Sochava 1978); in application to mountainous areas it receives a leading aspect of the study related to the geographical features of mountain depressions.
Ethnosystem	a historically formed group of people with common ethnic features and relations (language, components of culture, religion, ethnic knowledge of the environment, etc.), acting as an autonomous unit of society. The ethnosystem is most often based on the one "system-forming" ethnos, which may be in close connection with other

	ethnic groups (subethnic groups) occupying a certain "ethnic" territory (Gumilev 2004; Klimov 2006).
Mountain-depression geosystems	an independent class of geosystems, the general features of which are: a negative form of relief, isolation or almost closure and clear isolation, very dry and continental climate compared to the environment, the presence of a drier version of the landscape of this zone (Fadeeva 1996).
System of mountain ethno-nature management	a historically and genetically interrelated natural-economic organization of space, the system-forming components of which are mountain geosystems and ethnic communities, which develop the territories in their cultural traditions and forms of farming (Lubenets 2009; Ragulina 2000).

1 The Role of Regional Specificity in the Formation of Nonlinearity of Economic Behavior of the Territory

Natural inequality of the geographical and socio-economic conditions of the territory, a different type and history of development, infrastructure peculiarities, differentiation of population groups, availability of public goods and other factors determine the regional specificity of different regions' development. It is very clearly manifested in the territory of Siberia. The development of various scales territories is a multi-aspect and multifactorial process, the direction of which is determined by natural and socio-economic conditions. The regional and local specificity of their manifestation has particular importance in the study of these conditions. This specificity intensifies the disproportions in the territorial development to the north–south and east–west direction.

Establishing patterns, key characteristics and problems of the territory are the basis for analyzing the transformation of the economic and geographical space in the current conditions. It is important to identify local features of the economic and geographical systems formation; to establish geographical, historical, economic, political and other reasons for space imbalances and to specify normal and abnormal regions as opposite poles of territorial innovation or stagnation development. The authors use a set of modern objective (mathematical models) and subjective (qualitative and expert analysis) methods.

Regional inequality is mainly considered in terms of spatial heterogeneity, especially in large states (Friedmann 1966; Zubarevich and Safronov 2014). The spatial

development is always uneven and the spatial inequality arises as an objective consequence of the concentration of competitive advantages in some territories and their absence or deficiency in others (Krugman 1991). With the development of the regional economy and economic geography, other reasons for the heterogeneous development of regions began to be considered. It is political, social and economic inequality. Thus, Krugman (1991) (Krugman 1991) proposed to single out two groups of fundamental factors in identifying the causes of uneven development of regions. These are factors of the first nature independent of human activities and the second nature factors, created by human and social activities. The first one is resources and geographical location. They can be attributed to the reasons for spatial inequality. The seconds are agglomerations, institutions and infrastructure. They cause socio-economic and political inequality. Both groups of factors for some territories can simultaneously be advantages and hindrance obstacles to activity for others. They should be objectively taken into account in regional development plans. The role, significance and configuration of the factors can be changed over time. For example, when the territory develops, the role of first nature factors decreases, and the importance of second group factors increases, affecting the spatial inequality and regional heterogeneity character. Porter 2005; Tatarkin and Minakir 2012 have the same ideas. They note that spatial heterogeneity and regional development are associated with the emergence of various competitive advantages and their reproduction and the formation of the appropriate infrastructure supporting.

There are many research results with a quantitative and qualitative assessment of the regional inequality degree in recent scientific literature (Novikov 2013; Zubarevich 2010; Zubarevich and Safronov 2014). But these studies have some disadvantages as the final assessment of heterogeneity is given at the national level, therefore, interregional similarities and differences in the socio-economic situation remain outside the spatial analysis' scope.

Besides, the northern and Siberian regions of Russia are an object of innovative development and a subject of special attention in recent years. The study of their territorial organization and related changes in the socio-economic situation has particular relevance (Pilyasov 2014; Pilyasov and Zamyatina 2015; Zamyatina and Pilyasov 2018). For example, Pilyasov (2014) considers the northern futurology issues and the development of the northern periphery and highlights several scientific problems of their development. He notes that, first of all, it is necessary to take into account the peculiarities of the northern geographical position, the peripheral location, climatic discomfort and transport inaccessibility. It is necessary to work out several unique zone-sensitive statistical indicators to access and analyze the socio-economic situation, the life quality, the relationship of factors, spatial differences, etc. Concerning the Siberian and northern territories, the authors agree that modern economic and political processes can lead to rapid natural and socio-economic changes. It requires unique approaches to analyze the corresponding regional situation, which is reflected in works on assessing innovative processes of development of northern territories by quantitative and qualitative methods and analysis of their role in forming social processes (Zharov 2017).

The variety of natural, social, economic, political and other conditions and factors of Siberia regions makes significant the scientific problem of identifying a specific geohistorical and socio-economic situation. The objectivity of the decisions made in planning and forecasting the socio-economic development of the territory, the creation of an appropriate investment, political, social, recreational image and other territory management issues depend on the correct description of these situations. The quantitative assessment of local and regional conditions and environmental factors is carried out, various situations for the regions of Siberia are identified and typified. The comparative approach based on mathematical methods makes it possible to identify some nonlinear patterns of economic development of Siberia at the regional level. The results obtained are used for quantitative evaluation of the socio-economic inequality degree of the regions.

2 Geohistorical Projection of Regional Medium for Defining Territorial Spatial–Temporal Basis and Its Impact on Social and Economic Development Peculiarities of Siberia

Regions are at different organizational stages of industrial and investment processes, therefore study of interregional heterogeneity depending on their investment efficiency level is essential. Regional differentiation is significantly appointed by distinctions of internal investment and production volumes, as well as the difference of the medium characteristics such as investment climate, geographical location factors, nature-climate and resource potential, the development level of local infrastructure, and the efficiency of territorial management policy. Together they form the so-called geohistorical projection of economic development for a particular region.

The economy of the regions forms a chain of evolutional stages due to variation of spatial–temporal development. Given local conditions, it is a basis for the prediction of its future. In this regard, the evolution paradigm of investment activity underlies the research idea, when the history of production investing and the statement that different regions are on the different evolution stages of their development is considered. Their economy are not stable. It keeps phased changing, improving and then shifts in a new other states (Nelson and Winter 2002).

The study of spatial–temporal heterogeneity based on mathematical modeling methods, indication functions, envelope curve analysis, Bayesian methods, differential geometry approach and others (Aivazian 2008; Myadzelets and Cherkashin 2016, 2017). Available ratios and their changes for industrial and agricultural production and internal investment volumes of the regions of the Russian Federation are analyzed for data time series taking into account proportions of natural resource sector of regional economics.[1] Investments are calculated per square unit of a region. Such

[1] Socio-economic characteristics from the reports of the State Statistics of Russian Federation from 2000 to 2015.

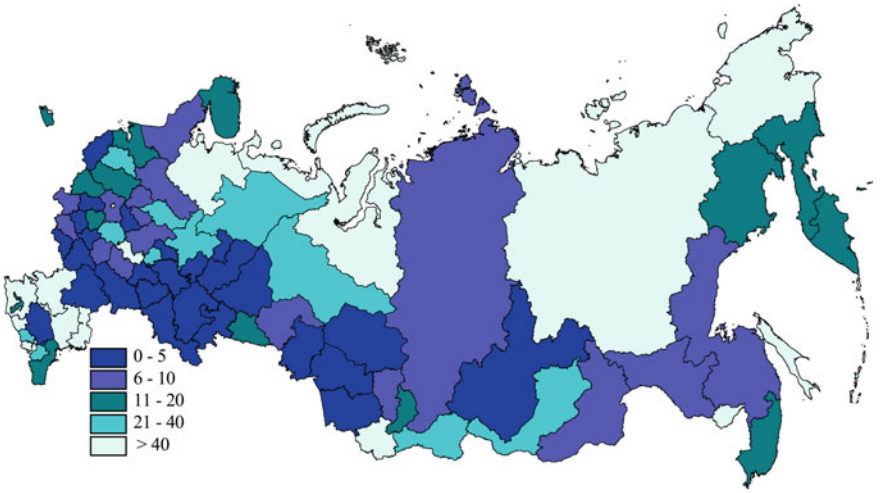

Fig. 1 Spatial heterogeneity of economic development of the Russian regions in the interregional similarity criteria of investment processes

meaning expresses the investment density and reflects the investment activity level of a territory.

The character of investment response on the volume changes of industrial and agricultural production underlies comparative analysis of Russian regions' socio-economic situations (Myadzelets and Cherkashin 2016). It reveals peculiarities of territorial development heterogeneity of the Russian Federation in the context of interregional similarity of investment processes (Fig. 1). All regions are divided into five groups. Similar investment regimes of economic activity are evidently represented for many Siberian regions. These are the Irkutsk, Novosibirsk, Tomsk, Omsk Regions and Altai Krai. The same situation is in some European regions of Russia, such as the Belgorod, Volgograd, Samara Regions and others. The Krasnoyarsk Krai situated nearby is not much different but can be assigned to the same economic type. In Fig. 1 the regions of the industrial belt of Russia are defined. The belt goes from the central regions of the European part of Russia through the Urals to the south of Siberia and the Far East. The Siberian regions situated along the belt form a united investment-territorial complex. The complex has common financial-economic and transport infrastructure with defined city agglomerations.

On the other hand, peculiarities of the spatial–temporal heterogeneity of investment processes and development characters of different territories can be reflected in terms of the calculated conditional age of economic development of different regions called conditional economic age (Myadzelets and Cherkashin 2017). It is characterized by comparative constancy of its value in time for every territory and depends on its development features and resource, innovation, investment and another potential. Obviously, Moscow and Saint-Petersburg have the highest calculated comparative

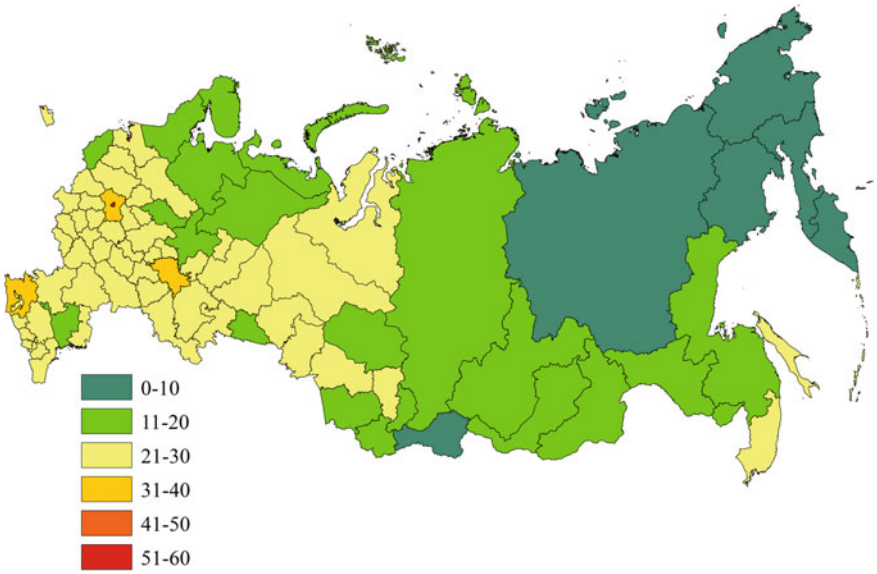

Fig. 2 Temporal heterogeneity of economic development of the Russian regions in the context of conditional age of territorial economic development (years)

values of this parameter—53 and 51 years respectively. The lowest values correspond to the northern areas, such as the Chukotka Autonomous Okrug (four years), Kamchatka Krai and the Republic of Sakha (Yakutia) (ten years) (Fig. 2). In general, the economy of the Siberian regions is young and characterized by low values of conditional economic age, for example, the Krasnoyarsk Krai—13 years, the Irkutsk Region—15, the Republic of Buryatia—13 years, and the Republic of Tyva—seven years. However, some Siberian regions with a long history of industrial development can be comparable to the central regions of Russia in type of economic development. It is reflected in characteristics of the calculated conditional age of the regional economy, for instance, the Kemerovo Region with the age of 27 years (see Figs. 1 and 2).

Generally, the size of the Siberian regions and their resource potential do not correspond to investment volumes in their economy. There are two main geographical groups (Fig. 2) are the northern, east-northern and far eastern regions with age from 6 to 20 years and the western Siberian and European regions of Russia with age from 21 to 35 years. Stable regional parameters of the conditional economic age (or the age of territorial development) are associated with the level of natural resource specialization of a particular region and its economic development potential.

Geohistorically, the Siberian regions form the territory having a traditional raw material orientation of the economy. Local production and the historically organized economic activity style freeze realization of investment and innovation processes. At the same time, they show a strong dependence on internal domestic factors including planned management which is now expressed in subsidies and various government

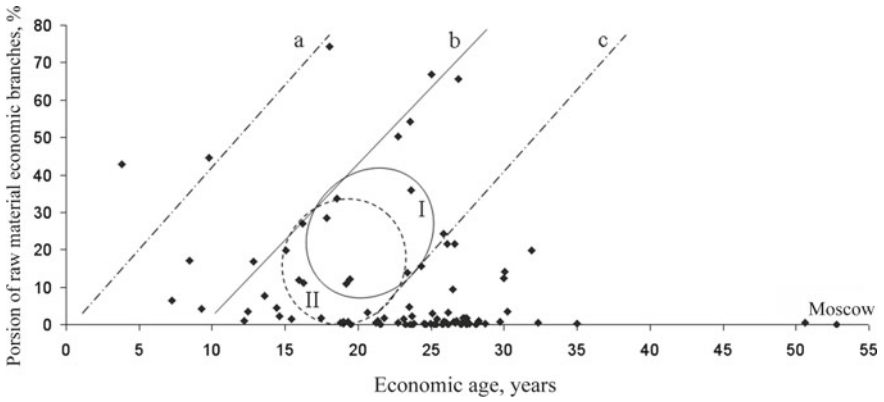

Fig. 3 Dependence of the share of the raw material economic branches on the calculated economic age for the Russian regions. Points—regional data, lines—boundaries of investment cycle *I–II,* and economic trends *a–c*, enveloping the cycles

support programs. The description of the evolution of the investment process can be clearly shown by the example of the development of investment cycles (Myadzelets and Cherkashin 2017) and comparison of the values of the conditional economic age with the proportions of raw materials, mining, and processing industry in different regions (Fig. 3).

There are two main trends. The first one is the decrease in the share of extractive industries in economic time, that is the nature of the transition from raw materials extraction to its deep processing. The second one is an increase in the share of extractive industry with an increase of conditional economic age. The latter one matches to raw-material economy. The Sakhalin, Tumen, Arkhangelsk, Irkutsk, Tomsk regions, Khanty-Mansi Autonomous Okrug, the Komi Republic, Krasnoyarsk and Kamchatka Krais are near the primary linear trend *b.* This trend characterizes the boundary between the extensive and intensive types of economic growth. In these regions investment is directed to the raw material industry in the sufficient size. There are low developed northern and several Siberian regions to the left side of this trend. These are the Republic of Sakha (Yakutia) and Tyva, Magadan Region, Nenets and Chukotka Autonomous Okrugs. The regions whose development is aimed at non-raw material development scenarios are situated to the right side from the trend *b.* The points show parts of the resource-investment cycles and are the place of tangent lines of the revealed trends in the graph. Different regions have different stages of these cycles. At the first stage, there is an increase in regional investments from external sources or income received due to the use of resources. They are spent on infrastructure and industrial development of the territory. This contributes to the accumulation of capital and the growth of the processing industry. The depletion of natural resources, the shortage and outflow of financial resources, the current changes in the external and domestic markets with a decrease in the production of primary industries and regional income, return the economy to a lower level of a raw

type, allowing the region to survive. Such behavior is typical for the economy of the Irkutsk Region, which has lost several high-tech processing industries over the past decades for various reasons.

The geographical medium is a material basis for territorial development, improving economic activity and the life quality of the population. The Siberian regions form the territory with a traditional raw material orientation of the economy in the geohistorical context, including underdeveloped peripheral areas. The emergence of internal social and technological innovations is directly connected with a self-development based on traditional lifestyle types and synchronous separation from these environmental-conditional established modes. There is a resource determinism for the Siberian regions, wich for a long time ensures the sustainable existence of the region, but not its sustainable development. Sustainable development requires constant investment from internal and external sources and a proper favorable investment medium that does not eliminate income. It is provided by higher meanings of the economic age of local production. This age satisfies the limit conditional age of economic development and infrastructure facilities of Siberia.

3 Ethnogeosystems of the Uimon Depression

Mountain depressions as the most convenient areas for human settlement and activity in the mountains are often characterized by poly-ethnicity, i.e., they are the territories of coexistence of various ethnic communities with their inherent farming features. The Russian Altai is characterized by the presence of depressions, which differ in morphometric parameters, conditions and factors of formation, methods of their development, current economic use, and the degree of resistance to anthropogenic factors.

The Uimon depression is located in the Central Altai physical-geographical province of the Altai Mountain Region, within the Ust-Koksinsky administrative region of the Republic of Altai (Atlas Altayskogo Kraya 1978). It is bounded from the north by the Terektinsky ridge, and from the south by the Katun ridge. The depression is located at an altitude of 900–1200 m above sea level, has a width of up to 10 km, and stretches along the Katun riverbed for more than 30 km. The depression is represented by erosion-accumulative gentle-ouval plains composed of loamy-sand-pebble deposits with the humus and meadow-humus soils prevalence, where forb-grass meadow steppes are formed (Lubenets and Rotanova (2017).

Favorable agro-climatic and soil conditions have contributed to the relatively rapid development and settlement of this territory. In 1798, the Old Believers founded the first permanent settlement—Verkh-Uimon. From the late 19th to early 20th centuries, 13 new settlements appeared both Russian and Altaian. There are 16 settlements within the basin, representing four types: Russian, Altaian, Old Believer and mixed (Fig. 4) (Kuchuganova 2000; List of Settlements of the Siberian Region 1928; Lubenets 2011a, b; Ustinova 1947).

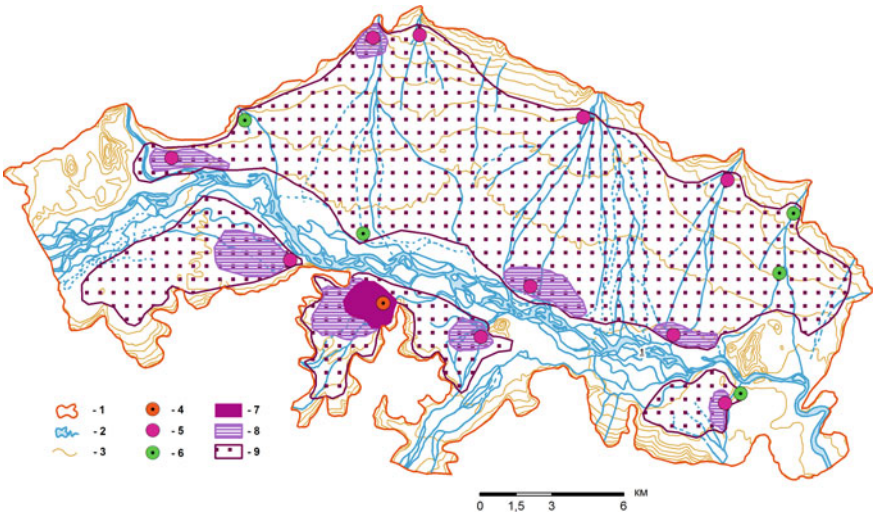

Fig. 4 Stages of development of the Uimon depression: 1—boundary of depression; 2—rivers; 3—isolines of the relief; the foundation of settlements: (4–6): 1—late 18th century, 2—19th century, 3—20th century; territory development (7–9): 4—late 18th century, 5—19th century, 6—20th to the beginning of 21st century

Based on the developments of Zavyalova (2004) and Klimov (2006) and taking into account the conditions of the location and ethnic peculiarities of the territory, the concept of mountain ethnogeosystem is accepted as the basic one. The basis of the ethno-economic impact on the environment is nature management.

The analysis of the state of ethnogeosystems is based on the study of a complex of integral indicators—natural potential, stability and variability of geosystems resulting from economic activities of individual ethnic communities. The assessment of the natural resource potential is carried out by clustering geosystems according to indicators separately for agriculture and grazing: shallow, low, medium and high. The variability of the geosystems is determined by calculating the ranking factor using the range of development, workload and degree of disturbance. It is determined for four categories: relatively constant, slightly modified, moderately modified and heavily modified (Lubenets 2010).

The nature management system of the Uimon depression is characterized by ethno-nature management and ethno-oriented farming (Lubenets 2011a). The development of traditional forms of economic management of ethnic communities is confined to their residence places, i.e., the corresponding settlements and slopes of nearby ridges (Table 1) (Bukhtueva 2006). The ethnogeosystems of the Russian and Altaian, Russian Old Believer and poly-ethnic groups have been adopted as part of the ethno-nature management system.

The impact of the elements of ethno-nature management on geosystems has territorial differences within the depression, depending on the living ethnic group. This is connected both with the natural resource potential, and approaches to its use,

Table 1 Types of ethno-nature management in the Uimon depression (%*)

Types of nature management	Settlements				
	Gorbunovo village	Terekhta village	Kurunda village	Multa village	Verkh-Uimon village
	Dominant ethnic (subethnic) groups				
	Russians	Russians, Altaians	Altaians	Russians, old Believers	Old Believers
Farming	53	99	18	100	83
Cattle breeding	59	75	94	19	67
Hunting	12	6	12	25	6
Fishing	35	6	0	19	6
Gathering of wild plants	29	6	6	19	6
Beekeeping	12	0	0	0	6

* *Based on the results of a questionnaire survey*

taking into account the ethno-ecological restrictions inherent in a certain ethnic group (subethnic group). Restrictions are manifested in the peculiarities of the settlement and economic use of the territory, in preserving traditional elements of the modern economic, cultural and household spheres (Lubenets 2011b).

The most stable is the ethnogeosystem of the Altai ethnos, which occupies the northern, most arid part of the depression. This area is characterized by an average natural resource potential for the development of agriculture and a relatively high potential for pasture cattle breeding (Bukhtueva 2006). The Altaians preserve traditions in the cultural and domestic sphere, lifestyle development, and in interaction with nature, the ethnos supports the traditional type of nature use—pasture cattle breeding. A significant share of the used geosystems is slightly or moderately modified (Fig. 5).

Representatives of the Russian Old Believers were the first to occupy the depression. They developed the most convenient and fertile lands. The natural resource potential of the geosystems used by the Russian Old Believers' subethnic community is estimated to be the highest. Due to traditions of nature-saving economy, geosystems developed by the representatives of subethnic groups are characterized by weak and moderate variability.

The ethnogeosystem of the Russian ethnic group in all spheres of life support is characterized by a low degree of preservation of traditional ethnic elements. The geosystems used in nature by the Russian ethnos are characterized by high natural resource potential for farming and grazing. In most cases, the change in geosystems is moderate, except for floodplains.

The appearance of collective and state farms in the 1930s, ploughing and development of virgin fallow lands in the 1950s played a unique role in transforming the nature management of the basin. Having adapted to the collective system of

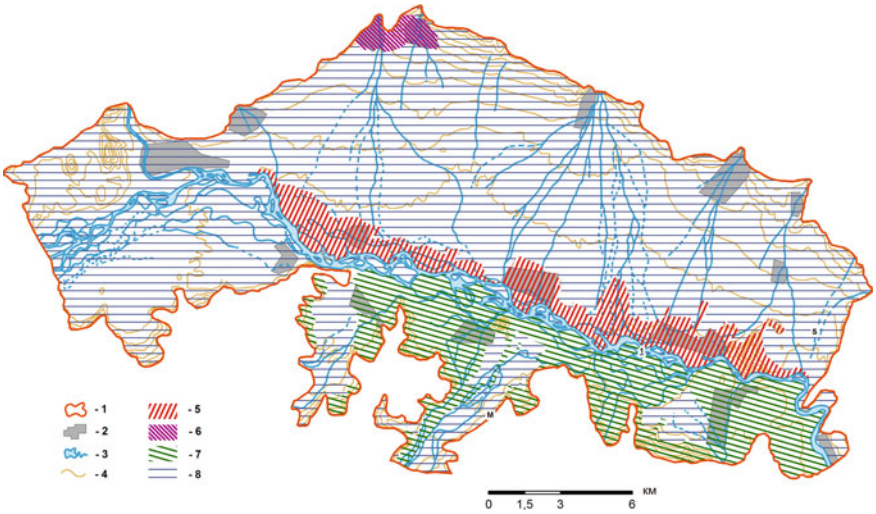

Fig. 5 Ethnogeosystems of the Uimon depression: 1—boundary of the depression; 2—settlements; 3—rivers; 4—isolines of the relief; ethnogeosystems (5–8): 5—Russian ethnic group, 6—Altai ethnic group, 7—Russian Old Believers, 8—poly-ethnic

farming, many residents were unable to use the traditional agriculture. This led to the predominance of the poly-ethnic ethnogeosystem in the area of development.

The current state of ethnosystems depends on the degree of preservation of ethno-economic traditions. Monoethnogeosystems, the Altai ethnos and the Russian Old Believers have preserved the nature-saving traditions for future generations of Siberia. In poly-ethnogeosystems, where different people live together, the traditional way of managing the economy is leveled. This is manifested in the form of a household plot and the set and number of nature management types.

The ethnogeosystem of the Russian ethnos within the depression took a priority position. It was characterized by the greatest transformation. This is due to the high adaptability of the representatives of Russian ethnos to changing external socio-economic conditions.

The Soviet collective farming caused significant destruction of the traditional elements of the economic management of ethnic groups and territorial predominance of the poly-ethnic ethnogeosystem within the basin.

4 Prospects for the Development of the Siberian Regions of Old and New Development

The study of changes in the socio-economic situation associated with innovation processes, the analysis of the stereotypical behavior of socio-economic systems,

the search for the causes of stagnation and ways to combine traditional types of the economy with the trends of new economic requirements, is critical now. The direction and intensity of the investment processes determine the rate of economic development.

The regions are at different stages of organizing the reproduction investment process. Their differentiation in terms of socio-economic development is determined by the difference in the volumes of intraregional investment. They depend on the investment climate, which consists of factors of geographic location, nature resources provision and the degree of the local infrastructure organization and effectiveness of administrative management. Due to the uneven development of the regions, they form a sequence of development stages. It can be shown using the evolutionary paradigm of investment activity (Yuzvovich et al. 2016). These issues are also considered in the evolutionary economics (Nelson and Winter 2002), when economic processes are considered spontaneous, open and irreversible, generated by the interaction of external and internal factors and manifested in a change in the economic structure and agents operating in it (Avtonomov et al. 2002).

The modern economic and political processes can lead to rapid natural and subsequent socio-economic changes in the corresponding regional situations. These aspects are reflected in papers on assessing innovative processes of regional development using quantitative and qualitative methods, analyzing their role in evolving social processes (Zharov 2017). Also, there are some publications where the special attention is paid to the problems and development of monotowns (Didyk and Ryabova 2014) and urbanized centers (Makhrova et al. 2016; Nefedova and Treivish 2010; Vorobiev et al. 2016), traditionally opposed in socio-economic research as depressive (crisis) and innovation poles.

In general, there are two main approaches to the formation of the theory of innovation. These are classical and alternative directions, presented by different schools (Varenik 2013). The classical theory connects the formation of the innovations with their economic and scientific-historical content. Alternative theories explain innovation by analogy with other spheres of life, for example, with biological communities (Pilinkiené and Maĉiulis 2014). The theory of economic growth is considered neoclassical (Barro and Sala-i-Martin 2004; Lucas 1988), in which mathematical models and methods of data analysis are widely used (Sala-i-Martin et al. 2004). In particular, the phenomenon of convergence of countries and regions is described, due to which emerging countries grow economically faster than rich ones (Barro and Sala-i-Martin 1992). Lucas (1988) developed a model that assumes the individual accumulation of physical and human capital. It is believed that the main drawback of his model is that it does not explain the differentiation of growth rates between countries (Trofimov 2000). This is the main mistake of many modern approaches. They consider the economic sphere without considering their fundamental basis of development, such as the geographical environment and its transformations (Golts 2002).

The approach considers the innovation process and its economic participants as a system with a unique environment of regions (Nesterov 2006; Raikhlina 2017). In this case, the territory represents the unity of the innovation system and its environment

(Wessner 2005) and forms the so-called innovation ecosystem (Nikonorova 2018) which is a favorable environment formed by the direct participants (subjects) of the process and in which their interaction takes place, aimed at creating and developing innovations.

The criterion for innovation effectiveness is the quality and efficiency of produced and consumed products. Then, there is a problem with the quantitative assessment of these indicators. Various evaluation functions are proposed, but necessarily concerning quality and efficiency indicators (Azgaldov and Kostin 2008; Barro and Sala-i-Martin 2004; Koritsky 2013). Their weakness is that they suggest absolute values. Nevertheless, we need to find relative meanings, which are comparative and correlated with the current world or state level.

The special calculated indices of regional economic age and economic efficiency of the regional economy were used to classify the regions by the nature of economic behavior (Myadzelets and Cherkashin 2016, 2017). Additionally, the human development index (data for 2015) was considered (Report on Human Development in the Russian Federation for 2017(2017). It comprehensively reflects the features of the quality and standard of living, human potential, education and other social characteristics that affect the formation of an innovative environment in the region. Territories with stereotyped, stereotypical cyclical and innovative economic models of behavior were identified based on the associations between the considered indicators (Fig. 6).

The innovation type is a classic example of the spiral evolutionary development of the economy. Such territorial systems are characterized by high economic age index (see Sect. 2), medium or high values of the indices of the investment efficiency and the quality of life of the population. Such regions gravitate towards the country's central part and have close logistic and industrial links with the capital.

Fig. 6 Classification of the Russian regions by the type of economic behavior. Behavior types: 1—innovative; 2—transitional (stereotyped cyclic); 3—stereotyped (raw); 4—stagnant

There are technological industries, information, scientific and educational centers in these regions. All these factors show the high potential for self-organization of these socio-economic systems.

Transitional behavior is typical for old-developed regions with average or above-average values of the economic age index. Usually, they gravitate towards Russia's central part, have a long history of assimilation and industrial development. The leading resource and investment cycle of these regions has finished, but their economics has not transitioned to the next innovation investment level for various reasons. These territories do not have such rich raw material base, which would allow them to be developed within the previous resource cycle. Therefore why they are forced to play catch-up and increase their lagging, stereotyped behavior and stagnation of the economic processes. These features also harm the social sphere. It should be noted that in this group the time of the region development is essential. For example, although the Novosibirsk, Omsk and Tomsk regions belong to this group, they are actually in the final stage of their previous cycle, at the bifurcation point and have a high potential to complete their cycle and transition to the next innovative type of economic development.

The regions of stereotyped behavior usually have a rich natural resource base and many sectors of the economy. They often have a sufficiently high intellectual potential, developed infrastructure, good connections with the center, but this is the feature which complicates the technological development of the economy of these territories and the transition from raw materials specialization of the industry to manufacturing. Therefore, they can also be conditionally called the regions with a stereotypical raw material type of behavior. These territories are also subsidized, characterized by low indicators of life quality. One of the stereotyped regions' features is a strong difference between the regional center development level and the rest of the region territory in favor of the center. It should be noted that this trend also characterizes the Russian economy as a whole.

In contrast to innovative ones, the regions with stagnating economic behavior types belong, as a rule, to the far periphery, have low investment attractiveness and efficiency, but are deeply subsidized. They cannot be actively engaged in resource investment and production cycles and establish stable economic ties with other regions because of the poor resource base.

In general, the Siberian regions do not have a single linear behavior and are divided into two main groups. In general, the eastern part has a trend of the raw stereotypical type of the economic behavior (Irkutsk region, Krasnoyarsk, Altai Krai and the Republic of Khakassia), and the western one corresponds to the transitional type (Novosibirsk, Tomsk, Kemerovo and Omsk regions). Traditionally characterized as a deep periphery with a low population life quality, low investment efficiency, a poor resource base the Republic of Tyva and the Republic of Altai belong to the regions with a stagnating economy.

5 Conclusion

During the restructuring and transformation of the Siberia regions' economy, the primary principle of innovative transitions to sustainable development should be implemented—the irreversibility of the process and the acceleration of development, the result of such upgrading is the transition to another level of sustainable development. The question is why some regions do not naturally move to the next stage of economic development, i.e. from the resource to an investment, and then to an innovative one. Why is there no qualitative restructuring of the regional economy in order to make an innovative transition? It is assumed that the main reason for the stable stereotypical behavior which does not allow the Siberian regions to get out of the established cycle ("traditional way") and move to an innovative type of development is the properties of the geohistorical environment of the regions, the features of its exploration and development, an extended stay in one state and subsidized support. These factors slow down innovative internal activity. Now, despite several objective and subjective circumstances which include historically later inclusion in economic activity, poorly organized infrastructure, the state equalization economic policy and strengthen support for depressed territories, some Siberian raw economics regions of new development are growing faster than the old industrial areas that determine the typical geohistorical character of inequal, nonlinear and indefinite development trends for Siberia in the future.

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The Development of Siberia Based on the Cultures of Indigenous People and Newcomers

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Abstract Siberia is an integral system, in which many factors create a unique natural and cultural environment. In this chapter, the Siberian region is considered as a single socio-ecological system. The focus on the natural resource management practices makes it possible to find standard features in indigenous and other peoples' cultural models, despite differences in the natural conditions of their living, worldviews, and value orientations. The study's aim is the generalization and typological analysis of

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V. N. Bocharnikov and A. N. Steblyanskaya (eds.), *Humans in the Siberian Landscapes*, Springer Geography, https://doi.org/10.1007/978-3-030-90061-8_17

physical, spiritual, and mental ways of exploring the space by peoples of Siberia. The study's basis consists of modern theoretical concepts, field expeditionary research, and the implementation of applied academic projects of the chapter's authors. The interrelation of natural landscapes and forms of traditional natural resource management, auxiliary crafts and household traditions, living environment, and social structure; mythological, ethnic, symbolic images of spaces, and spiritual culture of peoples of the Siberian region are investigated. The geography of research covers the territory of Gorny Altai, Irkutsk Oblast, Transbaikalia, and Yakutia. The general research field and working methodology are important: adaptation to the natural environment, attitude to the territory of residence, as well as analysis of ethnographic, linguistic, folklore, and musical materials. Among such integrative scientific tasks is studying the ethnocultural landscape of the Turks, Evenks, and Old Believers' people. This kind of ethnocultural landscape is being formed under various natural zones, spiritual models, nature management practices, and a special living environment.

Keywords Siberia' people · Culture · Ethnocultural landscape · Local identity · Sacred landscape · Indigenous ethnic groups · The Evenks · The people of Sakha · Old believers · Russian · Transformation · Ethnocultural adaptation · Music

1 Introduction

The development of the Siberian region is ambiguous. There were many versions, many ways to assemble a disparate picture into a single story. The authors want to draw reader's attention to the fact that the authors use a certain point of reference, based on which they collect the narrative of the development of the region. The idea that unites other theories is the paradigm. In the history of the development of Siberia we can distinguish three of these. They are based on the integration feature. This includes the culture, economy, and military power. We do not seek to categorize the scenario of the development of Siberia as one or the other. Instead, it is about identifying facets of a shared integrated history. Special attention is paid to the cultural component. In Siberia's development, the military aspect is important, but it is wrong to understand Siberia as a colony that the government seized by force. The economic factor is also essential. It was often more profitable to cooperate with Russia than with China or Mongolia, as we see in the voluntary annexation of the southern Altai. It was often more profitable for the scattered Siberian regions, to cooperate with Russia than with China or Mongolia. As an example, the voluntary accession of the southern Altai. Regions fit into the financial exchange. Communication with the center became vital. We insist on the thesis that Siberia's cultural development is no less important than the first two approaches. Moreover, it more reliably establishes a harmonious connection between the whole and the part. Through culture, Siberia began to gravitate toward the European part of Russia. Since the policy of the settlers, this was not just aggressive. Learning languages, building schools, and infrastructure have given the region a lot, but it has also taken away a lot. A kind of micro-globalization has erased some

features of the national culture. It helped to preserve the main features. We should not forget that not only the military but also civilians were relocated. By their own will or compulsion, they brought their personal views to Siberia and built a relationship with it, as they could. The sad side of Siberia as a place of exile led to the fact that it was the most passionate representatives of the upper class of society. They explored this region, put it in order, being at a distance. They could have been a little bolder in tsarist and even Stalinist times, because, as you know, they could not be sent further than Siberia. Culture, as a form of mastering reality, is directed at its opposition—nature. The settlers learn the cultural dispositions of the aborigines. There are the most profitable moves and saving reactions of human nature to the harsh conditions of Siberia. Therefore, the story of the history of Siberia would be incomplete without the culture of indigenous peoples. It is extremely similar in the basic prerequisites for the peaceful coexistence of man and nature, man and man, and speaks of their interdependent existence, which the inhabitants of the urban world forget.

The territory of Siberia is a traditional place of residence for various peoples. Among the pressing problems of our time, there are peculiarities of the development of Siberia by individual ethnic communities, adaptation mechanisms, ethnocultural ties, and transformation processes. For a long time, there have been changes in the living environment of the Siberian peoples. For example, during the industrial development of the Siberian region's natural resources, indigenous peoples faced the threat of the absorption of their original culture by anthropogenic civilization. From the point of view of the dynamics of culture, its development is interpreted as a "bifurcation leap" in the "aggravation of the situation" mode: the techniques and technologies introduced by civilization facilitate the life and forms of economic activity, but destroy the traditional foundations of the culture of indigenous peoples, plunging them into the ultimate conditions of life and spiritual choice. In search of an alternative environmentally friendly and human-sized path of development of society, interest in a traditional culture based on adaptation to the environment, contributing to the preservation of the generic qualities of man, has intensified. The complex integrative tasks of modern science have been heard today in studies of ethnolocal variants of the Siberia's culture of various scales—from global typological to private fates of individual ethnic groups, specific processes, or elements. In revealing urgent scientific issues, they focus on building holistic models that require deep integration of heterogeneous data and the convergence of distant scientific areas. Such studies require applying the principle of complementarity, a systematic approach, and humanitarian cultural methods that provide completeness and substantial volume in the study of complex problems. An interdisciplinary research aimed at studying adaptation mechanisms and the formation of local varieties of cultures of indigenous peoples of Siberia is one of the urgent problems of science. This region plays a significant role in the further sustainable development of the country as a whole, due to, on the one hand, powerful natural resources and, on the other hand, to conservation in their space of those forms of traditional ethnic culture that have a high level of adaptability to the natural and climatic conditions and the formed cultures and-ecological balance.

2 Siberia Image in Works of Russian Writers

P. Ya. Chaadayev wrote in "The first philosophic letter" (1836) that "We do not belong neither to the West, nor to the East wrote, and we have no traditions either that, or another". F.M. Dostoyevsky, being a culturologist, wrote about unity of Europe and Russia but as a religious philosopher he insisted that Europe needs the help of orthodox Russia: "Our world responsiveness helps to understand and in the necessary degree to accept any national outlook, to show a possibility of synthesis, and thanks to it open a way to brotherhood and a universal unification for the people" (Dostoyevsky 1972—1990, 148).

V. S. Solovyov claimed that Russian people undertake a mission to serve other people. His follower E. N. Trubetskoy offered an idea of "national asceticism". According to him, "True Christ connects all people around himself in some thoughts and in one spirit" (Trubetskoy1995, 309). He suggested finding such a form of unity in which there could be something special. Investigating the relations of cultures, N. Y. Danilevsky has come to the conclusion that they are not static, but dynamic (Danilevsky1991, 250). Based on this model, the Eurasians developed a thesis about a unique way of Russia, but refused pan-slavism. L. N. Gumilev formulated the concept of "new eurasianism". The basis (Gumilev1989) of his argument became Russia's geopolitical position.

For a long time, the image of the East was Christian, colonialist, and identification. The East was characterized as the rival of Europe as Another which is used for the understanding of own essence by the principle of contrast. According to E. Said, "Without orientalism research as a discourse, it is impossible to understand the systematic discipline exclusively using which the European culture could rule the East—even to make it—in a political, sociological, ideological, military and scientific way and even imaginatively after the epoch of Enlightenment" (Said 2016,10). The image of the East imposed by orientalism is aimed at the consciousness of its inhabitants who were accustomed to be looked at themselves with eyes of Europeans.

In this regard, there is a question from what position the Russian writers described the life and customs of the Siberian people. The attitude of the Russians to the Siberian natives was peaceful.

In Frigate "Pallada", I. A. Goncharov very patriotically described Siberia and the Far East's development. The writer participated in around-the-world travel and visited the English colonies. He knew what to compare. He claimed that the Russian colonization was not capitalist, but namely civilized, based on a self-sacrificing feat of the Russian immigrants. As for officials and the military, most of them remembered capital life and dreamed of returning home (Goncharov 1978). A.P. Chekhov also noted the feature of the Russian colonization. Unlike the British, using the local population as cheap labor in the development of Sakhalin, the main burdens were born by the Russian immigrants and the exiled, and this differed in the Russian colonization from European one (Chekhov1985, 50).

Huge desert territories were saved from overpopulation, but they had turned out to be a brake of intensive economic management ways. First of all, it was shown in

the preservation of economically unproductive forced labor. The prison and penal servitude in Russia had developed on the western sample described by M. Foucault in "Supervision and punishment". They got in inheritance to the new power, which used them as disciplinary and economical machines. The appeal to "Notes from the dead house", written by F. M. Dostoyevsky, helps to better understand GULAG's structure and role in the works of Solzhenitsyn and Shalamov. In "Notes", Dostoyevsky acts as an anthropologist of prison life (Dostoyevsky1972–1990). To begin with, he reconstructs typology of prisoners irrespective of their national identity. The prison erases ethnic and cultural originality and bares an essence of human nature, but does not promote the manifestation of high human qualities. Nevertheless, under these conditions, the heightened sense of justice remains a deep archetype of the Russian consciousness. Dostoyevsky noted that security guards and prisoners are guided by higher values, in emergency situations than duty regulations. The beings who lost human shape, find an ability to feel, express, and perceive the supreme values thanks to which the person remains in camp life. "Notes from the dead house" help to understand the Russian settlers's mentality to whom racial superiority was alien, and, vice versa, the sympathy and ability to help other people, who have found themselves in the conditions of an emergency situation, are peculiar to them.

How to keep and whether the immigrants, exiled, prisoners, people who left the homeland, and are forced to exist in unusual conditions keep identity? Is "the world responsiveness" described by Dostoyevsky manifested in them? In "The fascinated wanderer", N. S. Leskov described how the Russian person keeps the identity in the Tatar captivity (Leskov 1982). He is forced to lead the imposed life but does not accept other beliefs. It was that "canopy", an immune shield, preserving against loss of oneself during the alien's development. The same role plays the Russian literature which is sometimes unfairly called an imperial one, the role of a peculiar membrane, which does not protect from the alien, like "iron curtain", but, on the contrary, promotes its adoption and by its means strengthening of own national organism. The works of F. Abramov, V. Lipatov, and other Soviet writers also carried out this mission.

Summing up the results, despite collectivization, industrialization, and globalization, the historical type of the Russian person developed in the course of Siberia exploration has remained up to nowadays, and it inspires hope for maintaining the integrity of Russia.

3 Traditional Nature Management of Local Old Believer Communities on the Trans-Baikal Territory

Old Believer local communities resettled from the European part of the Russian Empire during the reign of Catherine II have lived in the south of the Republic of Buryatia and on the Trans-Baikal Territory for two and a half centuries. They were exiled to the Trans-Baikal Territory by families; therefore, the Old Believers were

called “Semeiskie” (according to one version “family members”). Residence territories of The Semeiskie—the Chikoy, Khilok, and Selenga basins are part of the Baikal natural territory’s buffer zone. In tsarist times, this territory as an administrative unit was the Verkhneudinsky County, today it is the Bichursky, Mukhorshibirsky, and Tarbagatay districts of the Republic of Buryatia, as well as the Krasnochikoysky district of the Trans-Baikal Territory.

The economic adaptation of the Old Believers who migrated to the Trans-Baikal Territory was expressed in the formation of specific life-support systems that differ from those of the Russian old-timed and indigenous population and are largely controlled and regulated by religious factors. For a long time, the Trans-Baikal Old Believers (Semeiskie) preserved the archaic features of the cultural and industrial complex; their economic calendar; and their daily routine obeyed religious canons. The religious beliefs of the Old Believers were not formal; the awareness of working on the land, accompanied by daily and regular prayers, contributed to forming a strong sense of community identity, self-discipline, and economic prosperity.

The economy and social processes were in a complex and ambiguous relationship: the desire to preserve the traditional way of life in a new natural and cultural area contributed to the development of capitalist relations in Siberian village (Bolonev 1994) and became a significant step in the development of trade and industry.

To this day, the Semeiskie retains religious, folklore, cultural, and everyday traditions, and the appearance typical of the Great Russians (Talko-Grincevich 1898). Under the conditions of mountain taiga and steppe landscapes, a non-ethnic environment, and transboundary position, the Semeiskie formed traditional life-support systems, which underwent cultural and political transformations during the twentieth century, but retained their uniqueness and originality. In parallel, with the development of conventional management, nature ethics, combining a careful attitude to nature and a system of spiritual values, was developed in local communities of the Semeiskie. Traditional nature management of the Semeiskie is a historically established, long-term, and environmentally balanced use of resources, which implies the possibility of their restoration. It determines the cultural image of the family and their identity. The study of Siberian agricultural systems, including life-support systems the Semeiskie, is of great scientific importance for preserving traditional knowledge and experience, which will allow future planning of agroecological development of the region in the future (Ragulina et al. 2018).

In contrast to the original places where the Old Believers lived in the warm and humid temperate climate of the Eastern European plain, the Trans-Baikal Territory nature presents a significant contrast. The diversity is so great that there is no consensus in Russian geography to which of the largest taxonomic physical and geographical zoning units it should be attributed. According to Mikhailov (1961), this is natural country—the mountains of the south of Siberia. According to Sochava (1978), this is Baikal-Dzhugdzhur region (within the country). Detailed studies of the types of the terrain of G. M. Tomilov, zoning of Preobrazhensky et al. (1965) gave grounds to single out the area of settlement of the Old Believers in two provinces of a single country—the Baikal Highlands: Selenga forest-steppe middle mountains, and partially—the Khentei-Chikoy southern and mid-taiga highlands.

Orographically, the territory is represented by a giant depression between the Khentei-Chikoysky highlands, the Khamar-Daban, and Ulan-Burgas ranges. There are many shallow to some extent closed small basins the bottoms of which lie at absolute altitudes of 500–700 m. Agricultural development is favored by soils—chestnut and black soil under cereal and forb-grass steppes, gray forest in forest-steppes. However, a sharply continental climate with large differences in temperature and humidity cannot ensure the stability of crops and livestock feed resources. Open to the south and protected by ridges from the west, intermountain depressions are poor in precipitation, the snow cover is low, and in dry years it is absent in some places. This allows the indigenous population to use year-round animal grazing.

A limitation for traditional European agriculture was a short frost-free period—from 2 to 4 months and long winter—up to 6.5 months. The amount of the heat of the vegetation period (above + 10°) on the Trans-Baikal Territory is 1500–1900°, and the amount of precipitation is 200–350 mm per year, which is 2, 3, or more times less than in the areas of the former residence of the Old Believers (Rakovskaya 2013).

Low soil temperatures with a huge influx of solar heat in May–June were a surprise for new settlers. They encountered a previously unknown phenomenon—eternal and prolonged seasonal permafrost lying at different levels, the surface temperature of which remained unchanged from −2 to −7 °C. In addition to the negative cooling effect on the upper soil horizons, permafrost also served as a positive factor as an additional moisture source for plants.

The water resources of the basins of the Selenga middle mountains are insufficient. Small rivers and streams with the intermittent flow, lakes with carbonate salinity. Drainless areas with saline soils and salt marshes are common. New settlements had to gravitate to the valleys of large rivers, their basins with constant watercourses.

Dry pine forests with an abundance of mushrooms and cranberries are widely distributed on the bottoms of depressions among dry steppes on low slopes. In floodplains and on the lower terraces—riverine high-grassy meadows. The slopes of the mountains are covered with pine and pine-larch forests; the shadow surfaces are covered with larch taiga. At altitudes of 1400–1600 m, larch-cedar and cedar taiga are the main areas for the extraction of taiga fauna and pine nuts' fishing (Malih and Pak 2019).

The variety of natural conditions and resources of the Trans-Baikal Territory required the flexibility of adaptive mechanisms and opened up new possibilities in expanding the life-support strategies of the Old Believers.

The largest reserves of energy resources in the country, deposits of high-value ores and minerals are known on this territory. In the eighteenth century, settlers found unlimited and accessible building materials necessary for arranging in a new place: building sands, refractory clay, limestone, kaolin, granite, tuff, perlite, and roofing slates. Woodlands framed by depressions are sources of business wood, hunting, and commercial animals. Among them are sable, Transbaikal black-tailed squirrel ("blue variety"), kolinsky, and many others. Of the ungulates—Manchurian deer, roe deer, musk deer, and elk. Numerous ordinary steppe and forest-steppe inhabitants have long been the subject of hunting—foxes and wolves. Among waterfowl and upland fowl—geese, ducks, hazel grouse, partridge, and capercaillie. There are large stocks

of fish in rivers and lakes. The Selenga river and its large tributaries are spawning grounds for the Baikal fish.

The natural environment led to the emergence of two types of the life-support systems for the Semeiskie. The first type is predominantly agricultural, formed in the steppe landscapes of the Selenginsky basin. The second is commercial and agricultural, localized in the Chikoy river basin and on the slopes of the Malkhansky, Burkalsky, Atsinsky, and other small ridges of the Khentei-Chikoy highlands. Following the basin principle (Korytny 2017), the Old Believers of the Trans-Baikal Territory can be divided into two groups according to the character of the nature use—the Selenga Semeiskie and the Chikoy Semeiskie.

In the traditional nature management of the Semeiskie, agriculture is represented by an interconnected complex of industries, including three main types—husbandry, focused on the production of cereals, gardening, which supplied the population with fresh vegetables, cultivation of crops for the production of fabrics (hemp, on the smallest scale of flax). This triad of activities was initially formed under the influence of natural and social conditions: the resource base and climatic factors favored crop production, and the lack of well-established market relations, a small opportunity to purchase food due to remoteness from trade routes and fairs, as well as the high symbolic value of the farmer's labor and the tendency to isolation from contacts with "antichrist" goods contributed to the sustainability of traditional agriculture. At the same time, the social and political transformations of the twentieth century significantly changed its structure and functions as well as its place in life support.

Agricultural resources on the Trans-Baikal Territory are limited by the terrain and lack of moisture, so arable lands have mostly focal character, in contrast to the East European plain. The Old Believers significantly expanded their area. Any plowing plots along river terraces, gentle slopes, piedmont plumes were introduced into agricultural circulation. Through trial and error, in relation to local conditions and microclimate, a land-use system and a new Siberian agricultural calendar were created (Bolonev 1978).

The Old Believers had a two-field system in agriculture—one year the land was plowed and cereals were grown on it, and the next year the soil "rested" under fallow. The two-field regime of land cultivation could last for 10–15 years on a certain territory, depending on its quality, then the land was left as a deposit for several years, after which it was re-exploited (Buraeva 2005). In the case of a two-field system of field cultivation, spring crops prevailed. A three-field farming system appeared (Gurova 2001); however, it never replaced the two-field system. Arable land was fertilized with manure and irrigated, creating small channels along the perimeter of the field. Manure was exported to the fields during winter and early spring. It should be noted that winter crops could be grown only in the Verkhneudinsky County, since they did not freeze there, as it happened due to the lack of snow in the central and northern parts of the Trans-Baikal Territory.

The Russian government in pre-revolutionary times sought to support all the peasants of Siberia, including the Old Believers, in the production of bread. It supplied the peasants with agricultural implements—sickles, plowshares, and scythes. The need for bread in the Siberian region and the Far East was palpable due to the arrival

of new settlers, city dwellers, the commercial and factory population, distilleries, military garrisons, and gold workers mines (Buraeva 2005). From their settlement on the Trans-Baikal Territory, the Semeiskie provided bread to both the Trans-Baikal Territory and the Far East.

Gardening has been and remains an essential activity for every family. In this type of economic activity, the Old Believers always succeeded in comparison with the rest of the Trans-Baikal Territory inhabitants. Most of the gardening was done by women. For vegetable gardens, a place was assigned behind each house; the vegetable gardens area could be different up to 0.5 hectares. At the end of the nineteenth century, approximately 5.8% of all cultivated land was occupied under vegetable gardens in Verkhneudinsky County (Krukov 1986).

Turnips, rutabaga, carrots, cabbage, onions, garlic, and some other vegetables were planted. Potatoes became a relatively new crop in the gardening of the old believers of the Trans-Baikal Territory. It was introduced into cultivation among the rural population by administrative means in the first half of the nineteenth century. The cultivation of potatoes did not reach commercial volumes and was grown up exclusively for self-sufficiency. The Old Believers always felt a great need for vegetables, since they strictly observed all religious fasts.

Livestock breeding, typical for the local Buryat population, did not become the main activity for the Semeiskie, however, it played an important role in life support. Agriculture is unthinkable without horses, and meat and dairy products have historically been included in the diet of the Russian population. The livestock complex is represented by a combination of traditional livestock breeding—cattle and small cattle breeding, as well as horses, with deer husbandry—a practice that has arisen under the influence of market conditions and demand for Manchurian deer antlers in Asian countries.

An interesting fact is that in the practice of animal husbandry the Old Believers adopted a lot from the Buryats, in particular, they borrowed differentiated cattle breeding vocabulary, the names of animals in relation to them as producers, the words that define the characteristics of domestic animals, the names of horses by suit (Buraeva 2005).

Due to the large number of cows and horses in farms of the Semeiskie, haymaking among other agricultural work has always been given a lot of time and effort along with husbandry. Grasslands occupied quite vast spaces, and they are still divided between the inhabitants of villages into shares. At the beginning of the twentieth century, the Semeiskie felt a great need for hayfields as they had not enough land, so often the Semeiskie rented it from the Buryats, who did not feel a lack of hayfields (see Fig. 1).

The Semeiskie is characterized by a sacralized concept of farm animals, especially horses and cows. These animals have always had symbolic significance among the ancient Slavs, which is still preserved in the Semeiskie. For example, the Semeiskie do not eat horse meat (Kozlova 2019).

In the nineteenth century, Manchurian deer husbandry or antler reindeer herding became widespread among the Old Believers of the Trans-Baikal Territory living in the Chikoy River valley (Potanin 1889). This activity the Semeiskie took over

Fig. 1 Hayfield. Fomichevo old Blievers village. *Source* Kozlova field materials (Kozlova, 2014)

from their Old Believer relatives living in the Altai. In the Altai, this industry is still developing, while on the considered territory the last Manchurian deer farm closed in 1949.

The occupation of auxiliary crafts by the Old Believers for two centuries had a subsidiary character and did not distract them from cultivating the land. One family could engage in several crafts, alternating them over the seasons. For example, in winter they were actively engaged in carriage at the Kyakhtinsky and adjacent tracts (Kationov 2006), and in summer some family members could be employed in the mines. Wage work for gold mining, hauling, and other types of employment was in many cases relevant, because by the middle of the twentieth century the population had grown, and the problem of arable land shortage appeared (Kozlova 2014). Fisheries and small-scale household crafts—blacksmithing, cooperage, carpentry, bee keeping—became widespread.

Large areas on the territories of modern Krasnochikoysky and Bichursky districts are characterized by forest cover (over 80%) (Belov 2015). Most of it is occupied by the cedar taiga, so the walnut industry is still one of the most popular. In the taiga, the Semeiskie hunted, gathered berries, mushrooms, and medicinal herbs. The Chikoy Semeiskie were less involved in carriage than the Selenga ones, but they were hired more often for mining and gold exploration, since the deposits are located in hard-to-reach mountain taiga regions of the Chikoy river basin that they know. During the twentieth century, the life support systems of the Semeiskie

underwent significant transformations related to collectivization, state anti-religious policies, agricultural reforms, and the period of transition of the Soviet state to a market economy. People lost many of the auxiliary fisheries. However, agriculture in the Soviet period reached its greatest extent (Kozlova 2014). In the perestroika era, this type of activity fell into decay. The events of the twentieth century were reflected in the cultural and religious sphere of the Semeiskie. People forgot some ceremonial traditions. However, among the Semeiskie, there have always been and still are keepers of antiquity. Nowadays, there is a revival of religiosity, a return to the roots of culture. The Old Believers mastered the natural resources and landscapes of the Trans-Baikal Territory. In the sparsely populated part of Siberia, agricultural lands, settlements, and roads appeared. The Old Believers preserved their cultural and religious traditions, expressed a respectful attitude to the land, and formed new ethical rules for taiga nature management, which is reflected in the careful attitude to the resources of the taiga at the present time.

One of the most important natural resources of the Trans-Baikal Territory for the Old Believers-new settlers was the freedom of space and the freedom of man, a personality with his activity and spiritual attitudes in this space. Along with the lack of administrative-political and confessional pressure, freedom of space pushed the life boundaries of an individual, his family, and the local community as a whole. The old believers of the western regions of the Russian Empire put down strong roots on the Trans-Baikal Territory. Until now, they have primarily preserved the identity of Russian culture, which had gone 300 years ago, and have become an integral part of the modern population of the region.

The Old Believer communities in the cultural space of the Trans-Baikal Territory became not only an example of farming but also the standard of prosperous life; their moral standards, solidarity and mutual support, the desire for literacy, physical, and moral purity contributed to the spiritual and mental specificity of the region.

The availability of rich life-supporting resources on the Trans-Baikal Territory made it possible to realize the Old Believers main value—labor as a spiritual service.

4 The Russians in the Altai Mountains' Natural Landscapes: Development of the Territories and Ethnocultural Identity

Judging by materials on Altai' mountains, the authors study the interconnection of new territories settlement processes and features of Russian ethnocultural identity. The research analyses data on people who represent that part of the population who are called long-term residents of Gorny Altai, Old Believers of the Uymon Valley and Orthodox believers among the people, who came to live on the territory during the Stolypin migration.

The ethnocultural adaptation of the Russian old-timers and new settlers to Altai mountains landscapes included agricultural cultivation of the territories, and some

process of worldviews adaptation to the new space. There is a start of the development of Russian toponyms. The Uymon Old Believers' world vision showed that they treated the territories where they lived as sacred.

The Uymon Old Believers had managed to found isolated settlements in the landscape' conditions with mountains and valleys and to organize a relatively stable confessional ethnographic group that still exists up to now. The most important constituent of the group' ethnocultural identity is the beliefs that are connected with spiritualization of the place of residence, Belukha Mount and the Katun River. The Stolypin migrants, who come to cultivate this region with mountains and taiga, built small villages. The population in such settlements was highly heterogeneous, if we take the migrants' original provinces' parameter. Small sizes of the settlements didn't let the new settlers from different provinces organize their own parts in these settlements, or "ends" as they called them. The migrants were consciously prepared for the assimilation and the development of new local communities of the region.

Thus, the cultivation by the Russian ethnos of various natural landscapes of Gorny Altai could have facilitated both forming and longer preserving the local ethnocultural identity the way it happened to the Uymon Old Believers' group. The cultivation process also led to the leveling off among the cultural differences, what is seen in the Stolypin migrants.

Questions of the interrelation of natural landscape characteristics of an ethnocultural identity are believed to be of much relevance, when seen as a phenomenon that reflects nature in culture. Some researchers study sacred places as markers of identity (Vinokurova 2017; Terebikhin and Melyutina 2014). Regarding Eastern Slavic population of Siberia, the investigation of such interrelations would reveal the influence of adaptation of an ethnos to new natural conditions on the state of their ethnocultural identity. Regarding their observations of the Belorus migrants in Siberia, R. Y. Fyodorov and A. A. Bogordaeva propose models of correlation of principles of the settlement and of the ethnocultural identity (Fyodorov and Bogordaeva 2014). According to E. F. Fursova, one of the forms to express the Russians' ethnocultural identity in Siberia is the system of their preferences of how their groups should settle. One of the essential factors, that cause the forming identity on the group's level, is the factor that relates to the culture and landscape, i.e., it concerns the spiritual connection with nature and with landscape (Fursova 2019). In this research, the authors analyze the connection of the territory cultivation concerning the development of agricultural and world vision forms and the ethnocultural identity. This approach applies to the materials about the long-term Altai' residents, Uymon Old Believers and Orthodox migrants, who come to settle these new lands during the Stolypin migration.

The research uses a method of integration of archival and field ethnographic resources. Both published and unpublished folklore materials have also contributed to the results of the study. The archival documents have been obtained from the Altay region state archive: Fund 233, from the Altai Republic' State Archive of Social and Legal Documentation. Ethnographic data collected in 2000–2010 in the Altai' mountains districts. Folklore notes that are gathered by I. P. Fedotova, Gorny Altai' Russian folklore collector, was based as the folklore materials for the research.

To study the Russians' ethnocultural adaptation to the conditions of the mountain region, we conditionally divided it into zones characterized by natural landscape features: low mountain, middle mountain, and high mountain. The Altai Mountain was settled by the Russians much later than the neighboring Altai Territory's flat areas. This process did not begin from the territories that are closer to the already developed ones, but, on the contrary, from the remote mountain-valley landscapes of the high-mountainous zone (the end of the eighteenth century). Then the Russians are settled at the middle mountains, and, at a later date, at the low mountains. In all landscape zones of the region, the Old Believers are the first representatives of the Russian ethnic group, adapting to new conditions. And up to the mid-end of the twentieth century, various Old Believer groups exist in the modern Republic of Altai (Shietova 2018a, I).

The Old Believers' economic adaptation takes place in conditions of sparsely populated areas, whereby it is possible to locate farmland at considerable distances from the settlement, to base small settlements. However, the Orthodox migrants, who appear in the middle and low-mountainous zones, are gradually pushing aside the Old Believers' population. In the high-mountainous zone, the Uimon Old Believers group is replenished by Old Believers migrants and continues to develop until the upheavals of the 1920s and 1930s.

The Stolypin agrarian migration in Siberia gave birth to several migrating groups that continued to conserve and further develop the traditions of their provinces. There is a historical and ethnographic area occupied by the settlers on the Altai Krai' territory, which is particularly distinguished by researchers (Shcheglova 2011). The migration flow observed in Gorny Altai is beyond those regularities, which are singled out for the Steppe Altai territory (Pozharskaya 2009). The number of migrants who came to Gorny Altai is only a small part. Places that were specified as the ones to be lived in by the Stolypin migrants in Gorny Altai are Lebedskaya, Ozero-Kureyevskaya, and Uspenskaya Volosts at Biysk Uezd of Tomsk Province (later they became Uspensky and Lebedsky Aimaks of Oirat Autonomous Oblast) (Map of Tomsk Province 1914). The agricultural census data conducted in 1917 reveals that most parts of the settlements (Fund 233, State Archive of the Altai Krai) were founded in 1911–1913. The government pursued the purpose to direct part of the migration flow to these places to cultivate the sparsely populated territories that were also less attractive for farming. Neither agriculture nor cattle-farming was looked upon as lucrative spheres of life of the new population, therefore the people had hoped for what forests could give them and bred cattle at those places where conditions made it possible. The arable farming was very much auxiliary (Shietova 2016).

It was established that throughout the territory of the Altai Mountain, as a result of adaptation to new natural and geographic conditions, there was a change in the ratio of economic activities that were traditional for the Russians in the European part of Russia (farming was basic, cattle breeding, forestry were auxiliary). The peculiarity of the territory—forest cover and mountain landscape—led to changes in the traditional life sustenance system. Cattle breeding has become the basis of the economy in the high-mountainous and middle-mountainous zones, agriculture

has faded into the background. The most tremendous success in agriculture was achieved by the inhabitants of the Uimon (high mountains) and the Charysh (middle mountains) valleys. The angle of inclination, the exposure of the slope, the degree of forest cover affect the ability to use natural landscapes in economic activity. The specificity of the land tenure of the Old Believers of the Uimon Valley is the fragmentation of land for various purposes, as a result of which the economic activity develops on micro-sites. All these features are reflected in toponymy, including the popular names of various farmlands. Creation of the Russian toponymic system is the evidence of the natural space' ideological development (Shietova 2018b, II).

Uimon Old Believers. Material about the Uymon Old Believers helps analyze the adaptation to the natural (landscape) conditions of Gorny Altai from the standpoint of the agricultural and worldviews-related utilization of the lands and the reflection of this process in the specifics of the ethnocultural identity of their representatives.

The Uymon Valley of Gorny Altai is an intermountainous trough in the valley of the upstream waters of the Katun and its tributaries (the Multa, Akkol, Chendek, etc.). There are a few villages in the Uymon Valley with Uymon Old Believers' compact population (Ust-Koksa, Nizhny Uymon, Zamulta, Multa, Tihonkaya, Gagarka, Gorbunovo, and Verh-Uymon in Ust-Koksa District of the Altai Republic). The environmental conditions produced a significant influence on how the group of Uymon settlers formed. D. N. Luhmanov notes that the relief of the Uymon Valley caused almost complete isolation of the population in these places because the people settled following the direction and relief of closed mountainous rivers. Such features of the territory explain why the local population forms an enclave and this becomes systematic in the process of building settlements (Lukhmanov 1990).

Old Believers adapt to the conditions of the high-mountainous Uimon Valley that are unaccustomed to the Russian farmers, form an animal husbandry type of economy with auxiliary agriculture. They enter economic activity into the surrounding landscape: they dilute lands over considerable distances from the settlement; they rationally tenure the land under their natural features. They also develop the Uimon valley's pace by foundation of the small settlements (originally as seasonal residences), many of which have later developed into villages (Shietova 2017).

The Uimon Old Believers are famous for their religious and mythological heritage associated with Belovodye; it is widely known that N. K. Roerich payed much attention to these conceptions (Roerich 1994). It is believed that Old Believers came to the mountains in search of Belovodye, historians know the documents describing the way to this place (Lipinskaya 1996).

The field materials give evidence for the existence in this area of the legend about Belovodye during the entire twentieth century and even up to the modern time. As the collected materials of this research show, Belovodye was differently understood by the Uymon population: either as the region of Belukha Mount, the Katun, and the Uymon Valley, or as some remote territory behind the borders of the Russian country, but also it was sometimes perceived as a spiritual reality that was not accessible for commonplace and sinful people. All these ideas used to be simultaneously common in the Uymon Valley up to the end of twentieth century, and even were believed until now.

The materials on the most studied in the region group of Uimon Old Believers provide an opportunity to analyze their adaptation to the natural landscape conditions of the Altai Mountain from the standpoint of economic and ideological development. Based on the analysis of the Old Believers' narratives (manuscripts by T. F. Bochkarev), we found that the resettlement of the Old Believers and first settlers of the Uimon Valley of the Bochkarevs, the Atamanovs, and others from the European part of Russia was preceded by a specific religious and mythological justification, a legend, a geographical tie-in of which, based on the narrative text, were Katun and Belukha (Shietova 2013). Thus, at the earliest stages of the Altai Mountain development by the Old Believers, we observe the Belukha Mountain's sacralization and the Katun River, that is, the territories under development (see Fig. 2).

The authors' opinion is that the earlier stage of the Belovodye legend existence is reflected when there were no routes to the sacred country and the village of Uimon itself (the last settlement indicated in the explorers). Belukha is synonymous with Belovodye in close geographical and ideological tie-in to the Katun. Thus, from the beginning of the Russian development of these territories, Altai's mountain-valley landscapes were associated with ideals of purity and holiness characteristic of the Belovodye dreams.

At the end of the twentieth—the beginning of the twenty-first centuries, the local long-term residents used to tell researchers that, if one goes high up into the mountains, he will see that the waters flowing there are white, consequently, they concluded that the Uymon Valley was the very place called Belovodye. Such interpretation corresponds to Old Believers' narratives, namely, the family legends about the migration to the Altai (manuscripts of T. F. Bochkaryov). During the interviews, I also noticed the sincere belief in this holy land that couldn't be physically approached, as only unsinful people had access to it.

The Uimon Old Believers correlated their mystical quests and spiritual needs with practical expediency. The sacralization of the territory of the Altai Mountains coincided with the choice of the optimal place of settlement in terms of natural resource management and life sustenance systems. In the Altai Mountains, the Old Believers in some sense found, created, or built their kind of Belovodye: sacred territory of residence, isolation, and enclaves of settlements, due to the mountainous landscape, and the possibility of natural resource management. They founded their own, spiritually and materially prosperous Old Believer society, the development of which was stopped by repressions and government policies of the 1920s and 1930s.

In the difficult years of twentieth century, the Uymon Old Believers continued to understand the unusual and exceptional setting of their land that was close to the highest mount in Siberia. For example, we can see the evidence of the clear understanding of the geographical specifics of Belukha as the highest peak in Siberia in recollections of the Old Believer T. F. Bochkaryov (Shietova 2013).

Therefore, the existence of legends about Belovodye among the Uymon population reveals the Old Believers' specific moral intention to preserve the basics of their belief and the ideals of holiness, the original nomination of the land with sacred powers, and to interpret some local historical and cultural events through these ideas.

Fig. 2 Old Believer TF Bochkarev with his son. 1970s. Photo from the family album. Gorny Altai, Multa village, Shietova, 2013

All the listed aspects are most important in the process of the Uymon Old Believers' ethnographic identity.

Stolypin settlers. The beginning of twentieth century is marked with the development of a net of many small settlements that appeared in the Stolypin migration course. A significant difference from conditions of the Steppe Altai lies in the

Altai taiga ("chernevaya" taiga), which allows only narrow areas of lands along river valleys and in separate wild depressions to be used by the settlers for building villages or groups of houses and farms (see Fig. 3).

Such conditions were unusual for the people to live and do farming in. The largest number of the settlements in the region in the first quarter of twentieth century was found in such districts with the highest level of migration: 104 settlements in Lebedsky Aimak (9,195 people) and 121 in Uspensky Aimak (11,709 people). In Maiminsky and Uymonsky Aimaks, the districts with much better developed arable farming, 61 *и* 60 settlements (11,770 and 10,135 people) (Agriculture and population in aimaks 1924).

The majority of migrants in Gorny Altai were not from the European part of Russia, but from Tomsk Province where they lived for some time. The population in settlements organized by migrants during the Stolypin reform was heterogeneous, considering the parameter of the migrants' original provinces. Among the new residents, there were people who belonged to different families. Thus, I conclude that no family seats were prevailing in any of the migrants' villages of Gorny Altai.

Apart from the Russians, there are the Ukrainians (e.g., from Kursk, Harkov, Kiev, and Poltava Provinces), Belorussians (e.g., Kursk, Minsk Provinces), and other people who came to live in Gorny Altai. As a result of the analysis of the archival materials, we reveal settlements with population from Ukraine on the

Fig. 3 Migrants from the Ufa province. 1910s. Photo from the family album, Gorny Altai, Turochak village. Field materials of Shietova, 2013

studied territory, moreover, these settlements were mononational. The examples of such villages are Novo-Dmitrievsky in Uspenskaya Volost, Alemchirsky, Biysky, and Sredny Salazan in Ozero-Kureyevskaya Volost of Biysky Uezd (the mentioned villages don't exist at the moment) (Agricultural census-papers of Yugala settlements …, Agricultural census-papers of Alemchirsky settlement …, Agricultural census-papers of Biysky settlement …, and Agricultural census-papers of Sredny Salazan settlement …). The Belorussian migrants are also mentioned in the archival documentation, but less frequently than the Ukrainians. Families of the Belorussians, who migrated from Pskov, Penza, Kursk, and Minsk Provinces, lived in such settlements as Kuter'ba, Kanagachi, and Choya in Uspenskaya Volost (Agricultural census-papers of Yugala settlements …, Agricultural census-papers of Kanagachi settlements …, and Agricultural census-papers of Choya settlement …), in Znamenskoye of Ozero-Kureyevskaya Volost (Agricultural census-papers of Znamenskoye settlement …), etc.

The Ukrainian and Belorussian migrants were eager to "merge" with the typical Russian population. The evidence to it is that similar surnames in one row in the document from one province and the same date of arrival to Siberia are sometimes marked with different names of nationality either in census-papers from the same settlement or in census-papers that are put together in their numerical order (the latter case can tell us that the registered people could have been relatives). Stories of my informants tell that the Ukrainian and Belorussian migrants had conscious intentions to assimilate into the Russians population and mention facts of changing their surnames and using their national languages in their own community at home. The archival and field materials show the policy among the migrants from Ukraine and Belorus to substitute their identity for the Russian identity during the first decades of the twentieth century.

The transformation of identity also happens in the Russian settlers, who came to Siberia from different European Russian provinces. For example, the archives don't help to trace the localization of Voronezh settlers in some of the villages, even in Maima village, which is the largest village, no such cultural evidence is found up to now. When the authors find people who are descendants from Voronezh Province, who could be representatives of their ethnic traditions, there are no traditions that the authors can register as the ones that indicated the original province. Instead of them, the authors found traditions that are characteristic of the arrival region with the lifestyle of the priestess Old Believers. There is only the memory of the name of the province where the older generation came from. This is the level of the historical memory of the Voronezh settlers' descendants. Thus, the authors can suppose that migrants from Voronezh Province were assimilated and their cultural-specific traditions transformed into Altai' regional. The materials of this research haven't yet given the possibility to trace the existence of community self-identification of the migrated people belonging to one and the same original province. The memory of the original region is actual only in the context of history of individual families.

To register the expression of identity in folklore a large number of folklore texts have been studied that belong to I. P. Fedotova, a Russian folklore collector at Gorny Altai. The notes dated back to 1960–1980 and gathered in Gorny Altai lack nicknames

or teasing rhymes that would point out ethnocultural differences of people, who live in different villages or their parts. On the contrary, the notes that are collected in the Altai Krai show that they can reflect the typical picture of development of ethnocultural local communities. The local regional identity that names some concrete place of residence ("from Manzherok", "from Turochak", "from Ulagan", etc.) and district of residence (Altai, Siberia) prevails in texts of chastushkas. The analyzed data of the folklore materials corresponds, as we see, with conclusions obtained from the archives analysis and field resources about active processes of assimilation and integration of the new settlers.

As a result of the work, it is worth saying that it wasn't at all possible to found settlements, or "ends" in such settlements, in which Russian migrants would make up groups or communities according to the specifics of their original provinces, in those natural environmental conditions of regions of Gorny Altai, designated as the ones with most prominent migration processes. Neither was it possible to form such settlements by the Ukrainian or Belorussian settlers. Gorny Altai became the territory where the Russian settlers' regional differences leveled off and the Stolypin migrants from Ukraine and Belarus assimilated. It became also characteristic of heterogeneous population of the migrations areas coming from geographically different places, the dominance of migrants from Tomsk province over migrants from other lands (i.e., those who lived in Siberia for some time before settling in Gorny Altai), the lack of family seats. All this was caused by many factors, among which, as I believe, there are the specific features of the low elevations of Gorny Altai, the necessity to adapt farming management to the new natural conditions of taiga. Among the Eastern Slavic migrating population in Gorny Altai in the first decades of twentieth century, there is the process of forming a particular common civil community. The elimination of regional specifics of the Russian, Ukrainian, and Belorus settlers happens, the way it is shown by the materials, consciously, as we may suppose with the purpose to integrate the settlers into the united society that is perceived as Russian.

As a result, the authors could emphasize that the cultivation of the territories by the Russian ethnos during the Stolypin migration in conditions of various Altai' landscape zones could facilitate both forming and longer conservation of the local ethnocultural identity. The way it happened to the group of the Uymon Old Believers, and the refusal from religious specific ideas and the development of new local, typical of some region community with the general Russian identity was the background of all of these processes.

The research is done with the support of RFBR, Project No. 18-09-00,028 "Ethnocultural identity of the Russian and other Eastern Slavic peoples in Siberia (XVII—the first third of XX c.)".

5 Mountain Landscape: Vision Images and Traditional Beliefs of the Northern turks—The Sakha People

It is known that the natural environment affects the entire structure and mental component of the economic and cultural system of an ethnos. In this context, a fundamental problem of studying the spatial development of territories and the formation of ethnolocal groups within the concept of humanitarian geography becomes relevant.

Dominant markers of space (mountain, forest, and lake/river) and the symbolic capital of a local group (language, folklore, ritual, images, beliefs, etc.) act as the main core when modeling a geo-cultural image. In this article, the concept of the mountain is considered as a figurative-geographical model associated with the emotional, rational, and conceptual experience of space based on the northern Yakuts ethnolocal group. For this purpose, the authors considered the following sources:—scientific research and field materials collected during ethnographic expeditions to the northern regions—Oymyakonsky and Verkhoyansk districts.

Recently, in the humanities, a number of studies are aimed at elucidating the emic aspects of space, i.e., elucidation of the meanings that representatives of the studied cultures gave and attach to the surrounding space. Studying the landscape as a palimpsest allows considering all the images and realities of a place, ideas about space, local myths, and the mental-geographical structure of a territory (Zamyatin et al. 2008, 207). Thus, in this study, along with the methods and techniques of anthropological sciences, the theories and methodological developments of cultural geographers, in particular, D. N. Zamyatin, used in modeling images of a historical-cultural territory, become priorities (Zamyatin et al. 2008; Zamyatin 2017).

Research conducted by a team of Novosibirsk authors on the worldview of the peoples of Southern Siberia (Lvova et al. 1988) that has already become classic in ethnographic science, had a great influence on the development of the study of the ethnic space of the Siberian peoples. Current studies by Romanova et al. (2016), Sodnompilova (2009), and other scientists deserve special attention since they present the regional experience of studying spatiality, symbols, images, and beliefs in traditional cultures.

In modern humanitarian studies, the term space is used as the equivalent of the concept of the traditional world, and therefore, the area of distribution of ethnic groups is considered as pragmatically, semantically, and symbolically mastered space. And natural objects (mountain, forest, and lake/river)—as dominant symbols of worldviews that define the basic parameters of the universe.

In the geo-cultural panorama of the Sakha people, orographic objects are distinguished from all natural objects with a complex of geographic, cultural, and semantic values. Moreover, depending on the cultural and geographical characteristics of the territory of residence of certain local Sakha groups, a mental image of a mountain in “sacral topography” varies from “positive valence” to “negative valence” (Casey 2002). For example, in the geographical vision of space of the central and Vilyui Yakuts, whose landscape is mainly characterized by the forest and steppe zone, the

mountains are a peripheral "dangerous" area of the "developed space". In the worldview of the northern Yakuts, the inhabitants of the mountainous terrain, a mountain is a part of the "developed space" and the center of the Universe, the mediator between the celestial and terrestrial worlds, the habitat of ancestral spirits (see Fig. 4).

The diversity of landscapes of the Yakutsk Territory led to a wide range of orographic objects: from small hilly areas to gigantic ridges, which are designated by the general term "*khaja*" (Turkic: *kaja, kьja, käjä*—rock; Buryat: *xaja*—slope) (Pekarsky 2008, 3242). The landscape of Yakutia is characterized by both earthen and stone elevations of the relief; therefore, a word "*taas*" is added as the determination of belonging to a particular type (Turkic: *tash, dash*—stone)—stone (Pekarsky 2008, 2646) and "*buor*" (Turkic: *bor*)—land (Pekarsky 2008, 560).

Hills and fells stretching on one or both sides of the river are denoted by the term "*myraan, muraan, byraan*" (cf. Mongolian: *muren*—river) (Pekarsky 2008, 1638) and combined by the common lexeme "*buor khaja*"—"earthen mountain".

Another term "*bulgunn'akh*", denoting a small earthen hill, a big knoll, at its root contains the Mongolian word "*bul*"—denoting cobblestone, boulder, and stone slab (Pekarsky 2008, 55). A stone mound is defined by the phrase "*taas bulunn'akh*". As a dialectal local term, among the northern Yakuts "*bulgunn'akh*" also means an ancient burial.

Fig. 4 "Sacrifice" to the spirit of the mountain pass. Chersky ridge, Momsky district, Yakutia. Photo by Y. A. Sleptsov

The term "*tya*" (Yakut: forest, taiga, Turkic: *tau, tag, dag*—mountain) can also be referred to the group of local terms (Pekarsky 2008, 2929). According to informants, in the northern areas, the hunting space in the highlands is called "*tya*".

The next term combining images of mountains and forests is "*tumul*"—a word meaning foothills, a mountain cape, a high hill, and a variation of words "*tumul tya khaja*" means "a solid hill covered with forests".

The hills, slope, a steep bank in the Yakut language are known as "*syyr*"—(Turkic: *syrt*—hill, hillock; *jap*—steep shore) (Pekarsky 2008, 2475). In the orographic dictionary, the term "*syyr*" in pair combination has the following lexical meanings: "*khara syyr*" ("black shore")—earthen steep shore, "*syyr khaja*"—rocky shore, and "*khaja syyra*"—steep bare mountain, mountain cheek.

The term "*dabaan*" associated with passing through the mountainous terrain (Mongolian: *daban*—the path to the mountain)—mountain pass, the path to the mountain, hill, comes from the word "*dabaj, dabaakha*"—to step up, climb the mountain, commonly known among the Turkic-Mongolian peoples (Pekarsky 2008, 658).

An impassable mountain is defined by the common pair phrase "*buom khaja*" (Altai: *pom*—impassable gorge, a path between the rocks in the mountain gorge; Buryat: *boom*—cape, prominent rock; Evenki: *bom*—gorge) (Pekarsky 2008, 345). The term "*buom"* denotes anything that hinders something that is associated with a difficult passageway or barrier. For example, a hardly passable forest or river is called "*buom ojuur, buom kyuel*".

High, hard-to-reach mountains and cliffs are presented by paired terms "*khadaar khaja*" (Tungus: *kadaar*—mountain, cliff)—a sharp-toothed mountain, a mountain with cliffs or debris and "*khadaga khaja*" (Buryat: *khada*—high mountain; Mongolian: *kada*—rock, mountain; Manchu: *khada*—a prominent sharp top of the mountain, peak)—rock (Pekarsky 2008, 3226–3227).

Rocky outcrops of bizarre forms rocks are defined in the Yakut language as "*turuuk taas khaja*"—standing mountains and "*kihileekh khaja*"—mountains with human figures.

The general idea of a mountainous landscape, a ridge, is expressed through the common terms "*khajalaakh sir*" and "*taas khajalaakh sir*". Thus, the understanding of space, the designation of a landscape is characterized by the phrase with the term "*sir*"—earth.

It should be noted that in the Yakut language the term "*sir*" has a wide semantic field and covers geographical (for example "*khajalaakh sir*"—mountainous terrain), economic ("*bultuur sir*"—hunting area), and mental ("*tereebyut sir*"—motherland, native land) spheres in its continuum.

In the myths created by the Sakha people, mountains, like other dominant symbols of the landscape (water and forest), arose when the god "*ajyy*" leveled the earth, and the devil "*abaahy*" created mountains, hills, forests, ravines, and reservoirs to spite him. Thus, in almost all mythological plots, primary elements arise because of contradictory actions of antagonists—the God and the devil. Therefore, they have an ambivalent essence: on the one hand, they are presented as positive and, on the other hand, as negative loci (Cosgrove 2008).

In the common worldview of the Yakut people, mountains are the elements of a far from perfect and positive space, an ideal example of which is certainly "*alaas*"—the "developed" place of residence (Danilova 2011, 16). For example, according to the mythopoetic heritage, mountains are always on the edge of the earth denoting the border of the developed space—"*alaas*".

In local versions of the Vilyui epic tradition, a peripheral region, where "motley and ribbed" mountains are located, is described as space, where "the earth and the sky rub between themselves". In this case, the negative load is enhanced by the "mobility" of mountains and color designation. All these characteristics are conditionally associated with the habitats of evil spirits.

In many epic scenes, orographic objects represent the boundaries between the Middle and Lower Worlds. However, in the epics of the northern Yakuts, mountains most often act as a kind of channels between the world of celestial deities and the world of people. Besides, mountains act as the center of the earth and correlate with the World Tree "*Aal luuk mas*". Here, we can note an important property—statics in the definition of the mountain semantics: "stable, static high mountains and ridges". The positive symbolism of a mountain can also be found in symbolic mystery texts, where a mountain is overgrown with the qualities of stability and immobility, as a result of which it is identified with the dwelling—a micromodel of the Universe.

The active use of the anthropomorphic code in the northern Yakuts, by means of which the classification of mountain parts are described, also indicates a symbolic link of a man with natural objects. The mountain elements are analogous to parts of the human body: "*khaja orojo*"—mountain top, "*khaja sihe*"—lower back, "*khaja kulgaaga*"—ears, "*khaja sireje*"—face, "*khaja khonnogo*"—armpits, "*khaja cunn'e*"—crook, "*khaja kuturuga*"—tail, *and* "*khaja argaha*"—back.

The projection of socio-anthropological properties onto mountain objects is also reflected in the idea that mountains are a frozen and petrified human society. Besides, in the outlines of mountains, rocks, and hills, we often considered the visual images of people and body parts. It is worth noticing a special, respectful attitude to the mountains, which was expressed through the endowment of human properties and statuses to them.

Northern Yakuts give special status to the mountain located near the settlement. They respectfully call it Mrs. Mountain—"*Ebe khaja*". It is the key symbol of the ancestral territory. At the same time the spirit—Mistress of the Mountain "*Khaja ichite*" is a patroness of the family line.

A man has another attitude toward inaccessible high mountains and cliffs in the highlands. Such rocky mountains are considered "dangerous" habitats of evil spirits. In mythopoetics, they are described as "black mountain rocks and cliffs". Thus, black color additionally emphasizes the image of a "dangerous" place. The color symbolism that characterizes the appearance of a mountain object is one of the main constants of modeling its mythological composition. The sacred mountains "*ytyk khaja*", like all the "positive" sacred natural surroundings, are painted in medium blue. The "positive" color palette also includes white color—the color of sacred status and heavenly origin.

The spirit—Master (Mistress) of the Mountain "*Khaja ichite*" is considered one of the most revered. In order to avoid anger and seeking his/her favor, people performed sacrifices, hung bunches of horsehair ("*delbirge*") on the tree (cf. Turkic, Mongolian *delberge*, cloth pieces torn from a dress, threw coins, buttons, and other things next to them (Alekseev 1980, 60). The northern Yakuts built a pile of stones "*taas kystaabyt*" on the mountain tops or in mountain gorges and left gifts next to it. It should be noted that the reminiscence of this action goes back to the ancient cult of the Turkic-Mongolian peoples "*oboo, ovaa*" and was preserved only in the northern Yakuts (Sodnompilova 2009, 53).

As the highest sign of hierophany, mountains claimed certain standards of behavior and attitudes. Northern women could not be near the sacred mountain bareheaded and barefoot, they were forbidden to climb the ancestral mountains. It was forbidden to speak aloud the name of the mountain, but to address through allegorical words: for example, "*ebe, tya, taas*", to point toward it, make noise and shout in the mountains, etc. A special prohibition was applied to travelers and hunters. Before going hunting in a mountainous area or going on a long journey through mountain passes, people sacrificed to "home" spirits (spirit of fire and dwelling) and to the spirit of the ancestral mountain, followed pre-traveling bans, did not tell the time of departure and arrival. All these actions were to ensure a safe journey and a successful hunt. There was a belief that if you take a pebble from the foot of the ancestral mountain, the spirit of the mountain will protect you on your way and the stone "will pull you back". Upon return, the pebble should be put back into place since it was forbidden to keep stones at home. Before using it in housekeeping, the pebble was placed in a container with water and left overnight so that water washed away the natural qualities of the stone.

The reverence of the mountain is associated with the archaic tradition of burial of deceased relatives or shamans in the mountains. It should be noted that the local population "hides" many sacred places associated with the ancestral territory of their ancestors from strangers. For them, it is not only a place of deep reverence as the "cradle" of ancestors but also a source of vitality, a place of communion with the sacred space.

According to the unwritten law on the cycle of life, a mountain, as the resting place of the ancestors, can be considered as a giver of the child's kut-soul. In the mythopoetics of the northern Yakuts, there are scenes when childless couples ask for the child's *kut* "soul" from the spirit of the mountain. It should be noted that the northern Yakuts consider themselves children of the ancestral mountains and call themselves "*khaja sakhalara*"—mountain Yakuts. They characterize themselves as "dignified, serious people with a firm and unshakable character, unlike the central Yakuts". According to the informants, "the mountain landscape influences the mentality so much that even people from other areas change their character and even their appearance". Indeed, the Yakuts have a pronounced feeling of "unity" with the place of residence. Thus, the "feeding" landscape simply permeates the entire human world, the mental matrix, the ritual complex (Chartier et al. 2015).

Therefore, the historical-cognitive analysis of the mental-cultural layer of the Mountain concept showed that, as for the orographic objects, the northern Yakuts still

have archaic ideas associated with the Turkic-Mongolian substrate of the ethnogenesis of the Sakha people. For example, the northern Yakuts transferred the metaphor of the south and stereotypes of spatial behavior to a new geographical space. The remoteness from the main contact zone of migration flows and the landscape, similar in its geo-cultural characteristics to the former territory of residence, contributed to the preservation of the archaic spiritual universum associated with the cult of mountains.

Unlike the central and Vilyui groups of Yakuts, whose mental landscape is dictated by paradigms-images of *alaas* and taiga, the northern Yakuts consider the spiritual universum of mountains as a special culture text, where each of its elements organizes a special sign-oriented space. Thus, the concept of the mountain permeates the entire space of the local version of the worldview of the northern Yakuts.

6 Khandinian Evenks: Transformation of Living Conditions

The establishment and development of the indigenous peoples of Siberia, transformation of living conditions, and preservation of their unique culture remain pressing issues of the day and the current research field.

Evenks is a large and widespread community of small peoples of the North and Siberia. The approximate borders of Evenki resettlement are: in the west—the left bank of the Yeniseiriver, in the east—the coast of the Sea of Okhotsk, in the south the, Angara river, Lake Baikal, and the Amur river (Russian Association …; Khromov 2004).

The culture of Evenks is characterized by a nature-saving entity based on their determinism in the natural environment (Sirina 2008). In their worldview, all nature is living, endowed with sensitivity (Sirina 2008).

For Evenks "sacred" places are mostly natural and cultural landscapes, and ensure that taiga and tundra are considered not only developed space but also a home (Sirina 2002).

Over several decades, Evenks' living conditions changed significantly. Especially during the period of industrial development of the natural riches of the Siberian region, indigenous peoples faced the threat of absorbing their distinctive culture by man-made civilization. The techniques and technologies introduced by civilization facilitate the life and forms of economic activity, but they destroy the traditional foundations of the culture of indigenous peoples, immersing them in the marginal conditions of life and spiritual choice.

Technogenic civilization provides significant environmental changes in the natural habitat of these peoples and socio-economic transformations in their livelihoods (Moiseev 1999) and the specifics of culture.

At the beginning of the seventeenth century, the Russians penetrate the vast taiga spaces between the Yenisei and Lena, where they meet the "deer people"—the Tunguses (this was the name of the Evenks until 1930) (Bychkov 1996). The name "tungus" was introduced into official and scientific use in the first half of the seventeenth century and it meant all ethnographic groups of the Tungus-speaking population of Siberia and the Far East. The ethnonym "evenks" was officially introduced in 1930–1931 and distinguished groups of Tungus-speaking "foot" and "deer" hunters of Siberia (Turov 2008, 4).

The territory of Eastern Siberia (excluding the mountain and foothill territories of the East Sayan) in the seventeenth century was a cultural region of Evenks, breaking down into 17 cultural and clan groups (Ragulina 2005, 56).

We proposed to consider the transformation of the living conditions of the Evenk people on the territory of Siberia on the example of the Khandi Evenks. The uniqueness of this Evenk group lies in the long-term preservation of ethnic self-awareness, the persistence of the traditions of microareal development of lands, despite the relative settled way of life, loss of deer farming, and the transition to the fishing and hunting model (Ragulina 2004).

The history of the Khandinian group of the Evenks can be traced over the past five centuries. Researchers believe that all this time the community has been located within the permanent area—on the border of modern Zhigalovskii and Kazachinsko-Lenskii districts of the Irkutsk Region (Ragulina 2004, 47). Before the beginning of the collectivization of the 1930s, the community consisted of nine to 12 nomad camps, each of which numbered from four to 30 people (Ragulina 2004, 48).

In Soviet times, the collective farm "Red Hunter" worked in this area" (Non-profit organization …). Paradoxically, however, transformations of the Soviet period, and collectivization in particular, affected the structure of values and the public consciousness of the Khandinians to a small extent, because in many respects the collective farm system was in line with the traditional norms of community (Ragulina 2004).

In 1960, the Evenk collective farm "Red Hunter" was liquidated. Its hunting grounds, property, housing, and people moved to the state animal farm cooperative. The starting point of the intra-communal imbalance was the creation of a system of industrial farms, construction of the BAM, and deterioration of environmental and economic conditions, that followed and moreover coupled with the growth of foreign contacts (Ragulina 2004).

In the beginning of the 1990s, as a result of the commercialization of the economy and politics of the country, civilization sharply invaded the vital activities of the Khandinian Evenks. The development of the Kovykta gas-condensate field (KGKM) began. Road and construction works, exploration, and drilling were carried out near the territory of the community. The situation was seriously complicated by "aliens" who hunted and fished in the Evenks' lands. The production of sable and wild deer decreased, the summer catch of fish on the lakes decreased.

In 1991, in the VershinaKhandy village, a self-governing national community was formed at a general meeting of residents (for post-perestroika time an increase in

national identity was typical). It included residents of the village, regardless of nationality, including the Evenk population of Kazachinskoe village and Magistralny township (having the same ancestral roots, they live at the expense of managing in the given territory). The territory of traditional natural resource management was allocated from the calculated cutting area in the Khanda river basin and divided into 11 sections of hunting grounds (Abalakov et al. 2000). Since 2000, the community has been registered as a non-profit public organization "Khandinian territorial-neighboring Evenk community".

Below there are the results of the expeditionary research of this community in the early 2000s (Shekhovtsova 2007).

The VershinaKhandy village is located in the Kazachinsko-Lenskii District of the Irkutsk Region, 57 km from the district center—the Kazachinskoe village and 39 km from the BAM railway line—the Magistralnyi village. The quantitative composition of the community is about 70 people (Fig. 5). In the Top of Khanda vil., about 30 people lived more or less permanently at that time, consisting of nine families. The rest lived in Kazachinskoe and Magistralnyi villages. In the community, in addition to the Evenks, by ethnic composition, there were: three Russians, one Tofalar, one Buryat, and one Yakut (see Fig. 5).

Most of the population (53 people) is of working age, but only 23 members of the community are considered to be employed. Almost all of the able-bodied men are working full-time hunters (11 people). There is also a forester, a huntsman, a diesel

Fig. 5 The hunters of Vershina Khandy village, 2,000th. Photo courtesy of M. V. Ragulina

operator, a driller. The unemployed are mostly women and young people. Working women are employed in health care, education and culture, management, trade, and some sew winter clothes (hats and high fur boots).

They live in a village in typical houses, next to each house there is a chum, which is used as a summer kitchen. There are no gardens and livestock there. Water is taken from a well near the village. Electricity is occasionally generated at a local diesel station. In the summer, families live on lakes and go fishing. The basis of life sustenance is hunting for large ungulates and furs, lake–river fishing, picking berries, nuts, and medicinal raw materials. Other sources of income—wages, pensions, and benefits—are not of a mass nature and are not the main ones.

The economic area of the community for a long time remained relatively stable, therefore, within its limits, there was a persistent spatial pattern of natural resource management. In the structure of the main area of hunting, there are central and peripheral zones. The central zone is confined to the Khanda river basin with tributaries, coincides with the Khandinskaya depression, it is the main life-sustaining habitat, including fishing grounds and hunting grounds, in part—the areas of wild plants collection. The peripheral zone runs along the foothills of the Orlinga ridge and more elevated parts of the Khandinsko-Orlingskii interfluve, adjoining the central part. Here, in cedar forests, there are the main areas of fur trade and walnut craft areas (Ragulina 2004).

The onset of industrial civilization on the land tenure culture of the Khandinian Evenks led to the extinction of the traditional system of vital activity of the taiga people, the emergence of problems of their depopulation and assimilation.

Today, only 71 people remained in Kazachinsko-Lenskii district. At the same time, almost all of them are mestizos, because assimilation has almost completely swallowed this nation (We are …). Young people have almost lost their native language skills (they have few words left), although they are fluent in Russian. Now, in the VershinaKhandy village, "only six people live permanently, the rest return to their native lands only for a while, mainly in spring and autumn, in order to fish" (We are …).

In the region now there is a non-profit organization "Khandinskaya neighboring territorial Evenk community", an amateur Evenk association "Yukte", and in addition the tourist ethnocenter "Following the Traces of Ancestors" has opened in August 2018. They all regularly participate in festivals, holidays, contests, and exhibitions.

For the Evenk population, the environment is not only a "feeding" landscape but it has a high spiritual and moral value. The difference between the Evenk culture of Siberia from neighboring ethnic groups is associated with the taiga way of life (Khromov 2004). They are well adapted to taiga life, taiga for them is a house, a nurse.

Preservation, revival, and development of the culture of indigenous peoples is a necessary condition for their survival (Mangataeva 2000). Experts are concerned about the extinction of the culture and language of the Evenk people. What could be the solution here? One of the options for their preservation is establishment of ethnocultural centers. Besides, ethnotourism may extend the life span of the culture of the Evenks for some time, but more in theatrical and museum version.

Public organizations began to play a growing role in national life in recent years. The first congress (Big Suglan) of the Evenks of Russia, which took place in 1993 in the administrative center of the Evenk Autonomous Region in the village of Tura gave a strong impulse to the social movement among the Evenk population. There is an opinion that the prospects for maintaining Evenks as an ethnic system are quite optimistic. The main factor is currently the search for new criteria for self-identification (Russian Association …).

The maintenance of the original historical and cultural heritage of Evenks requires close attention because the unique material and spiritual culture of Evenks has a centuries-old history of harmonious living in Siberia. There are ongoing attempts to revive the lost culture, its development, and maintenance. But the most important thing is the desire of the Evenk people themselves. The words are very encouraging: "Even if we become blue-eyed and white-skinned, but for now we call ourselves Evenks—the people will exist. The main thing is how you feel inside. … We are definitely not going to disappear" (We are …).

7 Music as an Institution of Cultural Adaptation to the Landscape

Russian immigrants were woven into the intricate cultural pattern that the indigenous peoples of Altai created. It is a response to the problematic conditions of the region At the heart of the worldview is the idea of the interdependence of man and landscape. Thinking is environmentally friendly by necessity. These principles are so valuable to society that they are broadcast at a non-discursive level. The most striking instrument of such a broadcast is music.

The structural isomorphism of music became evident at the very first analytical approximation to the music phenomenon, therefore music and language can be fused into a single phenomenon. Their conformity appears in certain circumstances. For example, the voice is a crosspiece between everyday speech and music.

On the one hand, the voice gives verbal meaning to the music, on the other hand, the meaning delivery in the language is based on its musical layer. The affective-emotive meter, "melos", and rhythm give the listener the real meaning of the pronounced words. That means that the message of the following passage can't be reduced to the literal meaning. It contains the context problem that the manner of speaking can solve. This free variation of sounds constructs the space to the music of speech.

Because music but not language is the field of philosophical-anthropological investigation legislated in the paper, we don't deal with the philosophy of language as it's taken in modern philosophy. Our call to the language is mostly a try to apply the analytical metaphor to the music philosophy that can turn the music multiplicity onto operable verbal conception. Besides, it's a clear methodological intuition to treat music as some semiotic formation or unique language.

In this context, the understanding of music provided by the article "Man and sign" by Russian anthropologist B. V. Markov displays an analytical interest. Naturally, it is necessary to make some theoretical corrections to use its methodological tools for music philosophy research.

The article's main concept is to explicate transmission from voice to music and musical instrument as a space of the sound birth to logical concept. We insist on distinguishing the material medium of the message and its content. Talking in Aristotle terminology it is the difference between the form and the matter. In his "Metaphysics" both of them embody a certain kind of cause."Cause" means that from which, as immanent material, a thing comes into being, e.g., the bronze is the cause of the statue and the silver of the saucer, and so are the classes which include these. The form or pattern, i.e., the definition of the essence, and the classes which include this (e.g., the ratio 2:1 and number in general are causes of the octave), and the parts included in the definition (Aristotle 2012, 62).

At the same time, the form is inseparable from the material. The matter is the power limited by form, it is an unconcealment of the thing or its "whattness", the something that wakes to being. It is something that lifts from the origins and finds a clear distinguishing in being given. Hence, we get the understanding of reality as matter is transferring from one form to another.

Using the music instrument metaphor, it could be said that being a complex of sounds a word is a material mediator of personal experience collected into ones' inward life as well as when the music instrument mediates its own sound through its "morphe" or essence of material.

The language itself is a form thanks to which the matter or music message of the speech gains the definiteness.

The true–false discursive dichotomy can't be the only way to pass the meaning of speech because it is not the language's essence. Its reference is based on other mechanisms. In behaviorism theory, the language itself is taken as stimuli complex setting the affective kit of reactions.

The meaning itself is being depreciated. Affect displaces meaning. World or environment is being perceived rather emotive than sensible.

It deploys the emotive orientation in the environment that settles down the game's rules embodied in one or another communicative strategy. This strategy can be defined as an "aggregate of norms and tricks used by the speaker to transfer his intentions and state of mind" (Plato 1971, 63).

The speaker's intentions define validity by and without them his words could appear false or contradictory. In other words, "we reach the limit of the language and lean on the nonlinguistic capacity for seeing the reality itself (Plato 1971, 40).

According to the analytical philosophy conclusion, the meaning of the word is defended by its use. The set of rules about the words using forms the "linguistic game". It's worth saying that "the language using is limited by the rules adopted by the society" (Plato 1971, 40).

Being the specific sort of language music appears to be the "music game" formed by society. The social institution determines music the same way as the individuals. Michel Foucault analyzed this mechanism in his "The history of sexuality" v.2. In

his text, he suggests three axes determining the subject himself and the sexuality of the subject. "The formation of sciences (savoirs) that refer to it, the systems of power that regulate its practice, the forms within which individuals are able, are obliged, to recognize themselves as subjects of this sexuality" (Foucault 1990, 4).

We can trace these axes in music because of the communicative nature of music. Music is a specific discursive or semiotic formation that exists thanks to a certain origin of power at the expense of this discourse.

In Siberian culture, man understands his duty to be a shaman, "kai" storyteller, or music maker in the dream. The last two cases are very similar to music studies. As a future master or storyteller the man gets rigorous instructions how to follow his mission. There are many legends in Siberian culture telling about a person who avoided these instructions and died. These legends transform the dream to the music institution. That means that the music phenomena could be understudied only within the strata in which appear "the form in which individual could and must realize themselves as subjects" of one or another music culture. These social institutes determine not only music but the man through his inner melody based on the "mellos" of the word. This makes music a means of antropotechnick. A more sophisticated analysis makes clear that speech is not a straightforward interaction. The word is more a label referring to a certain ad hoc defined meaning that is being decoded by the listener at his one's risk than a simple sign.

Comparing the figure of shaman to narrator in khakas culture, they give an opportunity to refine this statement. Both of them are suffering from the symptoms of shaman mental illness. But when shaman is dying in social meaning the narrator stays alive. Both of them are healing but the destiny of narrator is much simpler, probably because he uses the power of word but not of the spirits. The narrator does not use everyday voice in his practice. To increase his power he uses low throat "kai" singing because in speech there are not only verbal lay but also the musical one.

Pavel Florensky picked out the following speech elements. Phoneme that is separated to the height, the power, and the coloration. Besides it passes the speaker's feeling and articulation, i.e., the way of traction of the speech apparatus muscles during the sound-emitting.

Morpheme is a common conception but the sineme is alive meaning that changings during the communication. Both phoneme and sineme allow us to put a hidden meaning into a word. "The voice is being close to itself in the form of universality, as consciousness. The voice is consciousness. If we intensify nonverbal message of the voice using music we'll get the weapon that will be able to escape the sensible part of human soul and influence the perception directly. It makes a sense to talk about musical sentence and melodiousness of speech. Word has its melody expressed in vowels and rhythm in consonants. Firstly, we listen to the tone of speech and then perceive the meaning. That's way Khakasian people tell that we can only sing about essential things. The attempt of an old Khakasian woman to sing during the court session instead of making a verbal speech for the defense shows that the previous thesis should be taken literally. Music could have straightened the woman speech if the court social institute haven't prohibited this sort of discourse" (Losev 2001, 07).

Tone and "melos" are given in music par excellence because music instead tunes people by rhythm and melody to the certain perception of meanings. They also create herein-being persons' tuning as it's called by Martin Heidegger, than pass concrete emotions.

Person fuses in melody but the rhythm is a mediation factor which helps people to hold the feeling of themselves. This function of rhythm traces its origins in myth because it is an "energetic person self-esteem" (Sigmund 2016, 484). Energetic self-esteem differs from the everyday one because it is based on transferring the whole cultural understanding context (rhythm is a basement of culture: compare the Cuba rhythm, the tango rhythm, the city rhythm). That's why music understanding is impossible without myth.

Because of that music holding the myth intention within is a mediator witch tunes person to the holistic vision of the ethos and "life world' defined by the community culture.

The call of being is music. To avoid human personality fusion in existence between pure Dionysian music and soul, there must be a mediator. This mediator is a myth word, rhythm, dance, and scenic action. All these forms are overlapped on the music matter while providing activity to it, making it digestible to human and triggering necessary metamorphoses in his state of mind and even soul.

Music can unconsciously regulate the human cognitive arrangements in his everyday life actualizing often hidden ontological basement. According to the Plato "Musical education is supreme importance, because rhythm and harmony enter most profoundly into the soul and take the strongest hold upon it bringing grase and making a man graceful if he is rightly educated, but if not, the reverse" (Plato 1971, 401).

Plato marks out that music tunes a person to a philosophical mood. The specificity of music appears in the same way in ethical aspect of human behavior regulation and in ontological understanding of the world as a whole and it consists in the idea of the global interconnection. "The art is the world as a whole perceiving as beautiful" (Plato 1971, 125).

The music listening experience has double influence on people. Markov B. V. notes that singing of rhapsodes "eliminates" man but rhythmical marching songs on the contrary reinforce his being. Maybe human illumination appears because the absolute music destroys a men's ability to hear his inner world music and music of the surround area.

Naomi Cumming describes this problem by claiming "what is in question is the process by which a listener may get an impression of him or herself as an individual listening self" (Cumming 2000, 56). Naomi Cumming suggests that unknown sound helps a person to hold the self-awareness. It should be said that all unexpected changes provided by the rhythm in broad meaning in music push a person to realize himself. It is possible because rhythm has a changing potential because of its limited and discrete essence.

Personality needs the limitation because he or she feels him (her) self a part or limitation of the universe. Being lost in music human falls out of the world as a unite phenomena in which absolute adjoins the terminal and comes to ecstatic state of mind (Greek "ekstasis" means "to be out"). It was described as an "oceanic feeling"

by Roman Rolland in the letter to Freud us a "feeling he would like to call the sensation of "eternity a feeling as of something unlimited unbounded oceanic as it were" (Sigmund 2016, 45).

But Freud plusses that this feeling of "indissoluble connection of being bound together with all the external world" (Sigmund 2016, 46).

The same combination of personal border disappears with the felling of global interconnection we found in absolute music discovered by Pythagoras. The philosopher described it as the music of spheres: "Starting from this argument and from the observation that their speeds, as measured by their distances, are in the same ratios as musical concordances, they assert that the sound given forth by the circular movement of the stars is a harmony" (Aristotle 2015, 10).

These proportions are isomorphic to the soul harmony hence the Pythagoras claims that earth lyre is a mirror of the "heaven lyre" and playing it personality tunes to the cosmic harmony. It is an interesting experiment to change the instrument. What changes for the person when he plays guitar lyre or ethical tuvan frame drum called "buben", or "dongur"? Can we say that the "heaven dongur" is similar to the earth dongur and where the "heaven dongur" is?

Music is not an isolated phenomenon from the material world. Objectivity of a musical instrument directs a man to an actual situation. The timbre is the unique voice of the instrument. Thanks to manipulations with overtone, frequency, and vibration in Siberian music, not a melody, rhythm, or harmony, but, particularly, the timbre becomes the main expressive means. The need to adapt the instruments to the weather conditions underlines their symbolic connection with nature.

Music is one of the forms of exploring the landscape in which man lives. The ecstasy necessary for a shaman is achieved by playing the tambourine (tungur). Sympathy to the deeds of heroes is achieved by playing string topshur, and the feeling of joy inherent in music-making, is transmitted by a variety of folk instruments.

The gift of kaichi is connected with the place, that's why there are a lot of talks about native land in the texts. Kay is related to kamlaniye because the spirits of the place can hear human music. Kay is often used to treat psychosomatic diseases and lullabies. Music for lullabies is similar to a rune for cattle. This emphasizes the "protective" function. Such a supernatural connection with nature brings them together with shamans. Storytellers, members of the hunting artel, could make their tools right in the taiga. Sometimes they were left there. For the frame they chose a living tree more often it was a cedar or pine. The string-plate made of leather of wild or domestic animals was nailed to the frame. The strings were made of horsehair or tendons. Hair strings were woven clockwise, i.e., by the sun. The size of the instrument was determined "by hand, so that it was convenient to play". They also made small instruments for children. Topshur is a must-have tool when a story is told.

At the epic-mythological level, the topshur is understood as a kaichi horse. Therefore, it is necessary to use hair from the tail of the fastest horse as strings, preferably from the white one, which is associated with the esthetics of color in burkhanism. Topshur is closely related to the epic song, which often begins with the dedication to the instrument.

Music outside the epic tradition is called “topshur plays”. The title shows that the instrument is animated and that it is as much a creator of a musical canvas as a performer. Topshur as a bucket and as a home can be correlated with different types of improvisations, both epic and meditative. The folk tune of it was accompanied by a conversation in the house. Music for yourself is a form of spiritual self-improvement.

When playing topshur, rustles and overtones are used. That allows you to create a rich sound palette with its entire rigor. The game is not virtuoso, both in performance and in singing; it is not the form that matters, but the content.

The main instrument of a shaman is a tambourine. Repeatability of the timeless image is the tendency of traditional worldview, which is manifested in the creation of tambourines. When an artist paints a tambourine, he follows the tradition, and when a new tambourine is needed, he exactly repeats the drawing of the old one. The same is true of the iron parts of the tambourine.

The model of transition to another world is not a vertical or horizontal straight line, but rather a ribbon of Mebius, in which the layer of the middle world is thinned under the pressure of the upper and lower worlds. As the diameter of a tambourine is less than depth, it is an ideal place of linkage of two worlds. It “thins” the plane of the human middle world, as the difference between the external and internal in the tool itself is thinned.

The design of the tambourine allows to transmit entirely the vibrations of the membrane, as they are not dampened by the body of the instrument. As a result, the overtone and duration of sounds are increased. Their sound is perceived as more chthonic in comparison with the topshur in which the instrument body is closed. However, they are related to the presence of a leather membrane that leaves side tones.

A shaman can play a stringed instrument, and a narrator cannot perform Kay on a tambourine. A stringed instrument offers more possibilities for improvisations than a shaman’s tambourine, as it is melodic and, while retaining the rhythmic pattern corresponding to speech, can change the pitch of the tone.

Improvisation allows a narrator to remember the text, as the main danger for the narrator is the incorrect reproduction of the text. In the epos between the Kay’s throat tirades, solo instrumental sketches are placed. Their content and duration can vary, respectively, compressing or stretching the artistic time. A stringed instrument can only give such freedom.

A narrator witnesses the events he tells us about, and a shaman is a participant. He needs a tambourine, which is more specific and rhythmic. The time scale does not change when playing it. Rhythm, organizes time travel, pushes the shaman to the activity. Tambourine gives a fighting spirit and is symbolically a shaman’s weapon. Not by chance, its detail is called a bowstring, like in a bow (kirish). Symbolic arrows are hanged to it. Music is the language of spirits. Performing music is an address to the spirits for help. It is a kind of try to speak the same language as them. Hence, the throat singing as a language of spirits and instruments organically fit into the world.

Acknowledgements The study was conducted with the financial support of a grant from the Russian Ministry of Science and Higher Education (project “The latest trends in the development of human

sciences and society in the context of the process of digitalization and new social problems and threats: interdisciplinary approach", agreement No. 075-15-2020-798).

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Boris V. Markov Professor of St. Petersburg State University, Honorary Worker of Higher Education, Distinguished Worker of Science of the Russian Federation, Honorary Professor of St. Petersburg State University, specialist in the field of philosophical and cultural anthropology, methodology and theory of knowledge. Graduated from the Faculty of Philosophy (1971), postgraduate studies (1974) from Leningrad State University under the guidance of prof. M. S. Kozlova, has been teaching there since 1974. Doctor of Philosophy (1987), Professor (1989), Head of the Department of Ontology and Theory of Knowledge (1989–1994), Philosophical Anthropology of the Philosophical Faculty of St. Petersburg State University (1994). Academician, full member of the Academy of Humanities. Member of specialized councils for the defense of candidate and doctoral dissertations. Author of over 200 articles and four monographs. The growing interest in the process of civilization led B.V. Markov to the study of the structures of everyday life. The anthropogenic impact of labor, power, social institutions and disciplinary spaces, technology, architecture, mass art is carried out differently than in the world of ideas. In addition to "understanding" B. V. Markov pointed to other forms of experience of recognizing the other, and above all to such as the habit formed by repetition. In the last works of B. V. Markov, techniques of self-awareness and "self-care", the practice of understanding and communication, moral consciousness and rationality are studied as ways to increase self-control and self-discipline of a person living in a particular cultural space. Modernity—a "place of truth" is diagnosed by BV Markov as the loss of human dependence on "soil and blood", as the globalization of virtual reality, which has a transnational and transcultural nature and is no longer regulated by the state. The price that one has to pay for such "emancipation" turns out to be very significant, and philosophy must look for new forms of counteraction to bestialization of man.

Lifestyle Transformation of the Siberia' Indigenous Peoples in the Soviet Period

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Abstract Along with the processes of new lands annexation, the policy of Russia toward the small-numbered indigenous peoples of Siberia and the Far East was formed. Oriented more toward Europe, the Tsarist Government considered collection of the furred tax, yasak, as a primary goal in the annexed territories, paying little attention to the ethnic situation. Even though the nature of Russian colonization was rather controversial, dependence on indigenous hunters, bringing yasak, limited the severity of the conquerors. Up until the beginning of the eighteenth century, the Russian government did not interfere in the internal life and system of the aboriginal population self-organization. Only in 1822 does the "Charter on the management of non-Russians" appear, compiled by M. M. Speransky, an outstanding document for its time, which regulates the relationship between government representatives and

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V. N. Bocharnikov and A. N. Steblyanskaya (eds.), *Humans in the Siberian Landscapes*, Springer Geography, https://doi.org/10.1007/978-3-030-90061-8_18

indigenous peoples, taking into account the peculiarities of their development. The life of the indigenous peoples ensured by this document hadn't been changing until the arrival of the Soviet power. The specificity of the historical fate of Siberia, as a single super-region and a particular cultural-historical type, determined the features of the industrial revolution, the central contradictions of which passed into the Soviet period. This was preceded by an industrial revolution that began at the end of the nineteenth century and was continued in Soviet Russia. The twentieth century was the time of the search for a new policy toward the aboriginal population. The indigenous peoples were involved in the process of socialist transformations, the policy toward which was rather contradictory: during the socialist transformation toward the indigenous peoples of Kamchatka in the first period (the 20s—the beginning of the 30s of the twentieth century) a patronage policy was carried out, observing gradual changes, taking into account the interests of the peoples, their national-cultural characteristics and economic identity, but since the mid-1930s. The interests of the North peoples were subordinated to the needs of the forced building of socialism. Along with the achievements, there were also negative consequences: the erosion of the aboriginal lifestyle, destruction of culture, loss of native languages. This happened to the Rassokha group of Evens, when the process of involving the Rassokhintsi (the people of Rassokha village) into the mainstream of socialist development led to the loss of the traditional way of life. Fortunately, some groups of the Evens managed to preserve traditional beliefs and customs: worship of spirits, commercial cults, first of all—the cult of the deer, which for the Evens had a special meaning: it provided them with movement, clothing, housing, and was a food product. At the same time, the Nanai hunting economy, the most essential activity of this small-numbered indigenous peoples of the North, was seriously damaged. **Key problems**: Soviet modernization has brought the aboriginal population to modern civilization, technical and scientific knowledge, without which the formation of the modern type of personality is impossible. In the socio-economic sphere, the everyday life of small indigenous peoples have been done irreversible qualitative changes, but this did not lead to adequate changes in the spiritual sphere. Continuing to live in the atmosphere of a tribal mentality, the ethnic groups of the Far East were excluded from their natural habitat, losing their original culture and historical roots.

Keywords Socialist transformations · Socialism · Residency · Industrialization · The evens · Collective farm · Deer farming · The Nanais · The Koryaks · Yakutia

Glossary

Indigenous small-numbered peoples of the North (the term Indigenous Peoples of the North is also used) the name of the indigenous small-numbered peoples of Russia living mainly in the Far North and the Far East.

Socialism	an economic system and a social system, where the idea of universal equality and justice comes to the fore, there is no class division of society and the main features of which are social property, collective work, and planning.
Socialist transformations	under the leadership of the communist party, private property was replaced by country-wide one and cooperative, as a result of which the exploitation of man by man and social oppression were destroyed in society, the masses were involved in governing the state, the level of their culture increased, a single world view was affirmed—Marxism-Leninism.
Settled Lifestyle	a Way of Life Consisting in Living in One Place
Industrialization	the process of creating large-scale machine production and the transition from an agrarian to an industrial society on its basis.
The Evens, the Nanais, the Koryaks, the Yakuts	the indigenous peoples of the North.
State Farm	one of the main forms of agricultural enterprises in the USSR; state agricultural enterprise based on state ownership of the means of production.
Kukul'	sleeping bag made of fur.
Red Yaranga	a cultural and educational, propaganda institution organized in a yaranga—a portable dwelling of the peoples of the Far North.
Collectivization	the massive creation of collective farms, carried out in the USSR in the late 1920s–early 1930s by not always voluntary unification of sole farms. Collectivization was carried out at an accelerated pace.

1 The Peculiarity of the Industrial revolution's Ways in Siberia in the First Half of the Twentieth Century

In the twentieth century in Siberia there was a transition from the agrarian society to the industrial one, which became the main driving force of the country's life. In Siberia the period up to the 1930s is defined as an industrial revolution in all sectors of the economy and the beginning of industrialization. Siberian specificity was manifested in the special logic of its modernization.

1. In the center of Russia, an industrial revolution began with light industry, then it covered heavy industry, transport, communications, and agriculture.

In Siberia, modernization began with water transport and the railway, which created conditions for other industries.

2. In Russia the industrial revolution triumphed by the 90s of the nineteenth century, and it was taking its first steps in Siberia. Here it will have been mainly completed only in the 1930s after the mechanization of the minerals industry. The beginning of the twentieth century is considered as the end of the manufacturing era in Siberia. By this time, the mining industries, the largest of which were gold mining and coal mining in Siberia, were developing more strongly than the processing ones. Siberia produced three-quarters of Russia's gold, but its processing industry consisted of small enterprises.

In 1891, the Trans-Siberian Railway construction began, which made changes to the rhythm and life of Siberia: "After the discovery of America and construction of the Suez Canal, the history hadn't marked the more outstanding, and richer on direct and indirect consequences, events than the construction of the Siberian Railway" (Sabler and Sosnovsky 1903). Transsib included Siberia in the all-Russian and world market, contributed to the growth of the working class in the Eastern regions of the country. The flow of fund from the European part of the country into the Asian part began. A number of Siberian cities have become the major industrial centers: Tyumen, Tomsk, Novonikolaevsk, Krasnoyarsk, Irkutsk, Chita, Khabarovsk, Blagoveshchensk, Vladivostok.

Before the First World War, only the coal industry of Siberia was fully developing, but its production processes were almost non-mechanized. Logging, gold mining, processing industry—the main range of modernization areas of Siberia these years. And in the twentieth century, Siberia maintained the role of raw material supplier in Russia's economy. The main importance was agriculture, which occupied two-thirds of the activities of the Siberian region in 1913.

With the activation of industrial production in Siberia, the flow of immigrants who settled in rural areas has expanded. They contributed to the spread of the Russian plough, threshers, fanning-machines, pedigree livestock, which, under crossing with local breeds, gave a significant increase in livestock raising productivity.

The geopolitical specificity of Siberia softened the losses of the World War of 1914 for it: with a sharp decrease in population in European Russia, in Siberia, it increased significantly due to refugees and prisoners of war. There was a demographic boom in Siberia, although it was on the verge of a powerful crisis too. In many cities, incomes of the population were growing rapidly.

The structure of the economy of Siberia included domestic production, manufactories, factories, attempts at monopolization, but small commodity elements were prevailing. A number of industries in the East turned out to be weaker than in the western part of Russia (metallurgical and textile production). There was the need for speedy industrialization as Siberia lagged largely behind the central regions of the Union, although regarding its wealth it had every reason to develop a large-scale industry. The accelerated rates of industrialization were considered a means of overcoming the extensiveness in the development of the Siberian economy, improving the quality of goods and reducing their cost.

Siberia was of particular interest for the foreign capital investment, which contributed to an increase in the production of goods, the rise of agriculture, and improved the living conditions of the Siberian population. The economy was aimed at supporting the poorest people with loans and accommodations, cooperation was developed.

The socialist restructuring of the economy in the national regions of Siberia presented enormous difficulties. The small-numbered peoples of the North have developed another administrative structure: the clan (with the clan Council)—native or nomadic rural council—the national districts. For the formation of national rural councils it was required to have at least 80% of the native population living on its territory. Laryansky national area (the Ostyaks) was formed in the district of Tomsk, in the Krasnoyarsk district—Baikitsky national area (the Tunguses). It was established a Committee to promote small nations in Sibkraykom (Committee of Siberia Region). Gradually, a social structure of the same type as of the Soviet society was developed in Siberia.

One of the most difficult social and economic problems of socialist construction was the task of transferring nomads to settled life. The Khanty, the Mansi, the Nenets, the Selkups, the other peoples of the North were engaged in special sectors of the economy. None of the crafts could secure people enough, and they were looking for additional sources of livelihood: they were engaged in hunting and fishing, picking nuts and berries. With the preserved natural structure of the economy of the indigenous peoples of the Ob North, a primitive home-made technique remained, the processing of materials was carried out using self-made tools. At the same time, the products of the peoples of the North were distinguished by a good quality, purity, and elegance of work. For a long time their material culture was adapted to the harsh conditions of life in the taiga and tundra, practical sharpness was also reflected in the structure of the home, and in special clothes and shoes that saved from frost in the tundra (Sergeev 1953). The transfer of nomadic peoples to settled life meant for them entry into the agrarian stage of evolution.

Violation of the traditional Northern culture led to the fact that vast territories of the taiga and tundra were becoming deserted, losing the possibility of using their rich natural resources. Not all the nomads accepted a settled way of life, there were frequent returns to a nomadic way of life.

The efficiency of industrial production in Siberia was restrained by the level of education and the workers qualifications. Highly skilled workers were required in order to increase the labor productivity. New higher education institutions were being opened in Siberia, specialists from Austria, America, Germany were invited to the enterprises, and domestic workers were training abroad. Every year, the proportion of engineering and technical workers in the national suburbs increased. In most regions of Siberia, the formation of the working class was basically completed by the beginning of the Great Patriotic War.

The war led to the redistribution of material and industrial resources within the state. Central and Western Russia were at the heart of military activities, and the role of the economic, industrial, and cultural center was transferred to Siberia. Production departments of the evacuated to Siberia more than 400 factories from the republics

of the USSR initiated its grandiose industrial reorganization. On their basis, self-sufficient powerful enterprises-giants of heavy, metallurgical, manufacturing, chemical industry developed, giving it the status of the industrial, transport, and energy hub in the postwar years.

A special role in the modernization and industrialization of Siberia was played by the development of virgin and fallow lands, and the participation of young people in the largest shock Komsomol construction projects in the East and the North. More than 150 construction projects have been declared as All-Union shock projects, to which more than 800,000 young patriots were sent by Komsomol permits from various cities of the Soviet Union.

The diversity of natural resources and minerals makes Siberia a crisis-resistant formation. The energy, economic, industrial, scientific, and technical potential that has developed here makes it possible to holistically solve a lot of problems. And yet, in its current state, it cannot be called a system or an integral regional industrial complex. With all the individual high and bright achievements in the economy, Siberia retains a stable place as a supplier of raw materials these days. With an abundance of resources, it still continues to experience a shortage of material resources and qualified personnel.

Paradox of the current situation in Siberia is that a significant increase in demographic imbalance (a decrease in the number of people of working age, youth, and children) occurs in a region that has great prospects and has a clear focus on the future. The weakening of centralized state control over the use of Siberian resources has led to noticeable negative consequences that require a speedy overcoming.

This tendency is gradually acquiring a global sounding, which today's leading scientists are anxiously thinking about: "Due to the lack of understanding of the need for the deepest dialogue between Nature and a man, we again found ourselves on the threshold of a new and very formidable environmental crisis <…> of a new bifurcation—a new catastrophic restructuring of the very nature of human evolution, if you will, of a new round of anthropogenesis <…> The society has already approached <…> to a certain forbidden line, one of the signs of which is the loss of stability of a number of processes occurring in Nature <…> Man will have to learn how to fit into the natural cycles of the biosphere again" (Moiseev 1998).

Currently, the crisis is unacceptably long. The aspiration to centralization of a new type based on voluntary and interested cooperation is one of the powerful resources for the development of the region, which must be fully expanded and supported.

2 Formation of Soviet Siberia as a Specific Cultural and Historical Type

Siberia is an enormous super-region, organically united with Russia, and at the same time having bright specificity. Even geographically, it was discovered and developed much later than the central regions of the country. At the beginning of the twentieth

century, Siberia was an agrarian outskirt, a 90% peasant country in which the pace of agricultural development was ahead of industrial development. All processes and events reached Siberia later, and its culture was traditionally built as an "echo" of the culture of Russia.

The twentieth century has acquired a special meaning in the logic of the development of Siberia. Bordered by two powerful transitional epochs, it itself became a tremendous jerk, a "great rise"—in I. Ilyin's metaphorical expression: "It was a great rise of the depths, a thirst for light, an aspiration for heaven, an eruption of creative will …The dream of a new, perfect form, of a new wealth of being, of the approach of earth to the heaven has risen … "(Ilyin 2006). In the image of a grand mountain range, where the ups and downs suddenly change, the smooth slopes turn into steep cliffs, the essence of the culture of Siberia of the twentieth century is most fully expressed. There were climbing the steps of enlightenment, rushes to a new culture in the remote "depths" of the harsh Siberian region, and unexpected breakdowns and throwbacks in social, economic, and cultural development, and that natural, then artificially directed movement to "light," to "heaven," but always as an "eruption of creative will"!

The processes taking place in the twentieth century in Siberia became the realization of the "rebellious dream" of a new country, proletarian culture, of a "new man—the builder of communism," and of a communist structure of life, utopian in its ideal unattainability. The dream matured and strengthened, demanding incarnation. "It was a violent uprising, terrible and chaotic. But it came from the last depth; it was sincere, and its sparks flew towards the heaven: it was fiery, and its flame prayed to the Creator; and the cliffs were melting because of this fire, and primitive stones were flowing in a stream" (Ilyin 2006).

Powerful social cataclysms of the twentieth century—two World Wars and two revolutions—determined the country's development line for a whole century, at the very beginning of which many contradictions were sharpened to the limit. There is a rapid political restructuring in Siberia, the active development of cities and technology, the development of new natural resources, ideas and values, and these processes have their own specifics here.

The establishment of the Soviet power on the territory of Siberia took place from October 1917 until February 1918, and became one of the largest tragedies in Russia: it changed the ethnic and demographic map of the region, the ecology and economy, the whole way of life, value system and spiritual foundations of the culture of the peoples inhabiting it, the traditional consciousness of which understood the new ideology with difficulty. In May 1918, an anti-Bolshevik uprising of Czechoslovak corps broke out, and the White Guard rebellions took place. Soviet power fell in Siberia, which meant the abolition of the Soviet order and the rejection of the Soviet cultural policy. The White Guard regime was established throughout the region for two years. In Omsk, a Temporary Siberian Government was created, headed by Admiral A. V. Kolchak, and the city itself acquired the status of the capital of Siberia. In the 1920s, the "War Communism" regime was introduced in the USSR and Siberia. A new type of person was "forged" in the crucible of military operations at the front, hard work in the rear, the constant struggle against various enemies of the new system.

The education system was like a giant "furnace of revolution" in which "steel was tempered". In 1921, a new economic policy (NEP) was launched in Siberia. The main actors in Soviet Siberia and its proletarian culture were the working class and the peasantry.

The most important feature of the culture of the early twentieth century is called striving for novelty, the rejection of the past (Kagan 1997). During this period, a radical and uncompromising break with the past also becomes a determining quality in Siberia. The beginning of a new evolution of culture was marked by the steel line of the Trans-Siberian Railway, which separated the past epoch from the era of tremendous changes with an eternal border.

The ultimate diversity of the twentieth century culture was embodied in Siberia not in the diversity of philosophical and artistic trends, but in the ethno-social eclecticism of population and the incredible diversity of traditions. And the predominance of the Russian population did not smooth the problem. The difference between cultures of indigenous peoples and Russian peasants was significant. It is noted that primitive-communal relations among the peoples of the North remained until the October Revolution of 1917. The level of culture was different even within the nomadic and settled parts of one nationality.

The management of the affairs of national counties in the Soviet period was carried out mainly by representatives of the indigenous ethnic group. "In the Gorno-Shorsky district, the Shors accounted for 50% of the presidium of the district executive committee, mass work with the population was carried out in Shor, and the clerical work was in Russian. In other districts of ZapSibkray (Western Siberia Region), where there were 86 purely national (not mixed) rural councils (including 8 Estonian, 21 Kazakh, 20 Tatar, 15 German, 12 Chuvash, etc.), the paperwork was conducted in Russian, and mass-political, cultural and educational work in the native language of national minorities" (Krasilnikov 2006).

The cultural revolution in the national regions of Siberia was carried out as part of a single process in the country, based on common ideas. In Siberia, one had to solve additional tasks: the formation of a national labor intelligentsia, the creation of national-cultural centers. In studies on cultural construction, the leading role of Russian culture in the development of national minorities of the USSR and its humanitarian assistance in the development of proletarian culture are noted.

The Great Patriotic War became the tragic peak in the development of Soviet culture in Siberia, which terrible experience restructured its culture in accordance with the ideals of socialism, rallied the population of the country and Siberia into a single community of the "Soviet people." There were no fights on its territory, but it was included in war with human and labor reserves. In Siberia, the number of conscripts to the front was 20–25%. There are thousands of Siberians among the heroes of the Soviet Union, including the Russians, the Buryats, the Yakuts, the Khakas, the Altaians, the Nanais, the Evenks, and others.

The main vector of Siberia's development in the Soviet years becomes the movement from the agrarian society to the industrial: "It was this process that was the main driving mechanism of the country's life, and other economic, social and political processes were derived from the main essential course of history. The formation

of an industrial society in each region of Russia had its own characteristics, although it was mainly determined by all-Russian factors" (Zinoviev 2003). He identifies three stages of evolution that societies must pass through: agrarian, industrial and post-industrial, or informational.

The transition from the agrarian stage to the industrial stage is called modernization. It fixes the development of life-support technology, determines the measure of society's dependence on the technogenic environment and natural conditions. Competent development of new technics and technology is considered the driving force of the evolutionary dynamics of society. Not having completed the stages of agrarian development, the Siberian peoples, together with all of Russia, began the transition to an industrial state. In Siberia, the process of industrialization has acquired a particular contrariety. Indigenous peoples' living in the taiga, the Far North, and other extreme natural areas led them to develop special traditions of life and land use, representing a cultural model conflicting for industrialization. This fact partially clarifies the unevenness and instability of the development of Siberia.

Currently the issue of preserving the national world views, the richness of the cultures of the peoples of Siberia has become acute again.

3 Socialist Transformations in the Life of the Indigenous Peoples of Kamchatka: Achievements and Problems

"The Declaration of the Rights of the Peoples of Russia," adopted on 2 November, 1917, declared at the legislative level the equality of all peoples of the Russian Federation, including the natives of Northeast Asia (Declaration 1917).

In Kamchatka, large-scale transformations began after the end of the civil war. The general management of national construction in the country was carried out by the Narkomnats (People's Commissariat of National Affairs of the RSFSR), on 20 June, 1924 the Committee of the North was established, and in May 1925—the Far Eastern Committee for Assistance to the peoples of the northern outskirts. In the 1920s a patronage policy was formed which implied the gradual elimination of small-numbered nations from self-isolation and their inclusion in all-Russian life. The main features of such a policy were: the aspiration to take into account the peculiarities of the mentality and economic identity of the indigenous population; attempts to gradually incorporate it into the economic and cultural life of the country; care about the development of Aboriginal language and writing; gradual transformation of their economy on a cooperative basis, etc.

On 27 August, 1924 Dal'revkom (the Far Eastern Revolutionary Committee) adopted a temporary regulation on the management of the indigenous tribes. They were granted the right of self-government, in accordance with their customs, if they did not contradict the basic provisions of the Constitution of the RSFSR. The bodies of the native administrative management were: the general clan assembly, the clan executive committee, the regional native convention, the native regional executive

committee (tuzrik). Karaginsky, Tigilsky, Penzhinsky, Bystrinsky, Aleutian native district executive committees, and clan Councils were established in Kamchatka by a decision of the Dal'kraiispolkom (Executive Committee of the Far East) of 14 June, 1927 (Kuzakov 1973). At the same time, the class line was strictly conducted—the exploiting elements were barred from participation in all government bodies. Researcher M. A. Sergeev, concluded that the adoption of the principle of clan division in the construction of "native" Councils "was to a certain extent fundamentally erroneous and did not fully justify itself" (Sergeev 1955).

Since the 1930s, a period of "Sovietization" began, ethnic self-government was replaced by the state one and the usual system of Soviet administration was introduced, which included national counties, national districts, and national councils, up to rural ones. On 10 December, 1930, the Koryak National County was formed, and in 1932 the Aleutian and Bystrinsky districts of the Kamchatka Region. For the first time in their history, the indigenous peoples of the Northeast were given their national-state associations.

Initially, the creation of national districts had a positive meaning, allowing for the prompt involvement of the northern outskirts in new living conditions and eliminating backwardness. At the same time, the state and legal development of the peoples of the North stopped since their formation.

In the 1930s the interests of the peoples of the North were subordinated to the needs of the state development. An intensive industrial development of the territories of residence and the destruction of the traditional economy and culture of indigenous peoples begin. The status of Aboriginal management was changed. If in the 1920s, questions of life and development of the Northerners were decided at the level of the All-Russian Central Executive Committee (VTsIK) and the Central Committee of the All-Russian Communist Party (Bolsheviks) of the Central Committee of the CPSU (b) (Central Committee of the CPSU (b), then in the 1930s, their management was first transferred to the level of the region, and then into the hands of the district party and Soviet bodies. In 1935, the Committee of the North was liquidated, which led to the deterioration of the situation of small-numbered peoples. "The absence of a single state body to lead the socialist development of the northern outskirts," emphasized I. S. Gurvich,—"had a negative impact on the further course of reorganization of the economy and life of the peoples of the North. In a number of cases, a template approach prevailed both in the commercial farming and in the way Aboriginal people live" (Gurvich 1964).

Before carrying out large-scale events, scientific expeditions were sent to the Northeast to study the productive forces, natural resources, the situation of indigenous peoples and develop a strategy for reforming their lifestyles. In the KNC, industrial development was entrusted to the Kamchatka Joint Stock Company. In 1928, production cooperation began with the unification of the coastal settled population in the KNC. The basic form of industrial cooperation here became the simplest of forms—partnerships. They were created near the coastal Koryaks on the basis of traditional canoe artels (associations for hunting on sea fish) and at deer farmers—on the basis of nomad camps for joint deer pasturing. They switched to the charter of an

agricultural or fishing artel in the war or postwar years, along with the partnerships' growth and social economy strengthening.

V. G. Balitsky emphasized that many party and state bodies "made serious errors" (Balitsky 1969). The process of collectivization in the North, as he believed, "was immensely hurt by the aspiration to solve the most difficult issue of transferring the individual economy to the rails of a large socialist collective farm economy for several years" (Balitsky 1969). Persistent, systematic work, calculated on the number of years, was replaced by shock campaign and administrative pressure. V. G. Balitsky came to the conclusion that "all these measures could only alleviate, but not eliminate the difficult situation of small-numbered nations" (Balitsky 1969). As a result, the way of life of the Aborigines was undercut, which led to a catastrophic decline in the efficiency of their management. The ethnic groups themselves were not prepared for entry into collective farms, they did not understand what caused the need to break their established way of life, traditions, and customs over the centuries. They couldn't understand the principle of the class struggle.

Solid collectivization was carried out in parallel with a no less painful process of administrative introduction of a settled lifestyle among the nomadic population. A. Yu. Zavalishin noted that "the euphoria that arose that time, the confidence that it is possible to build the material basis of socialism and even communism in a few years, gave rise, on the one hand, to desperate attempts to achieve this task, and on the other hand, grossest errors turned into hard-to-count not only material and spiritual, but also human losses" (Zavalishin 1991).

The cultural policy of the Soviet state was carried out under the slogan: "All cultural achievements are for the working people!" The Soviet government faced the difficult tasks of educating a new man, the builder of a socialist society.

The need to eliminate the cultural backwardness of the small-numbered peoples of the North, to join the process of transformation of the economy and social relations, demanded a deep study of their economy, life, and language. In 1926–1927s, a lot of information about the aborigines was obtained in the course of the Circumpolar census in Kamchatka. Since 1930, the ethnographic study of the indigenous peoples of Kamchatka began by the employees of the Penzhinskaya cultbase (cultural base): A. G. Appolov, N. N. Bilibin, V. M. Krylov, E. P. Orlova. The contribution of S. N. Stebnitsky in ethnography and linguistics of the Koryaks was huge.

In May 1925, by decision of the Plenum of the Committee of the North, it was considered expedient to organize cultbase in the Far North—complex cultural and educational institutions that were created in the most separated and least populated areas. In 1930, the Penzhinsky Cultbase of the KNC (Koryak National County) was founded.

One of the most important directions of the cultural policy of the Soviet state was the elimination of the population' illiteracy. During 1932–1936s, writing was created for 14 nations of the Far East. In 1934, spelling-books and books for reading were prepared in the Koryak, Even, Itelmen, Chukchi, Aleut languages. In 1936–1938s, the writing of the small-numbered peoples of the North was translated from Latin into Russian basis. The appearance of writing led to the birth and development of the professional artistic culture of the peoples of Kamchatka.

Before the 1917 revolution, there was not a single lettered Koryak on the territory of the KNC (Koryak National County). By 1934, literacy in the Russian and Koryak languages had risen to 21.1%, and by 1937 to 60% (Sergeev1955). In 1934, the literacy of the Bystrinsky Evens rose to 70%.

Only for seven years—from 1926 to 1932—expenses for the needs of school education in Kamchatka increased by more than 14 times. Among the difficulties can be identified the fact that there were no teachers who knew the language of the aborigines. M. S. Antropov wrote that conducting classes in Russian was very difficult and inconvenient … he began to learn the Even language and conduct classes with younger students in their native language in all subjects except Russian … (Antropov 1931). Secondly, the elimination of illiteracy has not been without administrative pressure from the authorities. In response, deer farmers migrated to the tundra (Pykhteeva 1993a) (Figs. 1 and 2).

At the beginning of the cultural life transformation in the North, the education of deer farmers' children was conducted in nomadic schools. Single and double set schools were fully justified. The school constantly moved from one village to another. This form of education was most appropriate for the nomadic life of the Northerners.

But in 1931, the Committee of the North called for strengthening and expanding the network of boarding schools. Boarding schools were perceived by the local population warily. The deer farmers did not agree their children to leave the nomad

Fig. 1 Enpen Ivan Vekkikovich Koryak chavchuven of Penzhinsky district of Kamchatka Territory. Photo by Yu. Enpen

Fig. 2 Kalyan Maria Khalyulevna—chavchuvenka (nomadic Koryak). Photo by Yu. Enpen

camp. And the children didn't want to leave their parents. Changes in life were very painful for them. It took time to get used to the Europeanized way of life. Sleeping in a cot was not so easy. For many weeks, months, educators stand up to the struggle with the kukul'…. The child, who fell asleep on the bed in the evening, finds himself in a kukul' in the morning …

By 1940, the coverage of local indigenous children by Vsevobuch (universal education) was 93%. And by 1950—almost 100%.

In the 1930s, secondary educational institutions were opened. The Koryak National Pedagogical School in Tigil was among them. In 1934, in the Khabarovsk Teachers' Institute, the Northern branch was opened to train teachers for the schools of the peoples of the North. A huge role in the preparation of the national intelligentsia played the Leningrad Institute of the Peoples of the North CEC (Central Executive Committee) of the USSR named after P. G. Smidovich.

During the cultural revolution in the North, ethnopsychological peculiarities of the indigenous peoples were not sufficiently taken into account. The first is "the predominance of individuals with right-hemispheric brain activity (i.e., with a large development of spatial-perceptive brain functions) among the Arctic peoples"; and the second is "a different system of social control in the Northern communities … based on the depersonalization of responsibility allocated to the whole family group" (Pykhteeva 1993a).

The collapse of the family foundations of the indigenous Northerners, the breaking of the centuries-old clan relationships, the breakdown of the connection between generations are largely due to the boarding school education for children. From 1959 to 1979 Kamchatka's aboriginal languages were not taught in schools. Books in the Koryak, Itelmen, and Even languages were no longer published during that period.

By the 90s of the twentieth century, the level of education and vocational training did not allow Aborigines to occupy a worthy place in society, and poor health often prevented them from working up to retirement (Pykhteeva 1993a) (Fig. 3).

In the work "The Political History of the Russian State," the authors point out that at the initial stage, the Soviet government, "defending the freedom of national development, in fact consistently implemented this most important principle. At the same time, especially at the end of the 1920s, the practice of national politics was increasingly directed towards deformation and a fundamental change in its basic provisions" (Munchayev et al. 1998). In the late 20s–30s, the course was changed to the development of national languages and national culture.

The merger of nations, proclaimed in the country, led to a focus on the internationalization of the culture of the northern peoples to the detriment of the development of the national in their cultures.

Information about the state of health of the local population was fragmentary. Therefore, since 1924, traveling "medical examinations" detachments of the Russian Red Cross Society (ROKK) and the Health Commissariat operated in the North for several years. Traveling detachments marked the beginning of cultural development and the introduction of the people to cleanliness and tidiness. With the formation of national counties and districts, the construction of medical institutions went faster. In 1932, there were 4 medical points in the KNC.

Ten years after the census of the aboriginal population of 1926–1928s in the counties and districts of the Far East, the number of indigenous peoples increased from 4,9902 to 62,761 by 1937, which accounted for an increase of 123%.

The transformations carried out by the authorities throughout the country affected the Northerners. Conducting a struggle against the church, the authorities often exerted unceremonious pressure, demanding a "voluntary" decision of the assembly to close the local church and turn it into a school, club, cinema, or reading room. I. C. Gurvich was one of the first to touch upon the topic of Stalinist repressions against the aboriginal population, which, in his opinion, "had an extremely painful effect on the development of the peoples of the North" (Gurvich 1964).

In the 1920s–30s of the twentieth century, global changes in the socio-economic and cultural spheres, everyday life, equal to the length of the journey of more than one millennium, occurred in the lives of the indigenous population of Kamchatka.

Fig. 3 Chavchuvens—nomadic Koryak women Lilia Alekseevna and Marina Nikolaevna Kechgelkot. Photo by N. Siverina

Cultural modernization has accustomed the aboriginal population to modern civilization, technical and scientific knowledge, without which the formation of the modern type of personality is impossible (Gorelikov 2004) (Fig. 4).

At the same time, the aboriginal rejection of the environment, the barbaric destruction of nature by the minute and mostly with the participation of the aborigines themselves, led to the degeneration of the original culture, sponging, alcoholism, crime growth (Pykhteeva 1993b). Continuing to live in the atmosphere of a tribal mentality, the ethnic groups of the Far East entered a period of deep systemic crisis, which is particularly acute at the present time (Gorelikov 2004) (Fig. 5).

Fig. 4 Kechgelokt Lyubov Seergeevna—Koryak—chavchuven woman. Photo by N. Siverina

4 Deer—The Eternal Companion of the Even

By the middle of the seventeenth century, when the first Russians became acquainted with the Evens, the basis of their material life was deer farming, hunting, and fishing. In view of the peculiarities of economic activity, the Evens constantly wandered in search of better lands.

Deer played an important role for the Evens from ancient times. As the main means of transportation, it was indispensable in the taiga and in the mountains at any

Fig. 5 Yaganova Rimma, nymylan woman—coastal Koryak Photo by N. Siverina

time of the year. The Evens associate a lot of ancient beliefs, everyday traditions and customs, family, ritual, and funeral rites with deer farming.

Many deer farmers say: "Our people will live as long as there are deer. If there are no deer, there won't be our people" (Jernslentten 2003) (Fig. 6).

The Even's deer was distinguished by better tameness, had great height, weight, and was highly valued by the Koryaks and the Chukchi. The Evens are routinely guarding a herd while riding a deer or by foot. They are dissolved on free pasture in the shortest and frosty winter days. Famous scientist V. G. Bogoraz noted that the

Fig. 6 Brothers Sleptsov. Photo by Yu. Sleptsov

Lamut (Even—aut.) deer is valued at twice the price of the Chukchi's deer, usually calfs of the Lamut deer are bartered for the adult Chukchi's deer. The slain Lamut deer is also valued more than the Chukchi's deer (Bogoraz 2012).

In the main works, the researchers note that the Evens in the 17th—at the beginning of the 20th centuries had a relatively small population of domestic deer with an average of 500–600 heads, nevertheless, I. Khudyakov wrote that the Elguetsky (now Momsky and Abiysky districts, author's note) Lamuts are the richest of the foreigners of the Verkhoyansk county; their main wealth is deer. Without knowing the literacy, the Lamuts count their herds as tags; by cutting a small part of an ear from a deer and threading it; then a piece of ear of another deer, the third, etc. The thread is divided by fathoms, and each fathom contains about 1,000 ears. It is said that one Elguetsky Lamut has about 16 fathoms of such threads (Khudyakov 1969). According to the legend, the Even Afanasy from the clan Delyanki was employed by a rich man who gave him 400 heads for his work. The narrator indicates that before being employed by the rich man, he wandered with one friend, who said that he was poor, that he had only 5,000 deer heads (Archive of YCSSBRASf. 5, list 13, d. 73, l. 48–49).

Since the main means of transport of the Evens was a deer (oran), they have perfectly mastered the skill of taming the deer since childhood. Riding on a deer required special skills, they were passed on from the childhood. Young children wandered with adults riding on a deer (see photo number 1).

Children's saddles ("hanka") were made with wide and high bows, to which, on either side, were attached thin onboard lodges, forming a semblance of a box. On both

sides, the front and rear bows of the children's saddle were connected with additional boards (dura) in order to form something like a box, where children between the ages of 3 and 6 were seated. Sometimes a back or something like a canopy was made of willow twigs on the rear part of the seatback on a rainy day or in protection from mosquitoes. In addition, the child was fastened to the saddle with a special strap. The child could, while sitting, play, sleep without fear. A quiet, fearless deer ("Oneruk") was chosen to transport a child (Sleptsov 2014) (Fig. 7).

Riding a deer requires special skills. A child from 5–6 years old rode on his own: boys on a male saddle (emgun), girls on a female one. Right in front of my eyes, a 5-year-old boy first sat astride a deer, probably, a desire to impress or to show up in front of a stranger played a role. First, the elder brother was holding the leash of the deer on which the boy was sitting, then, after several laps, seeing that the brother was holding up, he released the leash, thus the boy rode on his own for the first time. Of course, at first, he got afraid of such a turn of affairs, but, seeing our delight and boasting, he took the courage and began to drive by himself. Later his father thanked me for teaching his son a horseback riding, thereby facilitating the migration, the little one could already ride bareback (Fig. 8).

According to the Evens, a deer must serve its owner after his death. They kill a personal riding deer or a draft deer of the deceased, three men from different sides threw mauts at the animal and strangled it. The corpse of the sacrificial deer was cut into the joints without breaking the bones. Meat was eaten, leaving nothing in store,

Fig. 7 Resettlement. Photo by Yu. Sleptsov

Fig. 8 Young shepherd. Photo by Yu. Sleptsov

part of it was handed out to neighbors or to those who helped dig the grave. The skull of a deer was hung on a special wooden stand near the grave, and they also hung up the skin of a deer there. Having finished with the deer, walking backwards, they were approaching the home of the deceased and when approached, they immediately went to their homes (Sleptsov 2012).

During the funeral ritual of the Even shaman Gavril Sleptsov, three deer were killed. The remains of three sacrificial deer were laid to the west of the grave on a special dais (see photo No. 2). Deer are resting on a dais of larch poles. From the words of the informer Sleptsov Dmitry Gavrilievich, the eldest son of the shaman, the first deer—"manchik"—was intended for laying a path for deer walking behind. A similar method is used by deer farmers when navigating in deep snow in winter. The second deer was considered a riding deer, the owner's favorite deer, and it was called "uchakh." In general, the Evens killed the riding deer of the deceased, and the strongest and most beloved, and they provided it with a saddle and leash. The third deer was meant to be a food for the deceased in the next world and a gift to the spirits of the Lower World.

The knowledge of the environment was determined by coincidence of the rhythm of a person's life with nature, who was forced to bring his life's activity to the immutable laws of nature. From infancy to the old age the Even constantly lived with the thought that visible and invisible forces of nature were soaring above him. Consequently, the Even culture existed in complete harmony with nature.

The surrounding—earth, water, forest, natural phenomena—is personified by the Evens with spirits and brought into the pantheon of deities. The feeling of unity with

Fig. 9 A child in the hanka saddle. Photo by Yu. Sleptsov

nature among the Evens is inseparable from the pagan worldview of the ancestors who deify the world around (Figs. 9 and 10).

5 The Last Nomads of the North-East of Siberia: The Rassokha Group of the Evens in the 1950s–1970s

The Rassokha group of the Evens got its name from the place of nomadic habitat in the upper reaches of the tributaries of the Omolon River in Northeastern Russia, where in the 1950s in the town of Rassokha the transshipment base of the Seimchansky Geological Prospecting Administration was located. In the mid-1950s, the leadership of the newly established Magadan Region became aware for the first time of a large group of individual farmers-deer herders who wandered in the areas of the Yakut ASSR frontiers, after which operations to involve the group in the course of socialist development began (Popova 1976).

Active work with nomads began only at the end of the 1950s, when at a meeting of the bureau of the Magadan regional committee on 25 April, 1958, they considered the question "On working with individual farmers-deer herders who wander around Rassokha" (Grebenyuk 2016). At this point, there was already an idea that the number

Fig. 10 Sacrificial deer near the grave of the shaman. Photo by Yu. Sleptsov

of the Rassokha population was probably more than a hundred people, of course, the current situation could not suit the leadership.

The first experience of joint cooperation with the deer farmers was associated with the activity of the fur factory, established in the settlement of Rassokha in April–May 1958. Almost all of the Rassokha Evens were excellent shooters and skiers. All the gained furs were delivered to the factory of the Rassokha village, and for the first time it wasn't transferred to other areas. According to the data from October 1958 to April 1959, the Rassokhintsi gained and transferred furs to the amount of 56 thousand rubles.

Along with the fur factory, Krasnaya Yaranga was created, at this stage it was important to attract the Rassokha Evens to participate in the elections of the newly formed village council. The employees of Krasnaya Yaranga, the Evens by nationality, conducted work among the Rassokhintsi in their native language, which caused discontent among the "elders." Gradually, the Rassokha people began to help them during the migrations, invite them to the yurts, and by themselves—enter the tent of Red Yaranga.

In order to supervise the work with nomadic deer farmers, in early April 1959 a group of the chairman of the District Executive Committee Pavel Ionovich Nikonov was sent to Rassokha and the places of the nomadic migrations. According to him, the Rassokha group was divided into three nomad camps, wandering at a distance of 20–70 km from each other. In 1959 the whole group consisted of 57 people, them of working age—29 people, including 16 men and 13 women, people over 60 years old,

but taking part in the work—3 people (1 man and 2 women), children up to 16 years old—25 people, them of the school age—12 people (Grebenyuk 2016).

The most important event during the whole trip was the holding of the first session of the Rassokha Village Council in April 1959, on the agenda of which two issues were identified: (1) the opening of the elementary school in Rassokha and (2) the transition to a cooperative economy on a socialist basis. All heads of families were strongly opposed to uniting the collective farm, saying that they want to live as before.

In September 1959, after receiving news from Rassokha that none of the nomads had brought children to school, a helicopter with employees of the Red Yaranga and the Ministry of Internal Affairs was sent to all three nomad camps. On 8 September, 1959, Rassokha children aged from 7 to 14 years old were taken by helicopter from the nomad camps to the Rassokha village (Grebenyuk 2016). At this point, the school had prepared a dining room, a bedroom for boys and girls, clothes, and shoes. During the first academic year, children often ran away back to their native nomad camps, as well as parents kidnapped their children.

In the course of work with the Rassokha group, due to the lack of deer farming experience at the Srednekansky state farm, in 1961 the Rassokhintsi were assigned to the "Buksunda" deer herding farm based in the Omsukchansky district. In 1962, 2.5 thousand deer were bought from individual farmers-Rassokha people (Khakhovskaya 2008). In 1963, the Rassokha deer farming brigades were handed over to the "Omolon" state farm in the Bilibinsky district.

Despite the changes taking place in the environment of the Evens, it should be noted that all the Rassokhintsi continued to lead a nomadic lifestyle and did not live in the Rassokha village. At the same time, refused to join the state farm in the early 1960s, Nikolai Pavlovich Khabarovsky, the head of the Rassokhintsi, was wandering together with his family around the Monakovo district. Up until his death on 15 August, 1965, he exerted a strong influence on all the activities of the Rassokha group and remained the largest deer owner among all the Rassokhintsi. After the death of his father, his son, Pavel Nikolaevich Khabarovsky, in 1966 agreed to work at the state farm. The last Rassokha individual farmer—Rosa Boldukhina—was involved in a state farm in 1967 (Khakhovskaya 2008).

The process of engaging the Rassokhintsi into the mainstream of socialist development, which began in 1956–1958s, stretched out in time until 1964–1965s, when any halfway organized work began within the framework of the "Omolon" state farm department, however there were some nomadic individual farmers who remained not working in the state farm until 1967. The process that was intended to be completed by the autumn of 1959 was formally completed only in 1964–1965s, that is, it took almost 10 years from the moment of the first decision of the regional committee bureau in 1956s. The idea of collective-farm construction was never implemented, and the Rassokhintsi were widely introduced to economic activities within the framework of the deer herding state farm only after the death of the last head of the nomads, Nikolai Khabarovsky, in 1965. However, this did not bring the expected results, normal work could not be arranged, and management problems hindered both the activities of the deer farmers and the head leadership of the "Omolon" state farm. As a result, it was not until 1971 that a new state farm, "Rassokhinsky," was created on

the basis of the Rassokhinsky department, and at the same time the managers needed at least five more years to reach profitable production, the effective work of the deer economy was managed in the second half of the 1970s.

This meant that the methods and decisions made by the leadership of the Magadan region in the late 1950s–early 1960 were ineffective. These decisions did not take into account the background of the issue, the "particularity" of the situation, the mood of the Rassokhintsi, and did not take into account forecasts for the further development of the situation. As it happens quite often, it was in the analogies that the managers were looking for the right answers, and the "strict collectivization plan" of the regional executive committee chairman P. I. Nikonov that was waxing eloquent on it, as well as the originally proposed options for joining the Rassokha people to one of the state farms—"Buksunda" or "Omolon," which were alternately tested. The analogies, which seemed reasonable to state managers, in the overwhelming majority of cases did not lead to correct solutions due to the fact that there was often no informational and analytical discussion of the problem that arose. In their work with the nomads, the managers acted in the course of events, which were changing in the process of deepening contacts with the Rassokha group. An analysis of events showed that at some point, realizing the seriousness of the issue, decision-makers still preferred a relatively mild scenario. The plan to isolate the leaders of both groups and confiscate the deer belonging to them (Grebenyuk 2016) was not put into action, but at the same time the children of the Rassokhintsi were brought to school using pressure.

A possible solution to the issue—the creation of the deer collective farm base in Rassokha—was proposed by P. I. Nikonov to the leadership of the Magadan region in the fall of 1959. The need for significant financial resources has influenced the choice of a less costly and more obvious way to solve the issue. This path led the management to errors in the formulation of long-term goals, since it did not take into account the predictive efficiency of the group's economic activity, but quickly closed the main question for managers—dekulakization and disappearance of the last nomads from the country map, as reported by the leadership of the Magadan region since the early 1960s, as if the case was solved.

6 Transformation of the Nanai Hunting During the Soviet Period

The Nanaian economy belongs to the economic-cultural type of settled fishermen, hunters, and collectors of the large rivers' basins, it has a complex, natural character. Hunting, as the most important activity of the Nanais, is reflected in their economic calendar. The Nanais distinguished the names of harvested animals by age and sex.

In the Soviet period, hunting has changed dramatically. Most of the traditional hunting equipment and harvesting methods were banned and out of use.

In the first years of Soviet power, hunting was practically not regulated. The number of hoofed animals was reduced, the sable was almost completely killed. The traditional hunting lands of the Nanai have lost their immunity. The best harvesting grounds were mastered by Russian hunters, which was discussed at the 1st native congress of the Far Eastern region (First Native Congress D. V. O. Khabarovsk 1925). Decrees of the Soviet government on hunting (on the timing of hunting weapons); (On the hunt) did not take into account the peculiarities of the aboriginal economy and put them in a difficult position.

In the mid-1920s, hunters did not have enough ammunition and weapons. Under these conditions, the AWOLs started to be used again. The output of hunting fell by almost half (Ibid.).

In the 1920s, consumer cooperatives of Dal'kraisouz (Union of the Far East) got engaged in hunting organization (State Archives of the Russian Federation. F.3977. Op. 1. D.365. L.92.). The resolution of the Dal'kraiispolkom "On the rules and methods of hunting in the Far-Eastern Region" allowed the peoples of the North to hunt without a hunting ticket, to use crossbows, determined the terms of hunting animals and birds (RGIA DV. 2413. P.).

Weapons and harvesting equipment were sold exclusively to members of the cooperative, and were given on lease to private owners who cooperated with the fishing guilds of Dalkraisouz (State Archives of the Russian FederationF.3977. Ref. 1. D.419. L. 134). Aborigines engaged in private harvesting were classified as poachers. Production partnerships and collective farms were created on the basis of cooperatives.

At the end of the 1920s, the hunting economy of Lower Amur was severely undermined by massive logging (RGIA DV. F.2413. Op. 4. D.1046. L. 44.). In 1932, a ban on the killing of sable was established in the Amur River region, and in 1935 an all-union 5-year ban was imposed (Sukhomirov 1985). The material situation of the Nanaians deteriorated, therefore the northern provision was introduced in the region (Archive of the IIAE FEB RAS. F.1. Op. 2. D.144. L.219.). The Nanai hunters switched to the killing of less valuable fur-bearing animals. Sable hunting was resumed only in the early 1950s. In the 1930–40s, smoothbore guns dominated harvesting; there were few rifle weapons. The lack of traps was partly filled by old hinges, sable traps, and dies.

After the war, the hunting lands of the Nanaian region amounted to 2,013,973 hectares, there were not enough hunters, dog sleds were still the means of transportation, restrictions on fishing, and, as a result, lack of dog food. These and other reasons forced to hunt in the nearest lands (Ibid Op. 4. D.14. L.2-3.).

In 1955, 18 fishing and 2 hunting collective farms were engaged in the gaining of furs in the Nanaian region (Ibid L. 3). The main object of the harvesting during these years was squirrel, in the Nanaian region it was gained up to 80 thousand units per season. The preserved cedar forests of Komsomolsk and Amur districts had more squirrels (Rosugbu 1976).

In 1952, 78 Yakut sables were released into the lands of the region (State Archives of the Khabarovsk Territory. F.1747. Op. 4. D. 10. L. 51; D. 14. L. 1.). As a result, its production, by the end of the 50s, has grown significantly, on average, 412 sables

per year (Ibid D.5. L.4; D.39. L.4; F.137. Op. 14. D.2420. L.52.). From 1936 to the 1950s, the American mink was released in the Southern regions of the Khabarovsk Territory and in Primorye. They started to gain mink in small quantities since 1944, i.e., the bag output of up to 10% of stockpiled fur (State Archives of the Khabarovsk Territory F.1747. Op. 4. D.5. L.4; D.14. L.1; D.39. L.4.)

Komsomolsky, Troitsky, and Amursky KZPH (Cooperative Animal Industrial Economy) were created in the Khabarovsk Region (Sukhomirov 1985). In 1968, purchase prices for furs were increased. Distant hunting lands started to be mastered, new winter quarters were built (Ibid). Hunters began to be divided into resident, seasonal, and amateurs. In the 70–80s the number of the Nanai hunters in harvesting farms began to decline. The main reason is the fall in the prestige of the hunter's labor at the Nanaian youth (Boyko 1977). In order to remedy the situation, in 1975 the new "Rules for Hunting in the Khabarovsk Region" were approved. Hunters-Northerners were granted with privileges—they were allowed to hunt from the age of 14, not being a member of the society of hunters, they did not pay state fees, etc. (Archive of the Institute of History, Archeology, and Ethnography of the Peoples of the Far East of the Far Eastern Branch of the Russian Academy of Sciences, f.1, op.2, d.354, l.228). However, the beast could be killed only under licenses or under contracts with industrial farms. By the beginning of the 1960s, the traditional harvesting lands of the Nanais became the property of numerous hunting public departments.

By the beginning of the 70s, the total number of resident hunters in the Khabarovsk Region was approximately 30 thousand people (Sukhomirov 1985). Of these, only 38 Nanaians worked in the harvesting farms of the Khabarovsk Region in 1990. This is a peculiar result of the development of the Nanai hunting industry during the years of the Soviet power. This branch of the traditional Nanai economy virtually ceased to exist. The hunting of the indigenous population of the Amur region is currently only amateur.

7 Conclusions

Many of the Soviet government documents, which determine the policy toward the indigenous small-numbered peoples of the North, objectively took into account the specifics of their culture and economic structure, and declared positive changes. However, the implementation of these decisions in the conditions of solid collectivization and the forced construction of socialism led to sad results: the principles of voluntariness and legality were violated in the most severe manner, and the living conditions of indigenous peoples were deteriorating. Migrations of the 1960s finally completed the destruction of the main traditional institutions of the North of Russia' indigenous peoples: the traditional economic complex, family-kinship ties, traditional systems of settlement and sustainment, led to the loss of their cultural characteristics.

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Siberia's Nature and Natural Resources in the Culture of Indigenous and Russian Population

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Abstract This chapter is devoted to linguistic and confessional images of Siberian landscapes that develop and exist among the indigenous Siberian and other groups of the Russian population and represent tools for their diachronic and synchronous analysis. The data in the chapter is represented by lexical and folklore-ethnographic field material. This data allows characterizing two groups of ideas about landscapes, reflected in the language, rituals, and narratives—about the originally sacred nature of the residence place and the ability of religious rituals to act as tools for developing new territories. Reconstruction of the Siberia landscapes' language images was carried out using a linguogeoiconical approach aimed at systematization, visualization, and cross-cultural analysis of language geographical information. As a result, the "folk geographies" sources of variability are established and the relationship between the assessment of landscapes as "own"/"strangers", "mastered"/"undeveloped" and economic practices of ethnic, religious, and social groups is characterized. Reconstruction of confessional images of the Siberian landscape is realized based on the comparative historical method. The analysis of visual, ritual, and verbal practices of

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V. N. Bocharnikov and A. N. Steblyanskaya (eds.), *Humans in the Siberian Landscapes*, Springer Geography, https://doi.org/10.1007/978-3-030-90061-8_19

Russian and indigenous ethnic groups revealed the fundamental similarity between natural functions and artificially created sacred loci: they are used to rank value norms and behaviors and support ethnic and religious identity. Also, the chapter explores two modes of attitude to minerals as resources to be extracted and capitalized, and in this regard, the landscape is nothing more than a passive space accommodating resources and minerals as belonging to local deities who govern them. Both approaches to the landscape lead to a different understanding of the landscape and its identity.

Keywords Landscape · Culture · Language picture of the world · Ethnography · Linguogeoiconics

1 Introduction

The natural substrate for the existence of humankind or the enclosing ("feeding") landscape (Gumilev 1972; Gumilev and Ivanov 1992) is connected by a complex system of direct and feedback links with the spheres of the material and spiritual life of ethnic groups. Relations in the system "natural landscape—the spiritual culture of an ethnic-confessional community" are the object of research for several sectoral disciplines and interdisciplinary areas—ethnology; social anthropology; ethnolinguistics; lingo-geography; sociolinguistics, historical, ethnocultural and humanitarian geography; cultural and ethnocultural landscape studies (Levinand and Cheboksarov 1955; Vahtin and Golovko 2004; Berezovich 2007; Gerd 2005; Sokolova 1996; Kalutskov 2000; Gerasimenko 2012, etc.). The landscape structure and natural resource potential of the ethnos' residence territory are reflected in the spiritual component of traditional culture, which forms the historical outline of any ethno-confessional community. This side of the world is most fully represented in the lexical composition of the language (toponymy, microtoponymy, folk geographic terminology, names of sacred natural objects, and geocomplexes), religious beliefs, and ritual activities-specific elements and components of the landscape.

Russian geographers initially considered the landscape or geocomplex as a system consisting of interrelated components—relief, climate, waters, soils, vegetation, and fauna, which to one degree or another are involved in the system of spiritual culture of the local society. Natural zones as an environment for the existence of ethnic groups were studied already at the formation of landscape science (Berg 1930). The objects of research were the natural resource potential of landscapes, the development and transformation of the territory, and vivid evidence of the adaptation of ethnic groups to the natural environment, which is also noted by foreign researchers (Shaw and Oldfield 2007). The study of dialectal vocabulary and toponymy began even earlier—in the middle of the nineteenth century (Murzaev 1984), and not only to create scientific classifications of soils (Dokuchaev 1887), forests (Morozov 1949), and geocomplexes (Solnzev 2001; Milkov 1981) but also to restore the course of colonization and movement of the masses, the mutual influence of ethnic groups (Berg 1915), and geographic reconstructions (Semenov-Tyan-Shanskii 1924). In the late 1960s,

at the junction of history, ethnology, and landscape studies, a new scientific direction took shape—the landscape historical geography (Zhekulin 1969). The use of historical, ethnographic, and historical sources, toponymic and landscape-lexicological methods (Zhekulin 1982), and a complicated lexico-geographical research method (Sokolova 1996) were allowed to reconstruct the perception and assessment of natural resources by the local society at different historical stages.

Currently, two approaches to the landscape have been developed in Russian geographical science. On the one hand, it is viewed as an entity that resides in the physical world but is involved in the spiritual culture system. Note that the cultural landscape of K. Sauer also had a landscape basis (biophysical basis) (Sauer 1996; Kolbovsky 2006) and humanitarian geography, where the subject of research is geocomplexes, natural and socio-economic objects and phenomena, and has the linguistic and visual images. This direction is defined as linguogeoiconics (Sokolova 2005, 2011). The systematization of geographical vocabulary in conjunction with the designated objects and phenomena has shown that native speakers perceive the landscape as a simple, less often complex whole or as a set of elements and components, the relationship between which is not always understood. Similar studies in the West are carried out within ethnic physical geography—ethnophysiography (Turk et al. 2011; Duvall 2011, etc.). Linguists and ethnologists more often study separate groups of toponyms and folk terms denoting landscape components (relief, vegetation, commercial fauna, etc.), as well as types of natural resources—mineral, agroclimatic, biological (Lindberg et al. 1980; Borchwaldt 1998; Yumsunova 2005, and others). However, there are works in which mythology and geographic vocabulary are studied in combination with natural and cultural realities (Tuchkova 2014).

Another approach is associated with the "dematerialization" of the landscape, representing it not as an entity that resides in the physical world, but as a metaphor, text, image, or scene. This idea was initially promoted by English-speaking geographers (Cosgrove 1984; Cosgrove and Daniels 2011) but later developed in Russia (Shaw and Oldfield 2007). This was facilitated by the close convergence of geography with philosophy, anthropology, and cultural studies. The emergence of geography beyond its traditional subject area was marked by the appearance of metageography in the interpretation of Zamyatin (2004). Geocomplexes have been regarded as a substrate of cultural phenomena and a factor in forming a grid of cultural landscapes (Vedenin and Kuleshova 2004). The structure of the ethnocultural landscape in the model of the geographer Kalutskov (2000) is determined not so much by the landscape differentiation of the territory as by the spatial relationship between the settlement (the core of the ethnocultural landscape) and the surrounding area. Previously, this model was defined in historical geography as a village—a settlement with land (Lubavsky 1909) and a settlement-neighborhood system that preserves the physical and geographical content of the concept of a landscape (Raman and Steins 1980; Skupinova 1982). In North Russian dialects, this relationship between center and periphery is fixed by the lexeme pechishhe "settlement with land". The stove (pech') in traditional Russian culture is the most critical component in the house structure, which in turn acts as the core of the peasant micro- and macrocosm, the ecumene (Sokolova 1996). The sacred center of the peasant ecumene personifies the

temple, around which small (central) and large (remote) zones of the parish space are formed with religious buildings and signs scattered throughout the parish (Kamkin 1992; Terebykhin 1993).

Almost all geocomplexes involved in the system of economic activity and ritual practices were sacralized. Such diffuseness, an indistinct separation of the rational and the irrational, the natural and the cultural, is a characteristic feature of traditional culture, which is based on the postulates of mythological thinking and narrative knowledge. In works devoted to the specifics of the former (Levy-Bruhl 2002; Meletinskij 2000), one is thought through the other using images—concepts "pasted" into objects (Levi-Strauss 1994), which creates a close articulation of all elements of culture. Thus, the manufacturing techniques for several things belong to the field of sacred knowledge (Baiburin 1993). Travelers, employees, prisoners of war, and exiles who visited the region in the seventeenth–early twentieth centuries intuitively caught this fusion in the cultures of the peoples of Siberia and fixed the brightest elements of the aboriginal population's material and spiritual culture (Titov 1890; Katanov 1905; Sinner 1961, 1968; Ides and Brand 1967).

The sacred sphere of the peoples of Siberia and sacralized loci were studied during the entire research period (Pallas 1772; Georgi 1776; Bunge 1830; Radloff 1884; Harva 1938). Finnish researchers made a great contribution to the study of the culture of the Ob Ugrians, Khanty, and Mansi, and one of the main subjects in Finno-Ugric studies was the religious sphere, closely associated with the sacralization of plants, animals, and natural landscapes (Karjalaien 1921, 1922, 1927; Kannisto 1938, 1958). Russian ethnologists proceeded from a close articulation of all cultural subsystems associated with traditional economy, consumption norms, social regulation, including the sacred, rational, and irrational knowledge (Arutjunov and Markarjan 1983). Simultaneously, the natural-ecological subsystem was decisive, the content of which determined the specific exchange of society with the natural environment (Markarjan 1983; Krupnik 1989). Attention was always paid to animistic beliefs, the processes of anthropomorphization of geocomplexes, and their elements and components; attribution of revered relief elements, stones, trees, animals; hypostasis, objectification of natural realities, phenomena, and their connections (Kulemzin 1976; Gemuev and Sagalaev 1986; Golovnjov 1995; Zen'ko 1997).

Currently, sacral landscapes are becoming objects of study, the ethnocultural markers of religious buildings and objects of nature endowed with a sacred status (Panchenko 1998; Glavatskaya 2008). Issues related to walking to holy places and other means of communication with the sacred world are revealed in the works devoted to the phenomena of pilgrimage, hermitism, and monasticism in Christian culture (Turner and Turner 1978; Eade and Sallnow 1991; Coleman and Elsner 1995). In the sacred landscape Ob Ugrians, the special attention of scientists was attracted to the cult of the bear, the brightest manifestation of which was the Bear Festival (Schmidt 1989; Csernyecov 1997; Wiget and Balalaeva 2011), among the Altai—the phenomenon of Burkhanism, which laid the foundations of a new type of sacred relationship with nature by replacing a bloody sacrifice with a bloodless (Danilin 1932; Potapov 1948; Balzer 2005; Sherstova 2006, 2010).

Geographic vocabulary (folk terminology and toponymy) in the languages of indigenous ethnic groups and the Russian population is considered in publications of discoverers and researchers (Krasheninnikov 1755), local natives (Chikachev 1990), entered regional dictionaries of dialect and borrowed vocabulary, etymological dictionaries, dictionaries (Eliasov 1980; Anikin 2000, etc.), and dictionaries of geographical terminology (Rosen and Maloletko 1986; Labunets 2003). The geographic and linguistic aspects of folk terminology, toponymy, and toponymic development of the territory have been analyzed (Melkheev 1969; Vahtin et al. 2004; Burykin 2006; Sokolova 2011; Tuchkova 2014, etc.).

2 Zonal Types of Landscapes in Folk Terminology and Mythology

The primary sources of folk geographic terms are dictionaries of indigenous languages, regional and local dialect dictionaries (geographic vocabulary is revealed by continuous sampling). The method of constructing a verbal image of a landscape consists of three "K": (1) classification of folk geographic terms and construction of terminological systems; (2) qualitative, quantitative, and cross-cultural analysis of terminological systems; (3) mapping of objects of nomination, creation of maps with a double (scientific and "folk") legend, supplemented by onomastic vocabulary (toponyms, ethnonyms, katoikonyms).

The composition and structure of folk geographic terminology and toponymy in the languages of the indigenous ethnic groups of Siberia and Russian peasants is determined by the landscape differentiation of the territory of residence, the specialization of the economy, and the peculiarities of spiritual culture. The cultures of arctic hunters and fishermen, tundra reindeer herders, taiga hunters and reindeer herders, and steppe herders are associated with the zonal types of landscapes and their mountain modifications. Fishing cultures in large river basins are related to different natural areas (Levin and Cheboksarov 1955). Among the Russian old-timers of Siberia in the south of the taiga zone and in the forest-steppe, nature management was complex. Fur trade, hunting, and fishing were developed in the tundra and northern taiga zone.

The folk terminology of the inhabitants of Siberia reflects the geographic reality very objectively and in detail. The systems of terms "Mountainous and flat relief" (22% in the geographic vocabulary of Russian dialects of Transbaikalia), "Waters" (about 20% of terms), "Vegetation and fauna" (35% of terms) have a significant volume (Sokolova 2013). In the languages of peoples living on the plains, the geographical concept of "mountain" may be absent. Thus, in the Selkup language, only the riverine heights and watersheds overgrown with forest are characteristic of the Middle Ob region. The earth itself appears to be flat, "like a plate" and rests on water. It is supported by mammoths, preventing it from falling (Tuchkova 2014).

Landscapes and their components are perceived primarily in the context of activities. For example, the lexicon of the Evenk language, which characterizes communications and the environment of movement, includes the names of landforms (mountain, hill, knoll) and zonal types of geocomplexes (tundra, taiga, steppe) and geocomplexes of river valleys: amnunna—"a grassy place in the taiga, which appeared instead of the former ice" (Chapogir 2017, p. 184). Landforms can act as landmarks and observation points: oróy—"the top of the highest mountain you can see" (Eliasov 1980, p. 269) (from the Buryat oroi—"top of a mountain" (Cheremisov 1973), p. 361); look—"A high place from which to view a large area" (Eliasov 1980, p. 90).

Consider the folk geographic terminology that characterizes the main zonal types of landscapes.

Plain and mountain tundras (loaches) have names in the Evenks, Chukchi, Buryats, in the Russian dialects of southern Siberia and the Arctic. Landscapes of plain and mountain tundras are reflected in the nature management's vocabulary (mountain pastures of deer, passes of different passability, etc.). Loaches and snowy peaks have become objects of sacralization and worship among all ethnic groups living in the mountainous regions of Siberia. The cult of the mountains continues to this day (Abaeva 1992; Anayban and Tyukhteneva 2008).

The North Russian word séndukha in the meaning of "tundra, nature" is used by the Russians, who have lived for more than 300 years in the lower reaches of the Indigirka and Kolyma rivers (Republic of Sakha-Yakutia). This group of the population associates the tundra with the core of the developed space—the ecumene and has a spirit-master—the soul (Chikachev 1990, p. 160). In the south of Siberia, in Transbaikalia, tundra (trunda), on the contrary, is associated with the northern limit of the ecumene, the achievement of which requires unique motivation (prospecting for gold deposits, etc.): "Yes, I got to the trund. They were looking for all the gold …" (Eliasov 1980, p. 416).

The population of Siberia is perceiving **the plain and mountain taiga** as a complex resource area—the territory of hunting, gathering wild plants, taiga reindeer breeding, and logging. For the Evenks, the taiga is the core of the ecumene, the world of native nature, which must be carefully preserved. In Russian dialects, the terminology of nature management has a large volume associated with the development of taiga geocomplexes for arable land and hayfields, the equipment of taiga huts, hunting winter quarters, and trails (paths). The vocabulary that characterizes the taiga natural resources (wood quality; species composition and habitats of commercial fauna; places rich in food for reindeer, etc.) occupies a key place in folk terminology. The conceptual design in the languages of different ethnic groups has a certain similarity. For example, the sable habitat in Russian dialects is defined as a sable place—"a place where sables are found" (Eliasov 1980, p. 386). Buryat language corresponds to the phrase bulgata bayan taiga—"taiga rich in sable" (Cheremisov 1973, p. 111).

All ethnic cultures of Siberia are characterized by the mythologization of the taiga space. In the picture of the world of the Barguzin Evenks, the idea is preserved so that the life of taiga, animals, and society is controlled by the mythological character Bug, the supreme ruler of the Universe . For Russian peasants and cattle breeders, the

steppes, solid massifs of taiga, personified the oikumene's periphery. The Russian dialects included the Turkism urman in the meaning of "hardly passable swampy taiga, forest, wilderness" (Eliasov 1980, p. 429) and the term zutan borrowed from the Buryat language—"difficult uncharted taiga": "Zutan stretched for hundreds of miles. What kind of beast can you not meet in such a large zutan" (Eliasov 1980, p. 138–139).

Meadow and dry steppes. The Russians and Buryats perceive the steppes of the intermontane depressions as integral natural resource formations. In the picture of the pastoralists' world, the steppes and meadows were animated, acquired master spirits. The Türkic-speaking peoples of Siberia, the Mongols and the Buryats, considered the grass to stand as a cover of the earth, the "skin" of the deity's face, and body with anthropomorphic features (Sodnompilova 2010, 41). All vegetations, the Yakuts believed, obey the goddess of the earth, herbs have a supernatural essence, and the soul's analog is sur and cab (Alekseev 1975, p. 28). The Baikal Buryats believed that the ploughing of virgin lands by the Russians caused damage to their native land, making the face of the earth clumsy (Sodnompilova 2010).

Among Russian peasants, meadow steppes, like riverside meadows, were associated with a place rich in all respects. To designate this type of geocomplexes, the word altai (altan), borrowed from the Buryat language, was used (Eliasov 1980, p. 53), which in the original sense means "golden" and in a figurative meaning "dear to the heart, dear; sacred" (Cheremisov 1973, p. 44). The aesthetic perception of meadow steppes conveys the term ungá—"beautiful steppe, steppe overgrown with bright flowers" (Eliasov 1980, p. 426)—from the Buryat ynge "flower" (Cheremisov 1973, p. 504). The dry steppes of the depressions and high plains of Central Asia, which were not suitable for farming and haymaking, had an extremely low resource estimate among the Russians. The term urman designated them in the meaning of "a large steppe space, where there are no settlements" (Eliasov 1980, p. 429).

Each ethnos built its system of relations with the natural environment, in which the central feeding landscape played the role of the core. For the Russian peasants, the center of the developed and inhabited space, the oikumene, were wide river valleys and intermontane basins with geocomplexes of southern taiga, forest-steppe, and meadow steppes. Tundra, mountain taiga, vast tracts of swampy forests, and the steppe plains of Central Asia were associated with the border of the ecumene (Fig. 1).

Systems of worship places are associated with the core-settlement, the near and far limits of the ecumene. The superposition of models of the sacralization of space, created in different ethnic cultures, gives a general picture of the sacralization of the Siberia landscapes and their components (relief, water supply network, soil and vegetation cover, fauna). In the Russian population culture, the tundra and taiga landscapes, the center of the settlement, and distant commercial coal are involved in the process of sacralization. The Evenks revered the taiga and mountain peaks, and mountain river valleys. In the cultures of fishermen in large river basins, for example, the Seklkups, the whole world—its beginning and end—was associated with a river flowing in the form of a real river to the north or northwest and flowing into a cold sea (Tuchkova 2014).

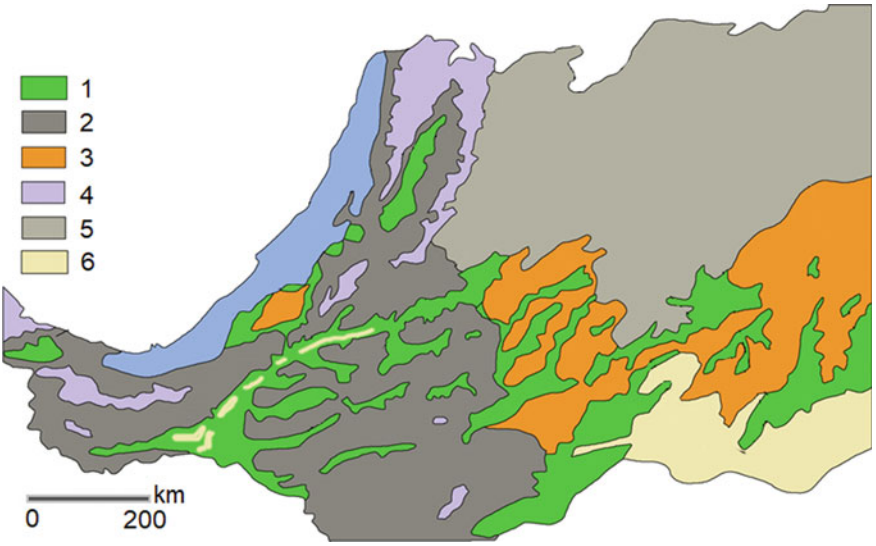

Fig. 1 Landscape differentiation of the Russian peasant ecumene in Transbaikalia (based on dialect lexicography (Eliasov 1980)). **The core of the oikumene**: I. Main economic zone: 1—meadow, steppe, and forest-steppe basins surrounded by subtaiga and taiga low mountains (Altai). II. Fishing places of varying degrees of remoteness from settlements (uhozhye, zutan); 2—taiga middle mountains with light coniferous pine and larch forests (pine forest, foliage) and dark coniferous taiga (rabble, cedar, fir); 3—middle mountains with light coniferous taiga; 4—high ridges of alpine type and loach appearance (squirrels, loaches). **The periphery of the ecumene**. I. Poorly developed territories included in the area of settlement of the Evenks; remote fishing spots; gold mining areas; 5—treeless ridges, taiga plateaus, swampy depressions (loach, taiga, urman in the meaning of "hardly passable boggy taiga, forest, wilderness"). II. Poorly developed agriculturally territories that are part of the Buryat settlement area: 6—high plains, depressions, and low mountains with geocomplexes dry—steppe, seber, khazgay, urman in the meaning of "large steppe space where there are no settlements"

3 Hydro-Network in the System of Khanty Sacral Centers: Mother River

The mythological picture of the world certainly includes elements of the natural landscape, which occupy the highest positions in the hierarchy of sacred symbols characteristic of one ethnic group. For the analysis of the natural objects sacralization in different ethnocultural communities, the concept of palimpsest (a text written over an earlier text) is productive. Rivers, rocks, and mountains in Siberia, successively sacralized by the Neolithic, Bronze, and Early Iron population, and then by adherents of pre-Shamanistic cults and shamanists, serve as the personification of multi-layered and multi-valued structures that preserve traces of different eras (Lewis 1979; Mitin 2014). Later, under the Lamaist and Orthodox clergy's influence, they became involved in the systems of sacral loci of Buddhists (Lamaists) and Christians,

marked with religious structures. Material traces of preexisting cults have in some cases been destroyed (Tivanenko 1989).

For the Khanty, the indigenous people of northwest Siberia, belonging to the Finno-Ugric group of the Ural-Yukaghir language family, the river is endowed with the maximum worldview status: it is through it that they think their "self". Their former ethnonym—As Yah, or Ostyaks—includes the name of the region's main waterway—the Ob River. It was called "As" and the lexeme also meant mother. Thus, the concepts of Mother-River-People were lined up in one semantic chain. It is not surprising that in the traditional worldview of the people the river image is polysemantic.

The river is a model of the universe. Vertical and horizontal structures characterize Khanty. The first sets a three-level ordering: the upper/heavenly world, inhabited by the highest spirits-gods, the creators of the world, life, and keepers of order; the middle/earthly, where the spirits of a lower rank and people; and the lower/underground, where the souls of the dead go, led by the spirits of death and disease. The second structure is hydrological; it is related to the main river Ob (Lukina 1990, p. 15–16). The upper world is associated in it with the river source and the warm south, and the lower one with the mouth and cold north. The river as a spatial archetype appears in the Khanty dreams, and usually it marks the north–south direction, but sometimes also the west–east tendency (Moldanova 2001, p. 95). Thus, the horizontal model of the spatial orientation of the Khanty is four-part, and, perhaps, at the intersection of coordinates, the middle world is thought, the embodiment of which is the riverine territory inhabited by the people or their local group. Researchers consider the world river to be an older spatial model formed among the autochthonous Siberian population, and the vertical one introduced by the Central Asian tradition (Kulemzin 1984, p. 171; Martynova 1998, p. 204).

The Khanty have many versions of the emergence of existence. They have common elements, but at the same time, each river has its original version. Khanty, living on the tributary of the Ob—the Trom-Agane River, prefers the river as the universe's source. According to the Throm-Agan version, captured in mythology, water is thought of as the primary element, and the intervention of the god-demiurge Torum leads to the emergence of rivers. The river appears to be the result of the very first act of divine creation, and this expresses its decisive role in the universe and the system of values of the people.

*God decided to create "bumpy" [ie made of cones] people. Looks …—the sea is around, how will they hunt, fish, graze deer. Then God put his palm and divided the sea into five rivers: Agan, Lyamin, Trom-Agan, Pim, Vakh. Land formed between the rivers. God was delighted then. He named the Trom-Agan River by his own name, as the deepest and richest. At its mouth is a hill—Torem cat fur (God's house is the earth). God commanded people to gather on this hill for sacrifices, and appointed his son Sorni-kon-iki to watch over the entire material world. Since then, the Trom-Agan river has been called sacred (*Yadroshnikova 2013*).*

Every nuance is essential in the given mythological plot. The very act of creation is impressive: Torum projects itself, its anatomical structure onto the created world,

literally creating it in its own likeness: laying hands on the water element determines the emergence of the first five rivers. Among them is Trom-Agan the most full-flowing and rich, bearing the name of the god-demiurge—Torum. The homomorphism principle, i.e., assimilation of the man and space structure, belongs to one of the leading in the mythological consciousness, and the above passage emphasizes the archaic nature of the plot. According to the Khanty mythological invariant, a bird pulls out the earth from the bottom of the world's ocean, independently or at the will of Torum. In the above version, the land appears between the rivers, i.e., it is existing between the rivers; it is an intermediate position, state, and essence. The land is secondary to the river and subordinate to it. In an economic context, constituting the basis of a people specializing in fishing, the river symbolizes life itself in the world outlook. And this symbolism is firmly encoded at a subconscious level, appearing in a dream. Almost every third of the recorded Khanty dreams contains the image of water, and most often it is river water. The river, like the road, is associated with life, and what is the state of the river, so will life. A deep and calm river in a dream promises a prosperous life, and congestion, drying out, waterlogging portend disease and even death, river rifts warn of impending danger. The person's behavior in relation to the river is also symbolic in dreams: to drown means to get sick, to get out of the water to recover (Moldanova 2001, p. 250, 287, 105).

The traditional consciousness of the Khanty interprets the river as a vector of time-being. This implies, first of all, individual human existence, since the life of a collective, i.e., culture and society, was thought to be unshakable, and the rules regulating it were determined during the creation of things and were constantly supported through a system of rituals. Human life as a dynamic beginning in the cycle of being and being was associated with the river flow. According to the hydrological model, a person comes to this world from the upper reaches of the world river and goes to its lower reaches. The echoes of this worldview plot were preserved among the Khanty in the form of a prohibition to sleep with their heads along the river you cannot wake up, i.e., die, go to the lower world, and also in the orientation of the head of the deceased in the burial along the river (Kulemzin 1975, p. 22). The river also acts as the sacred center of the Khanty. The place in space in which the communication of the supreme god Torum and the people created by him is bequeathed is the mouth of the Trom-Agan river, or the hill at the mouth. Each river is thought of in the form of a spirit, in whose habitat sacrifices are regularly made. Thus, the river image in the traditional picture of the Khanty is endowed with the function of a primary symbol, through which its most essential features are revealed—the creation of existence, the structure of the universe, and the place of man in it. Being the dominant element of the "feeding" landscape, the mother river also set the sacred coordinates for the people living on it.

4 *White Taiga:* Old Believers' Hermitage and Sacralization the Far Reaches of the Ecumene

For the newcomer Russian population, the division of the landscape according to the principle of "sacred"/"profane" fulfilled the task of mentally mastering a new space. At present, the study of Russian peasants-Old Believers as "creators" of sacred loci in the taiga zone is just beginning. This is explained both by the closeness of their religious groups and by the general orientation of research towards the study of folding the beliefs of the Old Believer denominations, their relationship with the government and society. Researchers, considering the history and modernity of Old Believer groups at the outskirts of Russia and abroad, paid attention, first of all, to the political, economic, and cultural aspects of adaptation reflected in their religious writings, language, ritual, and social practices (Crummey 1970, 2011; Robson 1995; Prigarin 2010; Gluszkowski and Grzybowski 2010). However, the process of adaptation to the "alien" natural environment and new landscapes was rather stated than analyzed (Pokrovskij and Zolnikova 2002). Exceptions were the studies devoted to the history of the search/construction of Belovodye as a sacral locus (Pokrovskij 1980; Chistov 2003; Dutchak 2007).

Only relatively recently, during the revision of the concept of Siberia's imperial governance, the question was raised about the Old Believers as colonizers of the taiga outskirts, deliberately used by the authorities as a cultural force (Remnev and Suvorova 2013). In the context of the underdeveloped infrastructure of the Russian Orthodox Church and the active "embrace" of Russian peasant settlers (Sunderland 1996), the appearance in the region of religious groups that speak Russian and have some officials saw an idea of Orthodox culture and prayer as a solution to this problem. Today, an international research team's efforts have begun to collect material about the life of Russian Old Believers surrounded by the indigenous peoples of Siberia. The first results of complex expeditions (Storozhenko 2019) made it possible to analyze that Siberian Old Belief's history does not know the mass conversion of indigenous peoples to Orthodoxy, as was in Karelia and the Volga region (Fishman 2003; Danilko 2018). Russian Old Believers and the aboriginal population, despite economic contacts, retain cultural autonomy and the distance of sacred loci. This circumstance actualizes the appeal to interpretations of the cultural (and religious as part of it) landscape as a "product" generated by the political and economic characteristics and social interests of ethnic groups and confessions living in the same territory (Jordan 2011).

The Old Believer Skete is an illegal settlement of the monastic type with an agrarian and commercial economy, which served as a religious center for the rural area. The Old Believers' hermitage, which is prohibited by law, provides unique material for reconstructing the Orthodox peasants' ideas about a properly organized "territory of salvation" (Dutchak 2007).

On the territory of Siberia, Old Believer communities were associated with different geocomplexes and cultural landscapes. In the south of the West Siberian

Plain, the main Russian population was concentrated in the southern taiga and forest-steppe. On the banks of Ob River and in the lower and middle reaches of its tributaries, networks of settlements arose, the population of which was engaged in agriculture and animal husbandry. Sketes were more often set up in the upper reaches of rivers, where there could be small villages specializing in forestry. At the same time, religious and economic ties were maintained with all the surrounding Russian settlements.

In Tomsk oblast, Old Believer settlements were associated with geocomplexes of the middle and southern taiga (Fig. 2). The boundary of the West's settlement area was the raised bogs of the Vasyugan plain (the central part of the Ob-Irtysh interfluve). In the middle taiga (Narymsky North), next to the sketes, there could be hunting and fishing grounds of the Selkups and Evenks. In the intermountain forest-steppe and southern taiga basins of Altai, Sayan, Transbaikalia, the area of settlement of Old Believers bordered on the lands of nomadic and semi-nomadic ethnic groups—Buryats and Evenks (Fig. 3).

The choice of the place of settlement determined the collective ability in a relatively short time to establish a life support system and a ritual full of value in their understanding. Compliance with ideological attitudes and adaptation to the surrounding landscape allowed the arrivals to consider a specific territory the embodiment of the "holy and distant lands" described in the legends and became the foundations on which the religious consciousness replaced the physical landscape with a model of an unreal sacred space.

The characteristics of found place—the future nucleus of development and sacralization—could reflect two types of symbolism of "white"—white as holy and white as pure. The latter variant was fixed in the current toponymy of the Tomsk-Chulym taiga, where in the last third of the nineteenth century the self-name of settlements "Beloborodovskaya desert" appeared. The toponym reveals the essential features of

Fig. 2 Ob river

Fig. 3 Skete surrounded by coniferous-small-leaved forest (Tomsk region, southwestern part of the interfluve of the Tomsk-Chulym interfluve)

the wandering "sensual desert": it is located in the taiga—a pure (primordial, divine) environment, which the monastic way of life of its inhabitants is called upon to preserve. The toponymy of the region also includes the oikonym Bolshoi Skeit and the limnonym Lake Skitskoe.

The sketes embodied the idea of an "earthly paradise" known to ancient Russian theology and a literal interpretation of the apocalyptic story about the Zhenya-Church hiding from persecution in the "wilderness". When organizing taiga sketes, this was expressed in the use of the symbolism of the temple space (the cells had analogies and iconostases), conducting divine services according to old printed books and subordinating the daily life of the skete community to the monastery charter. The combination of visual, ritual, and verbal forms of maintaining the sacred locus and religious authority of the hermitages allowed the Old Believer sketes, no less successfully than the "official" church institutions, to fulfill the tasks of preserving the ethnic and confessional identity of the Russian population of the taiga zone of Siberia throughout the eighteenth to twentieth centuries.

Despite the apparent differences in the purpose of sacralizing space, which were pursued by the Russian Old Believers-colonists and the indigenous ethnic groups of Western Siberia, the methods they used to construct sacral loci reveal basic similarities. They are united by the desire to turn confessional symbolism and mythology into an independent instrument of ethnic consolidation.

At the present stage, objective and subjective factors influence the processes of ethno-confessional construction of space. The objective factors include the degree of development and sustainability of the "sacred infrastructure" of territories, which is formed at three levels.

Macrolevel—"officially" institutional centers (ancestral sanctuaries of the indigenous population; temples, chapels, and monasteries of the Russian Orthodox Church);

Mesoscale—sacred places on the territory of the settlement and in the dwelling, outlined by the framework of family status; the Old Believers' sketes, which are in an illegal or semi-legal position;

Microlevel—individual elements and components of geocomplexes revered by the indigenous population and the Russians (forest stands and individual trees, springs, rocks, caves, passes, etc.).

Subjective factors include active participation in the ethno-confessional construction of regional authorities, national intelligentsia, and leadership of confessions, and the spectrum of their participation is quite broad.

Due to these factors' intersection, the current situation demonstrates a variety of sacred landscapes among both the aboriginal and newcomer population of Siberia. For example, concerning indigenous peoples, we observe, on the one hand, an active revitalization of sacred centers and practices, their study by the national scientific intelligentsia in the Khanty-Mansi Autonomous Okrug—Yugra (Moldanov 1999; Popova 2008) and in Gorny Altai (Ekeev 2005; Tadina 2005), on the other hand, their almost complete absence at the macro level in the Tomsk region (Nad 2011).

Concerning the Russian population, we can say that in the post-Soviet period the combination of the institutions of official Orthodoxy, alternative liturgical practices of the Old Believers, and folk forms of beliefs with a powerful pagan component led to the multi-layer identification model of Russian Siberians. For example, the population, drawn into the orbit of the influence of the Old Believer sketes, positions themselves as Orthodox, but this happens with a noticeable reluctance to see the dogmatic and ritual differences between the "official church" and the Old Belief, and the appeal to the "city" priest does not cancel the custom of annual almsgiving to the nearby Old Believer skete (Dutchak 2014; Tatarintseva and Storozhenko 2015).

5 Springs in the Russian Folk-Orthodox Tradition and Ritual Practices of the Twentieth to Early Twenty-First Centuries

The most critical factor in developing the Siberian region from the second half of the nineteenth century is mass agrarian migrations from the European part of the country, caused by the abolition of serfdom. Permanent colonization of Siberia makes it possible to trace how a particular place was assimilated and developed, and how it assimilated or rejected what was brought in from the outside by migratory waves (Man'kova 2008).

The formation of Orthodox religious landscapes was carried out at two levels. At the macro level, it manifested itself in the construction of monasteries and temples, which became pilgrim centers of regional and national significance. At the macro

level, the construction of sacred infrastructure was associated with creating a network of local folk Orthodox cults, which were based on the Slavic traditions of venerating local shrines and sacred natural objects—stones, springs, and trees (see, for example, Vinogradova 1999). A resonably well-indicated network structure has been studied on the materials of the European part of the country (Shchepanskaya 1995; Panchenko 1998; Vinogradov 2002; Fadeyeva 2002; Kormina 2006; Platonov 2014, etc.). Examples of such studies appear on materials from Siberia (Lyubimova 2011, 2013; Ermakova 2012). Special attention in modern domestic and foreign literature is paid to the description of folk forms of religious beliefs and practices (vernacular religiosity) that are not identical to the theological-dogmatic perception of religion, as well as its church-canonical incarnations (Panchenko 2014).

In the East Slavic tradition, holy places are water sources, hills, trees, stones, wooden crosses, and other natural or artificial origin objects endowed with a sacred status (Panchenko 1998, p. 12–14). They structure the space and saturate it with special meanings. The narrative repertoire that develops around them usually contains etiological narratives—legends and traditions that reveal a particular sacred point (Fadeyeva 2002, p. 124). The "beginning" of a revered place is usually interpreted as the result of mythological characters, epic heroes, or divine powers (Vinogradova 1999, p. 426).

As a rule, in the Siberian folk Orthodox tradition, water sources—springs or springs—act as local shrines. Their characteristic symbolism of the feminine fertile and healing principle is supported by the legends that exist up to the present time about the so-called manifest (emerging from time to time from the water) icons ("divine faces"), most of which are of the Theotokos type (Lyubimova 2013, p. 28). Legends about the appearance of a divine image distinguish a place from the surrounding space, giving it the status of a sacred locus (Panchenko 1998, p. 135).

The memory of the miracle that happened (the phenomenon of "divine power") finds its material embodiment in a religious building and continues to be broadcast using folklore texts and religious and ritual practices, first of all, healing rituals. Besides, such cult complexes have traditionally been places of periodic prayers for rain, for deliverance from drought, and a general pestilence of people and livestock.

Accumulating information about the disasters characteristic of a given area, the holy places represented a kind of "crisis network", the function of which was to maintain an "ecological and demographic balance" or "a balance between the resources of the territory and the reproduction of life on it" (Shchepanskaya 1995, p. 110). This was also facilitated by annual visits to the sacred point on holidays, which were an organic part of the folk-calendar local rites (Vinogradov 2002, p. 236–237) (Fig. 4).

Tragic events in Russian history of the twentieth century could not but affect the nature of the veneration of local shrines and the legends' content associated with them. Comparison of diverse sources (including archival documents and field materials of the author) made it possible to trace in detail the history of one of the most revered places in the Altai Territory near the village of Sorochy Log and to restore the circumstances of its sacralization. It was established that the mutual overlapping of the people's historical memory and the cult of local shrines led to the fact that the place of death of the peasant anti-Bolshevik uprising participants acquired a sacred

Fig. 4 The pilgrims at the icon of our lady of Kazan near the holy key. Photo by the authors, 2005

status, becoming a place of mass pilgrimage. The spring that broke through here during the Civil War became a revered object of nature, and the victims themselves turned into "martyrs for the faith" in the national memory (Fig. 5).

The veneration of the holy key that arose at the site of the mass death of SIBLAG prisoners in the Novosibirsk region is similar. The inscription on the stand installed near the source says that "where there was once suffering reigned and human blood was shed, springs begin to beat" (Fig. 6).

Thus, the memory of the local history events that did not "fit" into the official historical discourse received a kind of refraction in folk religious and ritual practices of venerating holy places. A distinctive feature of the legends about "divine faces" in this case can be considered their saturation with male characters, as well as carefully written images of the victims themselves. All this does not exclude the actualization of popular beliefs about holy places as special objects of nature, correlated with a female deity and marked with the symbolism of a female fertile and healing principle.

Fig. 5 A holy spring at the site of the participants' execution in the Civil War (Pervomaisky District, Altai Territory). Photo by the authors, 2004

The purposeful transformation of the economic and settlement structure of rural areas during the Soviet modernization could affect the religious landscapes, which manifested itself in the massive destruction of revered places and places of worship. Many types of folk religious and ritual practices, including the agrarian calendar holidays, traditionally accompanied by the entire process of harvest ripening, since the late 1920s, were banned.

The hardships of war led to a new surge of popular religiosity, including the pilgrimage resumption during the Great Patriotic War. However, already at the end of the 1950s, a powerful anti-religious campaign unfolded in the USSR. As part of the government decree implementation "On measures to end the pilgrimage to the "holy places", about 700 miraculous springs were destroyed throughout the country. Appealing to the slogans of environmental protection, the local authorities took unprecedented measures, as a result of which many water sources were littered with debris, covered with concrete, covered with lime, or plowed up by a tractor.

Despite the years of prohibitions and the struggle against local cults, the practice of venerating holy places remained stable in Soviet times. When the number of functioning rural churches in the country was small, the revered sites, in fact, replaced

Fig. 6 A revered source at the site of the mass deaths of SIBLAG prisoners (Iskitimsky district, Novosibirsk region). Photo by the authors, 2005

the church for the villagers, becoming one of the few "local" strongholds of popular religiosity (Panchenko 1998, p. 77).

Today, there is a widespread revival of tradition, manifested in the regular processions of the cross to the holy sources, the modification of the old, and the emergence of new sacred loci. This process is sometimes characterized as a kind of "churching" of venerated places since the Russian Orthodox Church plays the most active role in it (Kormina 2006, p. 130) (Fig. 7).

Spontaneous folk religious and ritual practices are being replaced by organized forms of pilgrimage and religious tourism. At the same time, one of the modern trends is associated with the perception of holy places as "environmentally friendly". Simultaneously, revered places continue to be symbols of the "small" homeland, which accumulate historical memory and form of the population's local identity (Lyubimova 2016, p. 130).

Fig. 7 Cross procession to the holy spring (Chebulinsky district, Kemerovo region). *Photo by* the authors

6 Mountains and Bowels of Southern Siberia in the Context of Traditional Culture and Reciprocal Economy

Mineral deposits and landscapes (geocomplexes) belong to different earthly spheres. Outside the landscape envelope, ore bodies are located, at great depths, below the boundary of the weathering crust, the thickness of tens and hundreds of meters. The search and extraction of mineral resources at all stages of social development required special knowledge and technologies, which contributed to the formation of local mining terminology (Borchwaldt 1998; Sokolova 2012, 2013). The shallow and daylight accumulations of minerals are reflected in toponyms: oikonyms *of Rudnya, Rudnaya Gorka, Zolotonosha,* oronyms *Zhelezny Kryazh,* hydronyms *of Altach ("Zolotaya"), Serebryanka,* etc.

The miners needed not only knowledge but also luck, luck. That is why, in traditional cultures, the view of mineral resources, their extraction, and further use is of a sacred nature: resources belong to the deities and spirits of the mountains, which allow or do not allow a person to extract them—the gods need to be able to please, you need to be able to negotiate with them. Such a view is realized in a complex social hierarchy system and reciprocal relations, where the most important actors are the gods as the true owners of underground wealth. They decide which treasures of the earth's interior can be given to people who have performed rituals of worship and sacrifices, and who should be punished for violating the gods' laws and stealing their riches. Sacral not only the bowels of the earth but also the deposits, as well as

the rocks and minerals that form them, including gems and ornamental stones—rock crystal, jasper, agate, jade, etc. (Yurgenson and Moroz 2014).

The cults of the earth's interior and deposits were reflected in the local community's social structure. Historically, the craftsmen associated with metal were divided into white and black. White blacksmiths worked with gold and silver, and blacksmiths with iron, copper, tin, and other metals from which weapons, horseshoes for horses were made, etc. Both groups of craftsmen were narratively related to the category of those who can enter into dialogue with the gods and the spirits of the mountains. These professions traditionally had their own ancestral ore veins and mines, nationalized or lost during Russian colonization (a tin mine on the Onon River in Transbaikalia) and after the 1917 revolution.

The sacredness of mineral resources is manifested in local narratives about miraculous encounters (sometimes frightening, sometimes hinting at misbehavior in places where minerals accumulate) with the true owners of the earth's wealth. In the Tunkinskaya depression (Baikal region) there are stories about the "red sand", which becomes a talisman if you find it in a sacred place.[1] It is believed that the sand is passed on to people by the deities of the mountains, who decide who is worthy of such a valuable gift. According to local residents, if this sand is sprinkled around the perimeter of the house walls, then fire, theft, and other misfortunes will not threaten its residents (field research in Buryatia, Tunkinsky district, Simonova et al. 2020).

Social memory of past ancestral dominions is based on god-given legitimacy, and currently forms the basis of the moral economy of the local population. Together with memory, legitimacy for informal mining of minerals is transmitted—according to the rights of the gods, this right is inherited by the descendants of blacksmiths. This local idiom justifies and reproduces the illegal extraction of valuable mineral resources from the point of view of other actors.

In the minds of residents, mining companies and their owners, bearers of a foreign ethnic culture, are illegitimate. These newcomers and dealers also have a place in the sacralized system of the local reciprocal economy of mineral resources. However, their role is far from being the leading one. Here it is necessary to refer to the history of the French businessman Jean Alibert, who in the middle of the nineteenth century became the owner of a graphite mine in the Sayan Mountains. He was the richest man and progressive "politician of the place", advocating, in modern terms, for the "sustainable development of the region": he built a railway, a greenhouse, a hippodrome, and also supported the culture of the Soyots. According to local legend, Jean Alibert unexpectedly quickly left Russia and returned to France. Neither the Frenchman himself nor his descendants were ever rich again; on the contrary, they were pursued by various misfortunes. The local legend in its own way reveals the reason for such events: Jean Alibert found very large diamonds in the mountains. He was warned that they cannot be taken out. The spirits simply showed them to him as a sign of their location, and the angry act almost killed him on the pass in the Sayan

[1] Perhaps we are talking about red-colored volcanic slags exposed on the slopes of paleovolcanoes, for example, the Chersky volcano, a cult place of the Buryats called Bayan Mandal (Zandanova 2007).

Mountains. Jean Aliber remained alive, but the rest of his life was unsuccessful: diamonds did not bring him wealth (field research in Buryatia, Okinsky district).

This legend and its social context have a way out in local morality: the one who takes a lot of resources will definitely be punished along with his family. Thus, the god's test people for the ability of the latter to be honest partners in a complex chain of reciprocal relationships, to be an honest agent of the exchange network, and to recognize the status and right of local deities and spirits to possess minerals.

It is noteworthy that this explanation is not limited to the legend of the French businessman. There are more examples as well. In 2002, YUKOS wanted to lay an oil pipeline through the Tunkinskaya Valley. The oil pipeline was supposed to pass near the holy place of one of the local pantheon's supreme deities. The sacred creature sleeps in the form of a stone statue, but at any moment it can wake up and begin to defend its place. Thus, residents interpreted the arrest of the former head of Yukos Mikhail Khodorkovsky as a result of the political will not of the state, but of a deity who did not want to be disturbed by the implementation of the oil pipeline project on its territory (field research in Buryatia, Tunkinsky district).

The idea of the mineral's sacredness and its historical and cultural significance can be transmitted to the outside world through the local production of art products and souvenirs. As an example, we will cite jade, which has a special sacredness in various regions of Asia, including in the culture of the Sayan Soyots. In 2006, the Soyots were included in the state register of the North, Siberia, and the Far East. Vivid distinctive features were required to confirm and reproduce the new status. Jade has become the visiting card of the ethnic group. It emphasizes and affirms an identity born at the intersection of the sacred and economic dimensions. The mineral has become the cultural and symbolic capital of the "young ethnos", in the sociologist Pierre Bourdieu (Bourdieu 1980).

The problem of inconsistency between the legitimization of extracting mineral resources and the tactics of justifying the right to use them is characteristic of various groups and interested actors. To understand the relationship in the system "ethnos—mineral resources" in relation to the cultures of the indigenous population of South Siberia, it is necessary to develop the phenomenon of landscape agency, its ability to react, which are interpreted through the prism of the socio-economic sphere, the informal reciprocal economy.

7 Conclusions

The landscapes of Siberia perceived by the indigenous people and the Russians both objectively and subjectively (within the framework of the basic model of the ecumene) were animated and involved in the processes of sacralization. Regardless of the enclosing landscape, the center of the ecumene in the traditional ethnic picture of the world was endowed with favorable properties (native meadows of Russians, native steppes and nomadic Buryats, taiga valleys and Evenki mountains, etc.). A real and surreal danger was posed by approaching the boundaries of their habitable

space, wherein the beliefs of believers the influence of the characters of traditional cults and folk mythology, spirits, devils, etc. was increasing. This also applies to vertical movements associated with the extraction of minerals. If mining was not of significant importance, as, for example, among the Selkups, there was an idea in everyday consciousness that there was "nothing" underground, only the gut, "the heart of the earth" (Tuchkova 2014).

Researchers of the archaic world outlook admit the presence of a certain "curvature" of the universe in the traditional views of the aboriginal Siberian ethnic groups, when "movement in any direction leads from the real world to the "probabilistic" world; at the same time, "the horizontal and vertical division of the world do not contradict each other, and complementary ones coexist in the Ural-Altai tradition" (Sagalaev 1992). At the initial stages of Russian colonization, Siberia was a place of hard labor and exile. The remoteness of the territory and the severe trials that fell to a lot of the Decembrists, participants in the uprising of 1825, contributed to the manifestation of archaic features in the perception of the way to hard labor and the very place of residence. The road to Siberia became not just overcoming endless spaces, but moving along the vertical axis of the universe "into the depths of Siberian ores", according to the figurative expression of A. S. Pushkin. In mythological stories, the mines personified a hole and an abyss; an abyss—the habitat of evil spirits and the dead's souls. The Governor-General of Siberia M. M. Speransky, who visited the Nerchinsky mountain district in 1820 (Sokolova 2012), compares underground mines with the underworld.

Siberia—*Siburda* in Russian dialects (Eliasov 1980, p. 375)—was negatively perceived by convicts, exiles, and forced migrants. The bulk of Russian peasants, having moved to Siberia, adapted to the region's natural landscapes and acquired the feeling of a small homeland. The formation of regional identity is evidenced by the opposition *chaldon (cheldon)* in the meaning of "Siberian, Russian old-timer of Siberia" (Eliasov 1980, p. 451)—Russian—"Russian living in the European part of Russia" (Eliasov 1980, p. 360). The center of the ecumene (cultural landscape) for the Russians who moved to Siberia became the lands lying to the east of the Ural Mountains.

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Modern Inter-Ethnic Contacts and Ethnic Processes in Siberia

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Abstract The Chapter is devoted to different aspects of interethnic communications. Various factors are estimated, and it revealed the specificity of interethnic connection and ethno-cultural transformation of Siberian people. Modern ethno-cultural space is transformed primarily under the influence of migration. However, ethnic composition is changing, and new ethno-cultural characteristics are emerging. Historical, geopolitical, psychological and economic factors influence the speed of transformation. One of the most important, given few attentions in the geographical literature, is the ethnic division of labour (EDL). In this chapter authors considered the geographical aspects of the ethno-cultural trans-border regions and ethno-contact zones. It analysed the definition of ethno-contact and their typology. One of the examples, markers and at the same time the results of interethnic contacts is borrowed geographical vocabulary. In the Siberian region the relation of ethno-cultural and regional identity of the population is defined in the structure of diversification of spatial-hierarchical

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V. N. Bocharnikov and A. N. Steblyanskaya (eds.), *Humans in the Siberian Landscapes*, Springer Geography, https://doi.org/10.1007/978-3-030-90061-8_20

levels of society' territorial organization. In Siberia ethno-cultural identity itself is considered as a function of ethno-mentality.

Keywords Ethno-cultural space · Regional identity · Ethnic identity · Interethnic mutual influence · Models of colonization · Ethnic division of labour · Ethnogeographic transformation · Ethno-cultural transformation · Migration · National geographical terminology · Oikumen

Glossary

Complimentarity	(from French "compliment"—praise, flattering terms) after L. N. Gumilev—subconscious feeling of mutual sympathy or antipathy, and the community of people that determines the division into "us" and "them". This concept must be distinguished from the concept of "complementarity" (from the Latin complementum—means of replenishment), or one, used, for example, in biology.
Ethnic labour division (ELD)	specialization of a sufficiently large number of representatives of a particular ethnic group in certain occupations, their professional preferences. EDL correlates with different access to resources, means of production, products of labour and power. This refers to the differences between individual sand groups.
Ethnic contact	process of interaction between two or more ethnic systems, which leads to the formation of new characteristics of the anthroposphere.
Ethno-contact zones (ECZ)	the geographical position at the junction, intersection or overlap of two or more ethnic areas; the absence of clearly defined natural interethnic boundaries, their permeability, "erosion", the predominance of contact functions; diachronic and synchronous interethnic interaction; the presence of a transition zone, the specifics of ethno-cultural landscapes. ECZ differ one from others in ethnic composition, size, the

	predominant form of inter-ethnic interaction, the level of hierarchy, geographical location, degree of urbanization, historical and geographical features.
Ethnic-cultural trans-border regions (ECTBR)	common areas of ethnic and cultural space of different sizes, having the properties of systematic character, split by state border.
Folk geographical terminology	an ordered set of folk terms denoting geographical objects, a component of traditional culture. Main sections (systems): physical and geographical terminology, socio-economic terminology, humanitarian and geographical terminology.
The identity (self-determination)	is a complex multidimensional positioning of the individual or group of individuals (ethnic, religious, professional, social, civil) in the environment, including the awareness of belonging to the community and to the territory, made up of a number of substantive components.
Oikumen	inhabited part of the land.
Transbaikal, Trans-Baikal, Transbaikalia	a mountainous region to the east of or "beyond" (trans-) Lake Baikal in Russia.

1 Inter-Ethnic Interaction and Models of Development of the Territory of Siberia

The development of ethno-cultural Siberian region space can be considered a vivid illustration of L. N. Gumilev's ideas (Gumilev 2001). It was formed over a long time in the tundra, forest-tundra, forest, forest-steppe and steppe zones as due to the contacts of colonists and indigenous ethnic groups. This process took place outside ethnic groups homeland partly. This is the primary reason that in the regional identity is strongly marked alongside ethnic identity. At the heart of its formation are the similarity of the landscape and especially interethnic cooperation, based on complementarity. The formation of the culture and regional identity in the multiethnic region is connected with *complimentarity*—the unconscious thrust of "a certain kind of people to each other". Complimentarity—(from French "compliment"—praise, flattering terms) after L. N. Gumilev—subconscious feeling of mutual sympathy or antipathy, and the community of people that determines the division into "us" and "them". This concept must be distinguished from the concept of "*complementarity*"

(from the Latin complementum—means of replenishment), or one, used, for example, in biology.

The sign of complementarity (plus or minus) determines the specificity of the interaction of ethnic, cultural tolerance among the regional and territorial structure of the regional community. As a result of the ethnic contacts and interaction between cultures, even in the simple co-existence of ethnic groups and the absence of violence the inevitable convergence of borrowing and ethnic cultures is inevitable. Under landscapes and interethnic mutual influence have been formed a regional ethnocultural territorial complex. The new quality of the population leads to the ethnocultural identity transformation.

The contacts of cultures were originally irregular or natural (wars). During specific periods, they disappeared from the territory of entire nations, but they influenced the modern culture of ethnic groups and left a cultural mark in the shape of the territory and toponymy. Gradually, the situation has stabilized. Ethnic communities have formed a world view based on the relationships to neighbouring nations as equals. The positive complementarity was the reason for forming bilateral and multinational settlements in the region. They are characterized by neutral ethnic contacts with maintaining identity ("Xenia" after L. N. Gumilev) or mutually beneficial ("symbiosis").

The example of xenia is the relationship between the Tatars and the Russians, and symbiosis—between the Khakass and the Russians.

The influence of Russia was the highest. It was expressed in the assimilation of other ethnic groups of the Russian language and traditions. Russian culture is influenced by the economic mechanism and lifestyle of the entire population, but it has influenced of other cultures. Interethnic marriages intensified interactions.

The region was characterized by acculturation, i.e., along with new cultural ethnic groups. Often, a new culture, brought by migrants, transformed the local conditions and the environment, becoming a source of innovation for the local population, spreading by diffusion in the development of intercultural relations from nuclear generators' "radial diffusion zone-wave". An example is the economic culture of the German Mennonites (South of Siberia). The diffusion of innovation is slow and concerns primarily consumption, although other areas have also changed.

A serious result of the influence was the Christianization adoption by the indigenous peoples (though transformed). There was the replacement of nomadic culture for sedentary one. Newcomer's culture acquired regional specificity under the influence of cultures and landscapes.

The interaction between traditional belief and Orthodox Christianity, significantly transformed and complicated elements of syncretism, as well as the influence for an extended period of atheism, reinforced the "infusion" of a whole generation of Komsomol-labour force, led to the specifics of confessional space, which is a buffer, a window from Russia to the Asian world. At the same time intra-ethnic and cultural differences are preserved. Even within the same ethnic group differences are significant. For example, the Russians are very different ethnic and cultural groups within the region—descendants of the Old Believers, the Russians—descendants of

Russian serfs and—displaced during the development of virgin lands and villages industrialization.

There are several models of development of the territory of Siberia. Each stage of development is characterized by a type (models) of different colonization types of inter-ethnic relations. One differs from another by the nature of interaction migrants (colonists), type use of nature and indigenous peoples and form transformation of ethno-cultural space. Some development of a new territories' models (colonial, industrial, economic, military and spiritual) described by Levintov (Levintov 2008). The identifying of these types is very relative, most of these "cocktails and centaurs". For example, the development of new lands can be attributed to both the focal and economic, colonial and spiritual models.

1. Earliest stage. Ethnic groups succeeded each other due to migration from East to West. Several waves of settlement, from primitive gatherers, fishermen and hunters, representatives of the ancient pit culture that is found in the south of the region all the necessities of life, from housing to food, went through this territory. The cultural layer of the settled peoples who lived here before the arrival of the nomads, preserved amazing scientific findings. Here we can see in the form of graves, archaeological remains of ancient settlements, as well as in toponyms.
2. Nomad stage was characterized by the dominance of nomadic peoples. Descendants some of the nomadic peoples living in the region up to the present time. Cossacks and other colonists from European Russia began to settle in river's valleys at the end of the period. This development model can be considered as a military-political, geopolitical and economic simultaneously. The end of the period is connected with the beginning of the colonization of the region's settled population. The main mass of the colonists come from the West.
3. Stage of mass colonization of the region. One had several waves and led to the formation of the foundations of the modern ethno-cultural geography of the region. The stage of mass colonization of the region had several waves and led to the formation of the foundations of modern ethnocultural geography of the region. The colonial model of development dominates. Migration flows are evicted, exiled or targeted flows of settlers due to the country's targeted policies. Colonization was voluntary and involuntary. This was accompanied by the export of culture and the reproduction of the way of life of the mother country among the indigenous peoples, which led to the expansion of the mother country. This model is typical for many empires. During this period covers the focus-economic model of development. The focal radial kernel generates a conditioning wave diffusion (the term Rodoman, (Rodoman 1999)). From the cores of innovation spread to other Nations even few foreigners with higher technologies can introduce their customs among the local population. The spiritual model of development is associated with messianism, with the policy of isolationism of certain ethnic and cultural groups, or persecution. Often has a religious character, but there are alternatives. In a rural location and currently

meet the local ethnic and religious communities of Russian old believer population, German (Mennonites, Baptists, etc.). However, these settlements first included some elements of a single European modern culture, and then the ethno-cultural community was transformed.

4. Soviet stage (most of the twentieth century) is heterogeneous, and it characterized by strengthening the interaction of ethnic groups. This stage can be divided into several periods (pre-war, associated with the beginning of industrialization; the years of World War II; the period of pioneering; the period of industrialization). It is period dominated by colonial, economic and spiritual model of development.
5. The Modern stage started in the late 80s-early 90-ies of XX century. It is characterized by a new wave of migration, leading to changes in the ethno-cultural environment of the region. Ethno-cultural, ethno-demographic, geopolitical, geo-economic components gone major changes.

2 The Role of Ethnic Labour Division in the Formation of Ethno-Cultural Space of Siberia

Let us focus on the ethnic labour division (ELD), one of the most critical factors of ethno-cultural transformation, which receives few attentions in geographical literature. It can be functional which implies division into organizational and performing work, mental and physical, considering qualification and regulation and creative component. ELD correlates with different access to resources, means of production, products of labour and power. This refers to the differences between individuals and groups. ELD should be understood as the specialization of a sufficiently large number of representatives of a particular ethnic group in certain occupations, their professional preferences. ELD was formed in multi-ethnic empires and is associated with mentality and specifics of the social structure of individual ethnic groups and ethno-cultural groups, as well as their role and fate in the history: the conquerors' descendants got "noble" occupations, the descendants of the conquered peoples got "menial" work. The Russian Empire was not an exception. The dominant ethnic groups became civil servants and landowners, and their descendants inherited these occupations. ELD contributed to the preservation of peace and tolerant relations in many multicultural regions, because after the conquest, during colonization and other migrations, ethnic groups occupied different ecological niches.

Ethnic professional preferences remained in the USSR despite all the attempts to eliminate the "remnants" associated with ELD. The destruction of the historically formed ELD had a detrimental effect on the economy of many regions, especially the Northern ones. Whole sectors of the economy were affected, for example, reindeer husbandry. During the industrialization of many areas, for example, the Norilsk industrial hub, the local population was not integrated into new economic structures, and migrated further into the tundra.

Currently in the post-Soviet space, professional preferences of ethnic groups are revived in a modified form. ELD is the basis for the economy segmentation along ethnic lines (Gerasimenko and Rodoman 2018a). This is particularly evident in large cities, but there is a similar trend in other settlements. Thus several large cities taxi drivers and minibus drivers are Armenians or Kyrghyz. They are also owners and workers in hairdressing salons, and they control markets, restaurants and other enterprises of the services sector. Representatives of the Central Asian peoples are engaged in construction, repair works, etc. In large cities supermarkets of large retail chains are also distributed among non-Russian ethnic groups: in some Tatars, in others Tajiks mainly trade. There are notary offices, consisting almost entirely of Armenians.

A unique role is played by the cohesion of the group, its mentality and structure. In the so-called "business" (small and medium) Asian, Muslim, Caucasian peoples, and even the Roma have advantages over the Slavs due to the clan-tribal system, wide family-related cooperation, when within the same family there are villagers and citizens, residents of capital and its ethnic region, peasants and civil servants, etc. The Slavs do not only have such a high birth rate, but also they do not have the skills of interfamily cooperation, and there is no ethnic cohesion. In the cities other niches are relevant for them: for the educated ones—working in offices and as civil servants, for provincials—working as guards and in other law enforcement agencies.

Russian socio-economic system is favourable for the "Asian way of existence" when customs dominate the laws, and there is an opportunity to negotiate with authorities by leaders of various communities. Based on Russian laws, European individual entrepreneurship is practically impossible due to the high degree of corruption and other mentality.

Unification of diasporas, communities, kindred clans, and a compact settlement on ethnic grounds, which migrants seek in Russia, as well as worldwide, contribute to ethnic segmentation of the economy and increase of its competitiveness. Isolated enclaves—informal ethnic areas—have emerged in cities (both large and small) and in some rural areas. Sometimes this leads to changes of building, planning and cultural landscape. Such examples exist even in the traditionally monocultural cities of Central Russia. Siberia is not an exception. Most often, Koreans, Chinese and Vietnamese people control markets and some food enterprises engaged in agriculture. They, as well as representatives of several post-Soviet republics, settle compactly. There are differences between rural and urban areas. They are evident at the extreme poles of the rural-urban continuum. Outside the cities, ethno-cultural groups initially settled in isolation, maintaining a close connection with the landscape, and minimized inter-ethnic contacts. Social stratification in rural areas reflects professional structure, it is less diversified, and ethnic labour division is closely linked to the consumption, traditions and lifestyle of an ethnic group.

3 Ethnic and Cultural Trans-Border Regions and Ethnocontact Zones in the Geo-Cultural Space of Siberia: Geographical Aspect of the Research

Global and regional developments are two sides of the same process. In the Era of globalization regional components play an essential role in the development process. The offset and blur the borders are the global tendencies in the present time. Bidirectional interconnections in the formation of trans-border regions are parts of a multi-layer system. The ethno-cultural space is one of the critical subsystems of a system.

Several ethno-cultural trans-border regions have been formed in Siberia. In the era of globalization, cross-border integration processes are growing. Even isolated regions become permeable to the diffusion of cultural and economic innovation from neighbouring States, and migration plays a vital role in this process.

Any trans-border region is unique, which is explained by the peculiarity of ethno-historical conditions, formation of economic forms and the specifics of cross-border processes. Nevertheless, they often face identical economic, humanitarian, cultural, political and legal problems.

TBR has characteristics and functions that potentially allow it to be used as a tool for cooperation or as a basis for regional severe conflicts, depending on some factors. A special place belongs to the contact function they perform ("Windows" to "other worlds" (Gerasimenko 2005)). Other equally important functions of TBR are barrier, distribution and control ones. Experimental function predetermines their use as platforms for development and testing of an effective mechanism for trans-border cooperation. TBR is inherent "corridors" for cooperation and integration, which is confirmed by our research (Gerasimenko and Semenov 2015; Gerasimenko 2020). Cultural trans-border links are often stronger than with actors within a state. Such examples are the relations of the Siberian regions with the border regions of Russia and China.

The interaction of "border stress" by Toynbee (1991) have been complicated or facilitated. The natural, communication, legal, socio-economic, political factors are the obstacles. Ethnic and cultural boundaries coincide with state borders rarely. The barrier function of Russian state borders is increasing, although the ethno-cultural, cultural, landscape, environmental and socio-economic space within the USSR was formed as a single one.

TBR becomes trans-border at different times. Part of them—overnight in the 90-ies of XX century, when the administrative, in some cases, conditional, borders turned into a state one, with increasing barrier function after the collapse of the USSR. Ethnic groups were divided, the borders passed between neighbouring settlements, turning relatives, friends, and neighbours into "foreign partners". Contacts between the populations have become the most serious and have far-reaching, not fully assessed consequences.

Another important interdisciplinary object of intercultural interaction is ethno-contact zones (ECZ). The main features of the ECZ are the geographical position

at the junction, intersection or overlap of two or more ethnic areas; the absence of clearly defined natural interethnic boundaries, their permeability, "erosion", the predominance of contact functions; diachronic and synchronous interethnic interaction; the presence of a transition zone, the specifics of ethno-cultural landscapes. ECZ differs in ethnic composition, size, the predominant form of inter-ethnic interaction, the level of the hierarchy, geographical location, degree of urbanization, historical and geographical features (Gerasimenko 2018; Gerasimenko and Rodoman 2018b).

The ethnic groups have formed ethnic areas, which can intersect, overlap or be placed in isolation. There are isolated ethnic areas, as in the case of local ethnic groups, and relative ethnic areas where there is only a concentration few representatives of an ethnic group, among the other (for example, Jews, Gypsies, Belarusians, etc.). There are continuous (solid) or discontinuous (fragmented) areas—dispersion, focal, exclave, enclaves, intermingled, mixed in Siberia.

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Ethnic areas may intersect, overlap or be located in isolation. They and habitats of biological species can be isolated, as in the case of local ethnic groups, and relative, when there is only a concentration of a concrete ethnic group (for example, Jews, Gypsies, Belarusians, etc.). In Siberia continuous areas (monolithic) or discontinuous (fragmentary) ones—dispersed, focal, exclave, enclaves, intermingled, mixed can be distinguished. Sometimes their integrity is violated, like spray, by exclaves of another ethnic group, most often near the boundaries of areas. Exclaves are located at a distance from the central ethnic core, within ethnic territory of other peoples. Enclaves are completely surrounded by a range of other ethnic groups. There are intermittent areas and primary (the territory in which the formation of the ethnic group took place).

Areas often lose compactness, they are reduced, divided into parts and become complicated due to migrations of other ethnic groups to its limits. Relic ethnic areas tend to decline and are unable to recover. Ethnic areas can expand due to colonization (for example, Russians) and move. Ethnic area is conditionally continuous. The population is concentrated in localized settlements, between which there is an uninhabited space. The primary spatial marker of ethnic area is cultural landscape. Different ethnic areas can overlap, forming multi-ethnic areas.

ECZ is not an intersection of the areas, but a part of geo-cultural space, where there are regular ethnic contacts. Ethnic boundaries differ depending on the interaction of ethnic groups (Fig. 1).

Before mass colonization in Siberia, solid ethnic areas with clear linear boundaries, a prevailed pronounced barrier role, and contact functions gradually grew. Nowadays, ethnic areas not only intersect, but also overlap.

Different ethno-cultural groups settled in isolation at first, occupying different ecological niches and maintaining a close connection with the landscape, or artificially delimiting space, minimizing contacts with inoethnic environment. Ethnic groups "got used" and interacted (according to L. N. Gumilev) following the law of complementarity. One of the essential results of interethnic interaction are cultural borrowings. According to R. Benedict, only borrowings, natural to culture, receive proper development. They are embedded in various cultural contexts, reinterpreted and transformed. Originally that is an exchange, consumer and household borrowings and contacts became more complicated. In mixed areas, ethnic groups are often divided. Even in large cities it is possible to differentiate space on ethnic grounds. Thus, ethnic areas appear. Migrations, often the primary source of innovation, played an essential role in forming the ethnic picture. Today the role of migrants has changed.

Ethno-contact zones are hierarchical. In Siberia we can distinguish civilization (macrolevel) ECZ, regional (mesolevel), local (microlevel). In the ECZ of macrolevel Russian ethnos as the largest interacts with the paleoarctic peoples ("circumpolar superethnos") on the Northern and Eastern borders of its ethnic area, with representatives of steppe civilization and mountain peoples in the South, and with Chinese superethnos in the Eastern part. The area of the Russians is conjoint, intersecting with other ethnic areas, with exclaves, which, in turn, interacts with other ethnic groups outside the central massif. At mesolevel ethno-contact zones, along with other ethnocultural regions, are spatially polarized, especially in the areas of transport accessibility. At the micro-level, local ones within regional ECZ are distinguished, as a rule, bi-national, but there are also polyethnic ones. They occupy one or more rural settlements, or part of the city territory. Formation of local ECZ was inevitable even in the case of the isolationism policy and led to imposition of areas. It was a long process. According to geographical location, there are central, provincial, deep, border and cross-border ECZ. These correlates with types of ethno-cultural regions identified by T. I. Gerasimenko. In Siberia, provincial ECZ are located in the railway and developed road transport availability. Internal ECZ, remote from national borders and sea ports are among them. Inter-ethnic interaction in such zones is stable, and population migration mobility is low. Deep ECZ are far from roads, almost entirely deprived of social infrastructure and remarkably rarely inhabited (focal or rare-focal type of settlement). Most of these ECZ coincide with habitats of Far North and East Siberia' indigenous peoples' minorities. Ethnic contacts in such ECZ are irregular. They are more intense in a few urban centres. However, the mutual influence is evident. Language and culture of autochthonous ethnic groups are transforming. The newcomers have adapted to the harsh conditions and, as a result of the convergence, inevitable under the influence of the natural environment, have many cultural and economic borrowings from indigenous peoples. Local multicultural ECZ in industrial

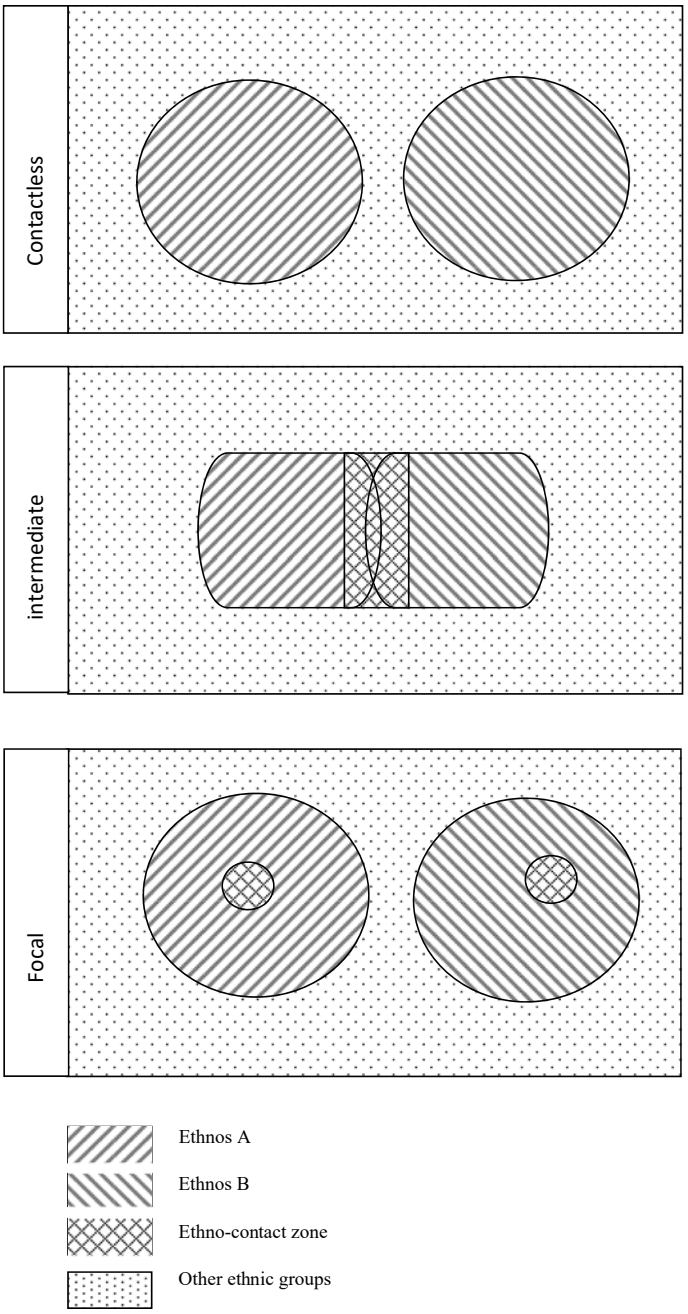

Fig. 1 Types of ethno-contact zones (Rodoman, Gerasimenko)

centres with mining and logging industries are a special deep ECZ. Border (particular case—aquaterritorial) and cross-border ones are another categories provincial ECZ. Border ones are adjacent to the state border, which historically formed as an ethnic or had the status of a political border with a pronounced barrier function. They are characterized by presence of ethnic exclaves. Aquaterritorial ECZ are coastal port hinterlands. External relations in such regions are often more significant than internal ones. Cross-border ECZ have developed as single ones on both sides of state borders or formed as a result of delimitation. Degree of urbanization varies between urban and rural ECZ.

In cities processes of inter-ethnic interaction appear more intense. The most dramatic changes occur in capitals (regardless of the population) and in cities-millionaires. But in many medium and even small cities there is an increase in ethnic mosaicity.

Part of Siberian ECZ originated in the pre-Soviet era, due to Russian colonization, migrations of population during the famine, resettlement of old believers, formation of border guarding zones (the Cossacks), and resettlement of exiles. The second group of ECZ appeared in the Soviet period during industrialization, due to repression, deportation of some peoples, development of the North, Siberia and the Far East, evacuation during the war, development of "virgin land", urban and industrial construction. The third group of ECZ is formed in the post-Soviet period due to mass migrations from the former Soviet republics. The specifics of ECZ formation and development are largely predetermined by territorial development models, as mentioned above. In "ethnic melting pots" (large cities, in areas of new development) the EGP has historically been formed as a multicultural interaction and, as a result, the formation of local and regional ECZ was inevitable even in the case of isolationism policy and led to imposition of habitats, as we have repeatedly written about. It was a long process, as opposed to modern ones, which are fleeting, and mixing of ethnic areas is often accompanied by cultural shock and prolonged stress on both sides. In the modern period, we are witnessing the formation of new ECZ, an example of this is local ECZ in ethno-cultural space of most cities, huge ones. At the same time, a considerable scale of migrations, poor knowledge of language and culture, society stratification in terms of income is a modern reality, leading to separation, isolationism, formation of ethno-cultural exclaves. Integration processes are inherent in the most educated representatives of society (both the host party and migrants), motivated to change of living conditions, additional education and prestigious work. Selection of types is very conditional, in pure form they are rare, and often mixed. For example, the development of virgin lands can be considered both focal economic, colonial and spiritual migration.

This long historical and geographical process is significantly accelerated in the new geographical reality. This is a kind of by-product and at the same time a result (spatial consequence) of both globalization and regionalization processes. ECZ area is a particular type of ethno-cultural regions, which has properties of the border. They have important common features: geographical position at the junction, intersection or overlap of two or more ethnic areas; absence of clearly defined natural interethnic boundaries, their permeability, "erosion", predominance

of contact functions; diachronic and synchronous interethnic interaction; presence of a transition zone, marginal ethno-cultural facts, specifics of ethno-cultural landscapes. Depending on the ratio of ethno-cultural groups, degree of complementarity and tolerance, strategy of ethnic leaders, national state policy, etc., different scenarios of ethno-cultural genesis are possible in the ECZ. These scenarios are reduced to two main trends: interethnic integration or isolation and divergence of ethno-cultural groups. ECZ need to be monitored.

4 Impact of Modern Ethnodemographic Processes on Ethnogeography of Siberia

Since the early 1990s, the ethnic structure and ethnogeography of the Siberian population has undergone significant changes and new trends have been observed, which differ significantly from ethno-demographic and ethno-social processes, typical of previous decades. The most clearly recorded among these changes are the following (Gerasimenko et al. 2017; Gerasimenko 2016; All-Union census of 1989; Dashimanzhilov 2016; Information materialson the finalresults of the all-Russian population census 2010; Popkov 2016):

- stable reduction in the total number and share (except Russians) of representatives of Slavic peoples, Turkic and Finno-Ugric ethnic groups of the Ural-Volga region, Baltic ethnic groups, German and Jewish folk communities;
- increase in the number and specific share of titular ethnic groups (except Khakas) in the relevant national-territorial formations;
- a significant increase in the number of representatives of ethnic groups of the North Caucasus, Armenian and Azerbaijan ethnic communities, the peoples of Central Asia (Uzbeks, Tajiks, Kyrgyz), the Chinese ethnic component;
- increase in the processes of ethnic assimilation, significantly exceeding the scale of ethnic separation;
- regional and territorial differences in the dynamics of population ethnic structure;
- territorial compression, first of all, of the Russian population in many regions and increasing numerical concentration of several ethnic groups in specific regions and territories;
- existence of considerable part of the population, who did not indicate their ethnicity at the time of the last census (an average of 2–4% by region).

A peculiar attribute of the Siberian population ethnic structure is the pre-existing dominance of the Russian ethnic group. With a reduction in the total Russian population, due to migration outflow and natural decline (in the 1990s–2000s), the share of Russians has not changed much and is recorded at an average level of 84% in Siberian regions.

Preservation of a specific share of the Russian ethnic group status quo is associated with a younger age structure of population than in European regions of the country,

which was shown up in a smaller decrease in natural growth indicators. In addition, the limiting factor of demographic losses of Russian population of Siberia was the influx of migrants of Russian nationality from Kazakhstan and Central Asia after the collapse of the USSR, as well as labour migration to the regions of the West Siberian North within the development of oil and gas sector. Assimilation of other peoples, especially Slavic and Finno-Ugric ones, which accelerated in the 90s also inhibited the decrease in the share of Russians. The preservation of a large share of the Russian ethnic group, despite its impressive migration outflow, is also due to a much significant reduction in the number of other peoples in the structure of Siberian population, meanwhile the influx of other ethnic migrants does not offset for these losses numerically.

At the same time, the number and share of Russian population in some regions of Siberia in the inter-census period has changed markedly. In most regions, its reduction is recorded, and its increase is observed only in 2 regions. The highest growth rates are in the Tyumen region. The number of Russians increased by 103,809 (4.6%), although the share decreased by 3.3% due to more incredible numerical growth in the structure of other ethnic groups population. In the Tomsk region, Russians increased by 39 000 (4.4%). The increase in the share of Russian ethnic group takes place in such subjects as Krasnoyarsk and Altai Krai, Irkutsk, Omsk and Kemerovo regions. At the same time, the number and share of Russian population steadily decreased in the majority of national-territorial formations. In the Republic of Tuva values of these indicators decreased by half, in Buryatia the number of Russians decreased by 13.1%. The maximum losses of the Russian ethnic groups occurred in Trans-Baikal territory—238.9 thousand (19.7%), Irkutsk region—355.4 thousand (14.2%), Kemerovo region—333.5 thousand (11.6%).

A new ethnogeographic trend is the territorial compression of the Russian ethnic group—the total outflow of population from depressed areas, and its concentration in regional capitals and economically prosperous regions. Ethnogeographic transformation and numerical reduction of the Russian population and other ethnic groups is accompanied by an increase in the share and number of many indigenous peoples of Siberia: Buryats, Tuvans, Altaians, Nenets, Khanty, Mansi, Evenks. So, the population of Tuva and Buryat republics increased, respectively, by 26.5 and 15%. The share of a titular ethnic group in the Republic of Tuva increased by 17% in 20 years. Such ethno-demographic trends may soon transform the region into a mono-ethnic space. The main reasons for this are compact settlement in places of traditional residence, low territorial mobility and relatively high natural growth among representatives of these ethnic groups. At the same time, the number of national minorities in Siberia (Kereks, Nganasans, Nanais, Enets, Selkups, Ulchis, Nivkhs, Chulyms, Dolgans, etc.) continues to decline, primarily due to their assimilation by larger ethnic groups. Simultaneously, ethnic separation is taking place among the indigenous peoples of Siberia. For example, such people as Soyots separated from the Buryat ethnic group, and Telengins and Kumandins stood out from the Altai ethnic group.

A sharp decrease in the inflow of Ukrainian and Belarusian population to Siberia, a steady natural decline and the strengthening of processes of their assimilation by Russian ethnic group in the post-Soviet period led to a widespread large-scale,

in most regions, a significant reduction in the number and share of the respective ethnic groups. So in Trans-Baikal territory, the number of Ukrainians and Belarusians decreased by 6 times, and the share decreased from 3.5 to 0.6%, in other regions 2-3-fold numerical losses of the population of these ethnic groups are also recorded. The reduction of the Ukrainian–Belarusian population affected Tyumen region the least, due to relatively young age structure of the population and higher socio-economic attractiveness of the region. There is still a relatively high proportion of the Ukrainian population. In Khanty-Mansi Autonomous District—Yugra it is 6% and in the Yamalo-Nenets Autonomous District it is 9.4%.

Similar ethnic and demographic trends are specific to some ethnic communities such as Chuvashs, Mordovians, Maris, Udmurts. In addition to low reproductive attitudes and migration aspirations, one of the main reasons for the steady decrease in their number is the high intensity of assimilation processes, peculiar to these peoples.

The number of Tatars is also decreasing, but at a much slower pace and scale. The size of decrease in Siberian regions (with exception of the Trans-Baikal territory, where the number of ethnic groups decreased by 2 times) averages 30–40%, with some regional differences. The share and concentration of Tatar population is highest in Tyumen region (7.1%). This is the only region where the number of Tatars increased by 5.5% during the inter-census period. Ethnogeography of Bashkirs, as well as the indigenous peoples of Siberia, is associated with territorial localization in one region. About 90% of this ethnic group is concentrated in Tyumen region.

Kazakh population of Siberia is characterized by demographic and migration stability, which is manifested by a rising in population and concentration of ethnos in the regions bordering the Republic of Kazakhstan. According to the number of Kazakhs, they mostly live in Omsk region (78,303 people), and their greatest specific share is noted in the Republic of Altai—6.1%.

The highest scale of population decline is typical for German population and Baltic ethnic groups (Lithuanians, Latvians, Estonians). The main reason for this ethnodemographic feature was their mass remigration to their historical homeland. In the 1990s, after the collapse of the USSR, with opening of the “iron curtain” and liberalization of migration policy, the outflow of population of these ethnic groups (especially Germans) outside Russia increased dramatically. In Omsk region, with the largest composition and share (6.3%) of German population, the number of Germans from 1989 to 2010 decreased by more than 84000 people (2.7 times), in Altai region—by 77,030 people (2.1 times). In Novosibirsk and Kemerovo regions, a smaller but significant proportion of German ethnic group (in 1989, respectively—2.2% and 1.5%) also experienced a twofold reduction. Remigration of the Baltic peoples, mainly deported to Siberia in the 1940s, began in the mid-1950s. It was further intensified in the late 1980s, and today the share of these ethnic groups in national composition of Siberian regions contributes a maximum of 0.2% in Omsk region and the Krasnoyarsk Krai.

With a significant decrease in the number and share in the ethnic structure of Siberian population of Slavic, Finno-Ugric, Baltic peoples, Germans and Jews, the share in the ethnodemographic composition of Siberian regions of the peoples of

the North Caucasus, Transcaucasia and Central Asia significantly increases. During the period from 1989 to 2010, the numerical representation of the peoples of the North Caucasus increased by 2.2 times, Armenians by 3.0, Azerbaijanis by 1.9, Uzbeks by 2.1, Kirghiz by 3.7, Tajiks by 6.7 times. Replacement by these people mainly of Ukrainians, Belarusians, Mordovians, Chuvashs, Germans is large-scale and geographically localized. For example, the number of ethnic groups of the North Caucasus in Tyumen region increased by 2.9 times, and the peoples of Dagestan (Avars, Dargins, Kumyks, Lezgins, Nogais), by 4.2. This region is home to 74.2% of the total representation of North Caucasian ethnic groups in Siberia, whose share increased from 0.8 to 2.2%, and in Khanty-Mansi Autonomous District to 3.3, 0.44.4% of all Azerbaijanis in Siberia are registered in this region of the Russian Federation. Armenians, Tajiks, Uzbeks, and Kirghizs are more dispersed, although their most intensive growth is also recorded in Tyumen region.

Azerbaijanis, Chinese, peoples of Central Asia and the North Caucasus have an impressive migration and demographic resource, which will ensure a steady increase in their share in the ethnic structure of Siberian population in the coming years. Especially in economically and socially prosperous regions and in agglomeration zones of large cities.

5 Folk Geographical Terminology as a Reflection of Intercultural Communications (On the Example of Russian-Buryat and Russian-Evenk Interactions)

Borrowed vocabulary in the languages of Siberian peoples and Russian ancient fairy tales and dialects is a clear marker of interethnic contacts (Anikin 1990). In Russian languages we borrowed from dialects of Transbaikalia (all areas through Transport Siberian Railway line) for about 10% (Fedorov 2000) and these words are represented in all blocks of folk geographical terms. Russian borrowings in Buryat and Evenk languages, related to the pre-Soviet period, are less numerous (vocabulary of agriculture, names of objects of Russian life, etc.). Dictionaries of Russian dialects and borrowed vocabulary, Buryat-Russian dictionary were used to draw up systems of folk geographical terms and their qualitative cross-cultural analysis (Fedorov 2000; Bereltueva 1989; Cheremisov 1973; Sorokoletov 1987; Eliasov 1980).

Russian folk geographical terminology was formed in the conditions of the taiga plains of European Russia. In Transbaikalia, the main type of Russian settlement was confined to the forest-steppe basins. It was located between ethnic territories of Evenks (mountain taiga) and Buryats (basins steppes and plains of Central Asia). This contributed to the emergence of numerous borrowings in terminology of physical geography and environmental management. The names of basins relief, locations, distinguished by microclimatic features, saline soils, steppe vegetation, hunting fauna are borrowed from the Buryat language. Evenk words for mountainous terrain, climatic phenomena, mountain rivers and lakes, boreal vegetation, fisheries

fauna entered the term system "Landscape": *murchug(мурчу́г)*'steep bank', *yaricta (ярúкта)* '1. Larch. 2. Larch forest', *bojun (бо´юн)* 'wild hoofed animal' (elk, Manchurian deer, wild boar).The names of basins relief, locations, distinguished by microclimatic features, saline soils, steppe vegetation, hunting fauna are borrowed from the Buryat language: *dulanny place (дуланноеместо)* 'a warm, sheltered place' (from dulaa(n) (дулаа(н))—'warm' [16, 200]),*kuytun (куйту́н)* 'a place, where cold lasts long' (from *hujte(n) (хыйтэ(н))*—'cold, frost, severe cold'; *seber (сэбэр)* 'an open place, which has no vegetation' (from Bur. Seber (сэбэр) 'pure, open'); *mangir (мангир)* 'wild bow',; *khuzhir (хужúр)* 'saline soils'.

Folk terminology of social and economic geography includes names of Buryat and Evenk settlement system elements, farmland (steppe hayfields and pastures), hunting and fishing fauna, food and medicinal plants, land and water communications, centres of local commerce. Russian borrowings in the languages of indigenous population are associated with home improvement, field husbandry, vegetable growing, and gold mining. Buryat language includes names of field and vegetable crops (rye, oats, cucumber, carrots, beets, cabbage, and potatoes). Colonized agricultural slopes of forest-steppe basins were designated by Evenk word *uro (уро́)* which means 'habitable place in the taiga'. Buryat borrowing*utug (утýг)* 'winter grazing' (from Bur. *uteg (ытэг)* 'estate (home with fenced mowing)',*butui(бутýи)* 'steppes and meadows where cattle grazes during the cold' (from *butuu (бытыы)* 'closed, deaf'), vegetable raw materials are associated with winter grazing: *badan (бадáн)* 'a plant which root is used in leather industry as a tanning substance', *myker (мыкéр)* 'buckwheat viviparous, the root of which is infused instead of tea' (from Bur. *meheer (мэхээр)* and others. A separate group of borrowed vocabulary in Buryat language are the names of field and vegetable crops: *orōhon (орōхон)* 'rye', *oroohoobeos (ороохообёос)* 'oats', lit. 'grain oats', *ugerse (ыгэрсэ)* 'cucumber', *carrots, carrot (морковно)* 'morkovno', *sveklo (свёкло)* 'beet', *cabbage*, *kapustynnabsha (капустыннабша)* 'cabbage leaf' Potatoes were originally called apples by Russians (Eliasov 1965). From this word comes the Buryat word *yabalkha (яабалха)* in other values 'apples', 'tomatoes' (Limorenko 2014). Later came the name *khartaabkha (хартаабха)*. In Tunkinskii basin there is a local name for potatoes *mondoruukhai (мондоруухай)* (from mondor 'round, rounded') (Eliasov 1965).

Acquaintance of Russian immigrants with religious practices of Evenks and Buryat record the names of worship places, buildings, and religious ceremonies. The culture of indigenous peoples included the concept of Christianity as the "Russian faith". An example of intercultural contacts was the festival *talá (талá)*, where Russians, Buryats and Mongols who lived near the Russian-Mongolian border participated.

Intercultural communication contributed to immigrants' adaptation to economy in forest-steppe basins and mountain taiga and familiarity with material and spiritual culture of Russian population. The general result of intercultural interactions was the formation of a new multi-ethnic and multi-confessional regional space.

Russian borrowings in the languages of indigenous population are associated with home improvement, field husbandry, vegetable growing, and gold mining. The word "oven" came to Buryat language in the form *peeshen (пеэшэн)* tumer-peeshen (*тымерпеэшен)* 'iron stove'). There is also a collocation o*rodger (ородгэр)* 'hut with an oven (literally "Russian house")' (Limorenko 2014). Evenk language included words like *pechi (пēчи)* (the so-called iron stove), palatka/balatka (*палāтка / балāтка)* 'tent'—a temporary hut of hunter and summer home (Eliasov 1980). Folksongs mention aword *solotokanma* (*солотōканма)* 'yourgold'.

Terminology of human geography reveals peculiarities of perception of developed space—oikumene by oppositions near—far, own faith—someone else's faith, ancient—modern, etc. Acquaintance of Russian immigrants with religious practices of Evenks and Buryat peoples record the names of worship places, buildings, religious rites: *dastan (дацáн)* 'a Buddhist temple with residential premises', *obon (обóн)* earthen or stone mound, that Buryats make for religious ceremonies or as identification marks on the ground', *dugan (дуган)* is a place where Buddhists sacrifice', *tailagan (тайлагáн)* 'supplication of the Buryats [shamans] with sacrifice'. Russian immigrants have learned Evenk and Buryat legends about bargut-the ancient inhabitants of the region. They are mentioned in the illustration to the geomorphological term *urkhai (урхáй)* (from Buryat *uurkhai (уурхай)* 'mine')—a hole in the shape of a bowl: "*The old people told that local urkhaiswere formed from the collapse of barguts graves*".

The Buryat language includes the term *orodoishazhan (ородойшажан)* 'Christianity, Orthodoxy (lit. English faith)'. Mixed marriages contributed to the adoption of the indigenous population of Orthodoxy: *karym (карым)*'1. A Buryat person, adopted the Orthodox faith, Russian way of life, Russian customs. 2. A descendant from a mixed marriage of a Russian and a Buryat'. An example of intercultural contacts is the holiday of *tala(талá)* (form Bur. Tala 'a friend'), in which Russians, Buryats and Mongols participated. It was held on in Trans-Baikal section of the Russian-Mongolian border in the late XIX–early XX century.

6 Correlation of Ethnic and Regional Identity

The identity (self-determination) is a complex multidimensional positioning of the individuals or group (ethnic, religious, professional, social, civil) in the environment, including the awareness of belonging to the community and to the territory, made up of several substantive components. Among them are the positioning of oneself as an individual, a family member, the awareness of belonging to a generation, social group, stratum, caste, clan, professional society, ethnic group, religion, landscape, location, region, state, epoch. All these components can be identified in two categories: the "place" and the "memory". The study of identity is of practical importance for the regulating of inter-ethnic relations and migration policy, zoning and forecasting the future course of ethnocultural genesis (Gerasimenko 2012).

Some authors question about the presence of regional identity in Russia. The idea that Russians lack of regional identity does not reflect reality. In Russia regional identity is created, but it is not expressed as in many foreign countries where rootedness accompanies patriotism, love for the native land and pride of it and regional brands. People are often ashamed of their provincial, especially village origin and try not to demonstrate the identity.

The reluctance to demonstrate the identity does not mean its absence, but is connected with the increasing polarization of Russian space: centre-periphery (on different levels) and stratification of Russian society leading to the displacement of large numbers of people as well as to xenophobia and snobbery, which unfortunately are the realities of Russian life. Regional identity is reflecting the territorial structure of geospace, and as a positive or negative image of the territory it is due to economic and geographical position—belonging to the capital or to periphery, marginality, borderline position. It is formed where there is such a geographically organized way—for example, a single ethno-cultural territorial complex as in some Siberian regions.

M. P. Krylov defined regional identity as a systemic set of cultural relations associated with the concept of "small native land", as well as the internal image of the territory (Gerasimenko 2012).

Regional identity is closely linked with the world image and the sense of rootedness. The image of the world as an important part of the spiritual culture is made up of geographical, historical, religious, psychological concepts, meanings and images and is influenced by a number of factors, including geographical environment. Geographic image of the world is determined by such concepts as "fatherland", "motherland", "homeland", and "earth". It cannot be complete without the concepts of "place", "frontier" and other geographic representations. Awareness of one's place in space is inextricably linked with the knowledge of the place in history. "Memory"—the notion of ancestry, place in the history and geography of the region (according to modern concepts—in "topohrone")—the basis of the ethno-cultural community identity formation.

The necessity to adapt to the landscape and to the political and bureaucratic state system contribute to the convergence of ethnic and cultural groups. Eventually regional ethnic contacts are intensified, this leads to the formation of stable spatial relationships. Assimilative processes and cross-breeding are amplified. The presence of regional identity and regional culture does not involve the compulsory merger of ethnic groups; on the contrary, they maintain differences and ethnic identity. The settlers remain in the orbit of their culture but acquire regional and local characteristics. The culture of indigenous peoples is transformed as well. In the end, regional cultures are formed. The identity has several hierarchical levels of positioning: from global to local.

The region is characterized by the unity of the ethnic and cultural, political and economic history, geographical location, the mosaic of economic-cultural types, and as a consequence—the cultural landscape. Regional culture that has developed on the basis of the mosaic of ethnic cultures with the dominant role of the Russian

culture, values, lifestyle, mentifacts, sociofacts and artefacts have much in common and allow us to consider the region as a single unity.

Identity can also be subjected to divergence. Socio-economic and regional cultural differences are often much stronger than ethnic, linguistic and religious. This was facilitated by the formation of the community in the USSR, when the ethno-cultural facets levelled, but actually causes have deeper roots. Russia has long evolved not as a national state, but as a multi-ethnic community, which is particularly important today in regional social, ethno-cultural and socio-economic policy. Different levels of government need to consider ethnic and cultural specifics of border areas and to implement policies aimed at integrating and saving bonds, which will help to maintain the stability of cross-border regions.

7 Ethno-Cultural Identity as a Function of Ethno-Mentality

The large-scale urban environment of Siberia—Novosibirsk, Omsk, Krasnoyarsk is represented by a unique form of territorial organization of ethno-cultural identity with a dispersed territorial structure. Ethno-cultural identity in the structure of the territorial organization of society is a function of ethno-mentality. The critical parameters of this mentality level are the components of cultural regionalism, which are differently and with varying degrees of certainty associated with some spatial-territorial level. These parameters are characterized by cultural relations, such as mutual contrast of regions and settlements culture, the power of self-consciousness (local patriotism) in regions and settlements, and aspiration to isolate regions and settlements, which in general do not coincide.

Ethno-cultural identity in the Siberian region is clearly seen in the structure of diversification of spatial and hierarchical levels of society territorial organization.

Let us make an attempt of territorial organization' conceptualization of ethno-cultural identity of Siberian population. Instrumental and methodological methods of geography of mentality, developed by the author (Lyubichankovskiy 2019), which allowed to propose a scheme of territorial organization of ethno-cultural identity of Siberian population at different spatial and hierarchical levels were used in the paper (Fig. 2).

Socio-economic space stratification, determined by centre-peripheral relations, is particularly associated with ethno-cultural identity. In Fig. 2 we can see the central-peripheral inversion of ethno-cultural manifestations stratification in space: authentic properties are manifested most in the outback and most blurred in socio-economic centres.

Ethno-cultural identity is regionalized in the socio-economic periphery, where ethno-mental manifestations are the most authentic, and the culture of rootedness is manifested as much as possible. At this spatial level exactly that ethno-cultural identity is represented by a continuous type.

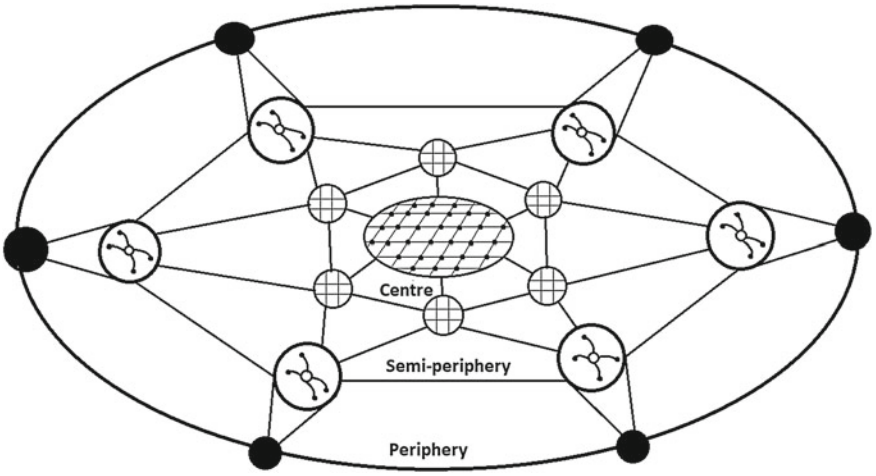

Fig. 2 Territorial organization of the Siberian population' ethno-cultural identity at different spatial-hierarchical levels

Ethno-cultural identity of the semi-periphery is usually expressed in a linear-nodular territorial structure with an increase in the "washing out" of the characteristic type when approaching a higher socio-economic territorial rank.

Socio-economic centre has a dispersed nature of the territorial organization of ethno-cultural identity with almost complete loss of regionalization. Here a network nature in the territorial manifestations of population ethno-cultural identity is expressed to the maximum extent.

Thus, the ethno-cultural identity of Siberian population is regionalized in socio-economic periphery, in semi-periphery it is expressed, as a rule, in linear-nodular territorial structure, and in socio-economic centre has a dispersed nature of territorial organization with almost complete loss of regionalization. Large-scale urban environment of Siberia—Novosibirsk, Omsk, Krasnoyarsk is represented by a special form of territorial organization of ethno-cultural identity with a dispersed territorial structure.

Thus, territorial organization of ethno-cultural identity of Siberian population is a multi-level system that includes both regional and extra-regional reality, which can be assumed to have an inverse zoning in cultural space in relation to socio-economic centre-peripheral stratification of space.

8 Regulation of Living Conditions of Indigenous Minorities

The main peculiarity of the Russia' northern peoples' minorities is the orientation of their activity towards traditional types of nature management: reindeer herding, hunting, fishing, gathering medicinal herbs and berries. For centuries, these peoples

led a nomadic lifestyle as the most appropriate for tundra conditions. Consequently, nomads living now in the tundra should be considered as a relict (Ivanov 1998) and, at the same time, an element of the feeding landscape (Gumilev 1993). The main system-forming "axis" of this ethnocenosis is the trophic chain "the dominant type of vegetation—the faunistic complex—the ethnic population". In this entrenched ethnocenosis, any change in the landscape leads either to assimilation or the ethnos divergence.

With the discovery and subsequent exploitation of subsurface reserves of oil and natural gas in the territory inhabited by indigenous northern peoples, traditional environmental management conditions have changed dramatically. This is especially characteristic of the northern part of Western Siberia, where about 800 hydrocarbon deposits with total reserves of at least 60 billion tons of standard fuel have been identified. In addition, deposits of ferrous and non-ferrous metals, coal and non-metallic raw materials are discovered in the Urals' eastern part.

The exploitation of resource economy objects, first of all, impacted all types of traditional environmental management. Thus, in the Middle Ob, hydrocarbons are produced on all nine municipal districts of the Khanty-Mansi-Yugra Autonomous Okrug (region of the Russian Federation). The technogenic objects created here have influenced the formation of settlement systems and environmental management of the indigenous population. For example, the proportion of the number living hereof Khanty, Komi, Mansi, Nenets, Selkups in cities is deficient—from 0.1 to 0.4%, and in inter-settlement areas it reaches 50%. At the same time, this pattern manifests itself: as we move from south to north, the proportion of indigenous northern peoples in the total population grows. Accordingly, the problems of their vital activity become relevant.

In the Russian Federation, many steps have been taken to reconcile the interests of nature users and the local indigenous people in the legal field. In a number of Russia' decrees, federal laws and government regulations spell out the rules according to which persons leading a traditional lifestyle have the right to compensation for damage caused by habitat transformation. Thus, in the decrees of the local authorities of the Khanty-Mansi-Yugra Autonomous Okrug (region of the Russian Federation) in the early 2000s, the status was established and the ancestral lands were fixed; contractual relations began to be concluded between subsoil users and representatives of the indigenous peoples of the north, defining the procedure for carrying out work on tribal lands.

Tribal land is a natural complex of territories (forests, rivers and their banks, lakes, swamps, meadows, pastures), which historically formed unique stereotypes of life and forms of traditional management of indigenous people. Land may be lands of communities and families, and individual citizens. At the end of 2006, tribal lands in the Khanty-Mansi-Ugra Autonomous Okrug of the Russian Federation were called territories of traditional nature management (TNM) of regional significance. However, the legal regime of these territories is not regulated: they are not registered in ownership and are not inherited. The TNM in the Okrug accounts for 20% of the territory, and in some municipal areas this percent reaches 50%. Within the TNM, it is 65% of the subsoil (Chistobaev et al. 2016).

All subsoil users are obliged to enter into economic agreements (contracts) with the head of the TNM for compensation payments. Three types of contracts are the follows: long-term, short-term, and arbitrary. Social infrastructure objects are created within the framework of compensatory measures, and monetary assistance is paid. All oil and gas companies strictly adhere to economic agreements concluded with representatives of TNM. Indigenous peoples have the opportunity to defend their rights in administrative and judicial bodies. One of the ways to further improve the consideration of public interests may be implementing the Pigue tax, which is equal to the value of external costs. This tax in the oil and gas complex consists of payments for pollution of the environment and the withdrawal for natural resources, and in the conditions of the North—also compensation to the indigenous peoples of the North for the removal of land for their traditional nature use.

The introduction of innovative methods of managing the impact of oil and gas production on the socio-ecological environment into practice (Solodovnikov and Chistobaev 2011) opened up the possibility of preventing the destruction of the natural and social habitats of northern' national minorities leading a distinctive lifestyle. Ensuring a balance of interests of subsoil users and unique ethnic groups should continue to remain a pressing task for researchers and managers.

9 Conclusions

The population of Siberia was formed and transformed for a long time under various factors. We examined various aspects of interethnic interaction and the mutual influence of different people. We have identified five stages of Siberia' colonization. Different models of territory development colonization by every stage. The factors are assessed, and the specifics of interethnic interaction and ethnocultural transformation of Siberia' people are revealed. The forms of interaction largely depend on the sign of complementarity (according to L. N. Gumilyov). The modern ethnocultural space is being transformed, first of all, under the influence of migration and ethno-demographic processes. The authors are also analysed the changes in ethnic composition and new ethnocultural characteristics. The features of mutual interdependencies are influenced by historical, geopolitical, psychological and economic factors. The authors have considered the ethnic labour division (ELD). As a result of interaction, ethnocontact zones are formed. Their definition is given, and an attempt of their typology is made. As an example of mutual influence, geographical vocabulary borrowed by different peoples is considered. As a result of changing borders and migrations, trans-border regions are being formed. We have considered the geographical aspects of their study. An important indicator of the ethno-cultural space' transformation is the ratio of the ethno-cultural and regional identity of the population. In the Siberian region, this ratio is determined in the structure of the spatial and hierarchical territorial levels' diversification. Ethno-cultural identity itself is considered as a function of ethno-mentality. The chapter also presents the main directions for regulating the living conditions of Siberian' indigenous peoples.

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Philosophy and Linguistic of Siberia in the New Millennium

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Abstract Philosophers, historians, culturologists, and social scientists, usually study the history of ideas, worldviews, beliefs, or other achievements of the civilization process, such as scientific and technical discoveries. The scientists conducted research on different scientific schools using cultural-linguistic analysis, content analysis, structural and semiotics analysis, and typological method. The research reference base includes diverse lexical material of different text types and discourse, and folklore and ethnographic data. A chronological framework of work covers seventeenth–the beginning of the 21st centuries. The research on North aboriginal and

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V. N. Bocharnikov and A. N. Steblyanskaya (eds.), *Humans in the Siberian Landscapes*, Springer Geography, https://doi.org/10.1007/978-3-030-90061-8_21

not aboriginal inhabitants' language perceptions is presented in the chapter. Cultural linguistics as a scientific and methodical direction of linguistics in the preservation, revitalization, and development of various languages of aboriginal inhabitants is noted. Geographers and ethnographers tend to pay attention to landscapes and natural factors, adaptation to which is a condition of ethnos survival. Today biology has become a leading scientific discipline that has had a significant impact on the cross-cultural research methods used in this chapter. According to the authors, the social and economic stratification of space, defined by the centric-peripheral relations, is mainly linked to the ethno-cultural identity. Ethno-cultural identity is viewed as a function of ethno-mentality. This mentality level's key parameter will be the components of cultural regionalism, connected in various ways and with different degrees of certainty with space and territory, and characterized by a set of original cultural relations in regions and settlements. The problem is how the interaction of cultures is conceived: based on the dialogue taking place on the public stage, accompanied by critical reflection and argumentation, or by functional language, technologies, and other civilization achievements assimilation? The authors highlight the integrative character of spiritual codes of culture and their semantic invariability at the constant expansion of codes' notional field in their interpretation in the following chapter. On the materials universalization bases, the etymology and distribution area of the name "Samokhody" (freewill settlers) with which East Slavic peasants backsettlers in some regions of Siberia were identified, the mechanisms of occurrence of the given ethno-cultural identity form, and also the subsequent transformations are formulated. It is challenging to analyse different axiological preferences, social and moral norms, and legal and economic differences. They are revealed as the experience of comparing "own" and "alien" is accumulated, and their justification requires a sufficient amount of intensive study of the daily life structures of a particular social group. Siberian life's axiological paradigm should not interrupt the historical tradition; any changes and transformations are constructive only in the Siberian basic spiritual values preservation paradigm. Theoretical and applied aspects of cultural codes formation are considered: the basis of culture concept and its features discovered in the twentieth century, modern scientific theories of "cultural codes", and their significance for studying historical transformations of the Siberian peoples' ethno-ecological system.

Keywords Anthropogenesis · Ethno-genesis · Cultural code · Culture · Mentality · National character · Language picture of the world · Adaptation · Transformation · Geophilosophy · Biopolitics · Ethno-cultural identity

Glossary

Anthropogenesis	in biopolitics, ethnos is understood as a social and political construct on the basis of which the relations of own and alien relations are built.
Biopolitics	is a new form of power, the art of population management. Unlike dominance, it is based on knowledge of consumption norms, resources of life support, demography, etc.
Cultural landscape	is an earthly space, which a certain group of people has mastered in a utilitarian, semantic, and symbolic way.
Colonization	is a term of English-speaking origin that implies and reinforces a certain initial social, geographical, and ethno-cultural inequality, which does not imply a fair correction of the previous situation, but is aimed at changing spatial patterns of settlement and resettlement. The result of this type of development is a colony or colonial state that is dependent in some way on the metropolis.
Ethnos	is a group of people, naturally formed in the natural environment, who have developed an original stereotype of behaviour that contributes to self-preservation.
Ethno-genesis	is the process of the ethnosevolution, which takes place under the influence of natural factors, as well as cultural, political, and civilizational practices.
Eurocentrism	is a value system proclaiming in one form or another the cultural and civilizational superiority of Europe, imposing the process of modernization of other nations according to the European model.
Eurasianism	is a geopolitical, social, and philosophical doctrine that criticizes Eurocentrism and orientalism for unilateralism, aimed at the synthesis of Eastern and Western cultures.

Ethno-cultural identity	in the structure of the territorial organization of society there is a function of ethnocentricity. The key parameters of this level of mentality will be the components of cultural regionalism, which in different ways and with different degrees of certainty are associated with some spatial and territorial levels. These parameters are characterized by a set of cultural relations, such as the mutual cultural contrast of regions and settlements, the strength of self-consciousness (local patriotism) in the regions and settlements, as well as the desire to isolate regions and settlements, which in general do not coincide.
Ethno-cultural landscape of Siberia	is a zone of distribution of ethnic and cultural phenomena of the living ethnicities in Siberia.
Evens and Evenks	are aboriginal peoples of the North, Siberia, and the Far East of the Russian Federation.
Geopolitics	is a concept of control over territory, laws of distribution and redistribution of power and influence centres of different states (superpowers).
Geophilosophy	is a direction in modern philosophy, within the framework of which the priority of the history of the formation of cultural spaces that determine the history of thought is declared.
Geospatial space	is a system of stable cultural realities and representations on a certain territory, formed as a result of coexistence, intertwining, interaction, and collision of different faiths, cultural traditions and norms, values, deep psychological structures of perception, and functioning of world pictures.
Human capital	is a productive factor of modern economic development, the unity of abilities of a collective labourer, as well as the opportunities and conditions for their implementation.
Kaichy	is the Owner of the Kay, the Performer of the Heroic Epic. As a rule, in the form of a musical work accompanied by topshur.
Linguistic personality	a personality expressed in the language(s) and through the language—a set of abilities and characteristics of a person that determine the creation and perception of speech works—texts.

Linguistic picture of the world	historically formed in the everyday consciousness of a certain language group and reflected in the language a set of notions about the world, a certain way of perception, and structure of the world—conceptualization of reality.
Linguistic ecology	is a branch of linguistics focused on the development of scientific theory and practice for the preservation, support, and development of endangered languages of small peoples.
Mentality	a deep level of collective and individual consciousness, including an unconscious set of disposition of people to act and think in a certain way and a set of conscious and unconscious elements of the human psyche, inherent in society and cultural traditions of the country.
National character	stable features typical for members of a national (ethnic) community, features of perception of the world, and motives of deeds (ideas, interests, and religion), of norms, and rules of behaviour.
National consciousness	is a set of social, economic, political, philosophical views, religious, social, and moral values.
Shaman (Kam)	is an established name for ecclesiastical persons capable of travelling in a state of ecstasy to the world of spirits and agree with it on meeting the needs of people. In Altai, the shaman is called "Kam", and the shamanic ritual is called kamlaniye.
Traditional worldview	is a system of people's views about the world and the place of a person in it, which evolved and changed, but in general terms continues to be preserved up to the present time.
Westerners and Slavophils	two main philosophical and ideological programs in the Russian social movement and philosophical thinking in the 30–50 years of the 19th century, one of which insisted on the need for European modernization, and the other defended the identity of the development path of Russia.

1 Anthropogenesis, Ethno-Genesis, and Biophilosophy of Siberia

The ontological feature of homosapiens is its ecstatic entity, his attitude to nature not as a "cell", but as an open system. This creates a world and a self that can be formed independently. The theory of evolution represents man's origin on the line of animal development, but it is unpromising. The place of man in the world is

determined fundamentally differently from the animal's place in the environment. It should be revealed not only in physical, but also in cultural parameters. Such a position raises the question of how "external factors", such as the state of the natural environment, form the "internal"-subjective reality (mentality) of people? (Braudel 2007a, b; LeGoff 1992; Habermas 2016).

In light of the theoretical difficulties of the human anthropogenesis semilaric theory, it should be understood as a product of something in which it is in no way intended. This is the place of its production, where the means and production relations coincide. The use of hard tools in the Stone Age has led to a unique situation where pre-sapiens have been freed from their bodies' rigid determinism by the external environment. Such an explanation does not mean the intermission of the body's evolution.

On the contrary, in the new artificially created conditions it begins to become humanized and aesthetically improved, and in so far as it is possible to turn the created tools against the impact of the natural environment and to direct efforts to the creation of a sphere within which life becomes more diverse (Elias 2001). Only selection is now defined not by the natural but by the artificial cultural environment. The problem is that the norms and codes of conduct are different in various cultures. However, most often the supporters of both "multiculturalism" and transcultural accept European culture in advance by the scale of other cultures' assessments.

In addition to cultural-historical approaches, there are empirical approaches in which cultural and technical achievements are derived from biological prerequisites. Elimination of the body does not lead to the disappearance of adaptive selection mechanisms. Ethno-genesis is influenced not only by geography, territory, and landscapes, but also by climate. To some extent in the process of civilization, people get rid of its pressure. The history of housing shows how people who were not adapted to the harsh conditions of cold or hot, dry or wet climates, created artificial containers to live relatively comfortably.

These paleontological data reveal an interesting feature of homosapiens: thanks to the greenhouse effect they are inhibited by the process of monstruosolization, which is possible due to the preservation of intrauterine morphology in the extrauterine state. The family's physical and mental warmth serves as a protective system, which is still poorly developed in infants.

In the current environment, the climate problem has become more acute due to technological overload. The growing interest in the Arctic is stimulated by the extraction of mineral resources and by talks about global warming. At the same time, it turns out that the inhabitants of the "welfare society", depleting the planet's resources, have something to learn from the small peoples of Siberia, who lived in their scarce territories for centuries, without causing them harm, and were formed as quite friendly and hospitable communities.

The ethno-genesis theory is the next methodological problem that needs to be discussed. Some people consider ethnic groups to be peculiar "natural products" that grow naturally in the process of people living together in one or another ecological niche. Others, on the contrary, consider ethnic groups to be frameworks. The ethnic phenomenon forms an ethno-sphere in which natural, mechanical, mental,

and social processes interact. The dynamics of the ethnic system is characterized by self-organization and cyclicality, purposefulness, and development (Rudeckij 2016).

In Russian ethnography, the enclosing landscape is one of the fundamental concepts in social and natural history, which studies the interaction of nature and society by analysing specific ethnic formations (ethnos, super-ethnos, and sub-ethnos). Ethnicity is the unification of people in specific natural conditions that determine their physiognomic specificity, substantively revealed by social, cultural, and environmental laws. Humanity is inextricably linked with time, movement, and matter (Keligov 2012).

What has been happening recently marks a new stage in the annulment of previous "cosmic" agreements. According to the previous "space templates", the life of humankind lasted for hundreds of centuries, up to the first third of the nineteenth century, when, on the one hand, an avalanche-like growth in the number of people began, and on the other hand, the active processes of globalization of economy, communications, and technical intervention in the structure of the planet developed.

Ethnos, which do not create a new cultural landscape, but rather adapt to the natural, become parasites in interaction with cultural aliens, or a service staff. On the contrary, ethnic groups in the creative phase of development assimilate the conquerors, resulting in the emergence of new young people, combining different ways of landscape development. L. N. Gumilev's domestic concept has not grown out of nowhere and in turn caused interesting professional discussions, during which other points of view on ethno-genesis were also discussed, in particular, the opinions of foreign researchers, who replaced the concept of ethnos with the concept "ethnicity" (Bocharnikov 2018).

Our Ecumene is a human-made and ecologically transformed territory with the main population of the planet, lives by more than one social or biological law, other laws are much deeper than our genetics, but we do not suspect about them. Indigenous peoples in modern society represent the "last" ethnos that have preserved their "spatial agreement" with the Cosmos, concluded according to the "old" rules.

2 Geophilosophy of Eurasian Civilization

Seas, rivers, and mountain range from the natural boundaries of countries and peoples that seek to preserve their traditions. Furthermore, rivers and seas not only separate, but also connect peoples. They form the communication channels through which people, goods, knowledge, and other cultural achievements move. For example, the Mediterranean Sea, on which Greece and Rome's achievements were circulating, has defined the face of Europe. The same ways for Russians were the Siberian rivers. The spread of people on the Earth's surface, the formation of large settlements, and the expansion of communications simultaneously belong to both the history of humankind and the natural history of the Earth. These ideas were discussed as far back as Kant and Herder's days, and geographical metaphors have given a new impulse to humanitarian sciences' development (Pietsch 2003).

In “Nomos of Earth”, K. Schmitt, together with Spengler, Haushofer, and other geopoliticians, reconstructed the organic understanding of history, according to which not philosophical ideas, but the order of life in a certain territory and the need for its transformation and protection determine what is called a national idea, the character of the people, mentality.

Geophilosophy is not geopolitics, although there is a common ground between them. Namely, it is a protest against the absolutization of the role of ideas, spirit, and morals in people’s history. Geopolitics focuses on the territory (Deleuze and Guattari 2007). Geophilosophy is based on the unity of the cultural and natural landscape, which is understood in folk culture as a living being, not an industrial raw material. In Plato’s “Timey”, Cosmos is conceived as an absolute living being with no environment and thus does not distinguish between internal and external. It absorbs nothing from the outside inside out, but it does not release anything from the inside out. Cosmos as a giant animal has no niche of habitation and does not feel the need for spatial movement. It is the only one, where the eternal return is realized: it acts as a whole waste-free ecosystem, where there is no difference between mouth and anus, and supermarket and landfill. Christian theology, on the contrary, is based on the difference between the external and internal. God creates a world, where he sends his messages and for this purpose sends to the Earth his son Jesus Christ, who is both God and man. Since the Earth was defined as a place of suffering (hell was at its centre), it is obvious that it does not look like Plato’s living Cosmos.

The natural landscape is structured and formed in various historical periods in different ways. For example, at first Siberia was considered the place of fur hunting (hunters), then as a territory of agriculture (settlers), as a place of exile, and, finally, as a source of minerals, a place of oil and gas extraction. What brought northern land explorers to Siberia? Of course, there were material and geopolitical motives, but one cannot help noticing the process of cultures’ interaction. Why did many peoples voluntarily join Russia? Firstly, we took less tribute than, for example, the Mongols, and secondly, we were more tolerant of faith and customs. Thirdly, we were neighbours, and it seems very important. If the Spaniards, English, and French colonized distant, alien peoples, we had to deal with our close neighbours. Of course, the neighbourhood was not without excesses, but they were smoothed out in everyday interaction.

Without denying the differences between peoples, it is impossible to accept the division of people into higher and lower races, because in every territory, where people live, regardless of skin colour, there are very different races. Herder explained the difference between people by climate and landscape: “In every other territory of the Earth, the Mongols are degraded or ennobled, but at their land they remain what they have been for millennia, and will remain so until the land is changed by nature or art” (Herder 1977, 173). To tear a man away from the Earth is to cut him off from his homeland.

At the same time, the ethnos are autonomous, as Herder pointed out: “No matter how the climate affected, every animal, every human being, plants have their climate, because everyone perceives the external influences in their own way, organically processing them” (Herder 1977: 182). The movement of an African to Europe has

minimal effect on his appearance, but in the case of marriage to a white woman, her genes can significantly change the child's appearance. This makes it necessary to combine evolution and genetics. Changing the species is not so much the result of a body's adaptation to the new environment as the evolution of the organic form itself. On the one hand, there genetic boundary is rigid. Wild animals do not mix with alien species. Artificial mixing usually leads to changes only in external features, and the internal genetic type does not change. On the other hand, the living picture gives grounds to speak about the evolution of organic form from a plant to a man.

The impact of climate on the organic structure of the peoples of the North is beyond doubt. Big head and cheekbones, wide shoulders, small height, and fleshy body are the result of adaptation to severe climatic conditions. Similarly, weakly expressed attractions, low needs, and meek temperament are all the result of the harsh northern nature impact. However, why hasn't the warm climate caused the Mongolian people to grow in elegance and beauty? This may be due to the steppes and lack of water. Perhaps, it is not so much about the climate as it is about primitive culture and upbringing.

The development of Siberia and the Far East is misunderstood as an exchange of ideas and technologies, especially as a philosophical debate. Since the eighteenth century, some attempts have been made to understand the civilization development based on the history of ideas and cultural and geographical processes. Kant and Herder understood the experience of navigation and discovery of new lands; Spengler, Danilevsky, Russian geographers, and Eurasians gave their answers to the globalization process, which took the form of colonization. Modern authors, such as Deleuze, Brodel, and Gumilev, were looking for an answer to the question about the causes of cultural explosions from the point of view of geophilosophy. Geography saves the history of thought from the cult of regularity. It is about the geography of the mind. It tears the history of thought away from itself and connects it with the environment.

Vernadsky's theory of the noosphere has become the global information community's first project even before it was formed. Modern history is becoming "cosmic" not only in the sense of man's entering space, but also thanks to the genuinely planetary scale of science and technology development consequences. Today, the negative rather than positive aspects of thought transformation into a planetary phenomenon are revealed. If Vernadsky saw the science transformation into an international outlook, globalization of information, technology, communication, and exchanges as exclusively positive phenomena, then we are wary of it today. In the new world, such dangerous viruses have appeared, from which we no longer could find protection.

Globalization has made our world so unstable that the part of the synergy called the theory of disasters has become the most popular one. Of course, today we know much more about the development of nature, anthropogenesis, and world history, but we have not made much progress in understanding their interrelation. There are many facts; there are not enough bold and fruitful generalizations. Philosophers no longer dare to build systems that cover the different regions of existence studied by specific scientific disciplines. Only talented laymen, not professional philosophers, dare to do so. Therefore, there is a need for a philosophical reflection of general

scientific concepts that synthesize the sciences' results about man, nature, and society. If human nature, the way of thinking and beliefs, language, law, and morality are largely determined by biological, geographical, and even climatic factors, there is a question of revealing what is called a "place of thought".

3 People, Space, and Time in a Regional Language Picture of the World

Language is a cognitive and informative tool in which human mental activity and the main codes of culture are fixed. Using a language a man perceives the world and reflects it. Processing information about the world around, a man uses background knowledge which is the result of Russia's centuries-long history. Namely, the "collective knowledge—as A. A. Zalevskaya notes—sets necessary reference points using which people conceptualize the reality" (Zalevskaya 2005: 353).

V. I. Karasik claims that in the structure of a language personality, a special place belongs to values as the most fundamental characteristics of culture (Karasik 2009). The cultural wealth reflecting the essence of an axiology of culture is fixed in a national picture of the world of the language personality—in conceptual schemes and verbalized representations—characterizations about own "I" and the world around. In the course of speech and text creation, the language personality perceives, produces, and transforms information. Being guided in the cogitative activity by the language picture of the world, the man selects the signs of reality and integrates the entire perceived massif; accidental signs are eliminated; and only the closest and informative ones for a certain culture-bearer are perceived and realized.

Language as a data bearer of a world picture under the influence of various factors—natural, political, social—can change, respectively, being reflected in a language picture of the world.

The research of the Transbaikal scientists (Biktimirova 2018; Ignatovich and Biktimirova 2016) on various fragments of a regional language picture of the world of the Transbaikalians have received disclosure due to a comprehensive study of the regional option of the Russian language in synchronous (a modern national spoken language of the Transbaikalians) and diachronic (the language of literary texts of Transbaikalia in the seventeenth–nineteenth centuries) aspects. Mental structuring of ontological space by the Siberians-Transbaikalians displays itself in the systems of coordinates "space" and "time". Processing of time and space is carried out by the soul and consciousness of a person created by the nature at the genetic and social levels of a person's development. The space-time continuum accumulates historically collected experience. The Russian pioneers of Siberia were in the closed space for a long time due to geographical remoteness from the centre of the state and that could not but affect the mentality of the Transbaikalians and the language picture of the world. Space is an expression of material objects' coexistence, and it is a matter life form characterized by such properties as extent, degree of structure, coexistence,

and interaction. For the Russian consciousness, space, but not time, is valuable first of all. In Russian, a lexeme "time" is related to words *to twirl* and *a spindle* as the idea of time is connected with repeatability and recurrence. Sign figures of Russia are an endless road, difficult way, and the Russian trio of horses carrying a person along with boundless open spaces of spiritual rises and commotion of the spirits. Representation of geographical ontological space of the Siberians is inbuilt in a paradigm "*outskirts—Russia*" and "*One's own and Another's*" (Fig. 1).

Development of the earth beyond the Baikal began in the seventeenth century. The movement to the east "meetings to the sun" was a strategic task of the Moscow state government. The territory beyond the Baikal is often called *Daura, Dauria,* or *Daurianukraine* (outskirts) in pioneer's documents. In the seventeenth century Dauria—the earth and borders of which are not still definitely established. It is known that Daurian lands included the territory from the southeast of Transbaikalia to the western part of Priamurye. The earth behind the Baikal received its name Dauria from the nationality of Daura inhabiting this territory till seventeenth century, which in the national consciousness of pioneers and first residents means "paradise on the earth". Such a perception arose because during the development of Dauria by the pioneers a lot of treasures, gold, silver, gemstones, and a variety of flora and fauna were discovered. The pioneers' development territory was called "earth" or "zemlitsa" in the Siberian literary texts. For example, besides the Daurian land, such lands as "nizhneudinskaya zemlitsa" and "mungalskaya zemlitsa" are mentioned.

Behind the Baikal, the geographical remoteness from the central part of Russia is sharply felt. Today the Transbaikalians say about the European part of Russia—"*west*" "*to go to the west*" that causes visitors' bewilderment. This tradition arose in pioneers' documents: the European part of the Russian state is called as Russia in the documents: "…is released from Nerchinsk customs to Rus sworn-men Kozma Nechaevsko".

The main reference points and borders of the pioneers discovering Dauria—lake (in ancient documents the sea) Baikal and transport arteries of the *river* as well as ridges and mountains which were called—a *stone.* To go to Russia also had an equivalent—*to go behind the stone.* Features of "outskirts" designation: his—another's.

When developing the territory of East Transbaikalia, the Russian explorers accepted the already existing geographical terms and toponyms, adapted them to the Russian language system, and assigned their names as new, undeveloped territories,. The nomination and reproduction of local and aboriginal names concerned generally large and important geographical objects: rivers and settlements developed by the Russians. The scientists fix toponyms of different origins—it is known that they were borrowed from languages of the native population: the layers of linguo-paleoasian, linguo-turkic, and linguo-mongolian (the Tunguska, Shilka, Nercha, Amur, Ingoda, Khilok, Albazin, Irgen, Argun, etc.). There are also settlements behind the Baikal, settled in desert places and have received the Russian-speaking nomination owing to religious specifics and the Russian traditions: Gorodishchensky large industrial village and settlement of Nikolskoye, Monastyrskoe, Trinity Monastery,

Fig. 1 **a** A sample of the cursive document of the seventeenth century, Nerchinsk provincial office. **b** Conversation Taniana Y. Ignatovich with old-timers Transbaikal territory. **c** The map of the lands beyond the lake Baikal. Semyon Remezov's "The Drawing book of Siberia"

(c)

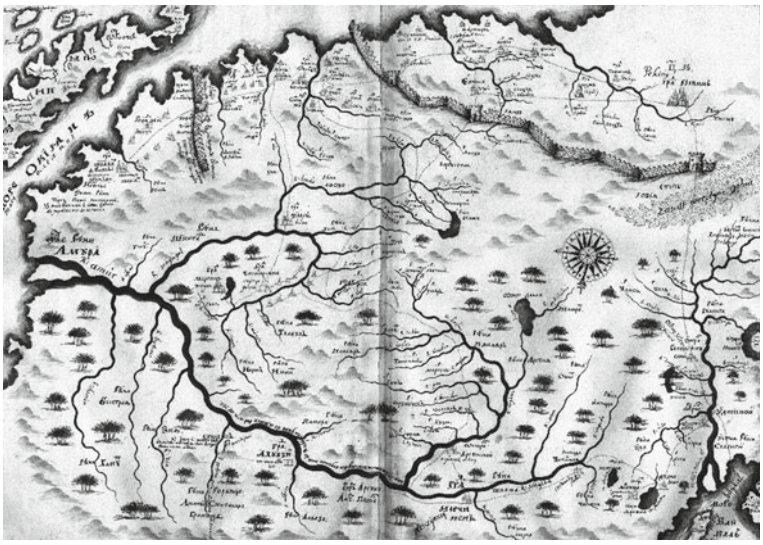

Fig. 1 (continued)

and Spasskypustynka. Such tradition to name geographical objects also exists in modern Transbaikalia.

The geographical described space stands against the administrative space cultivated by the Russian pioneers. Unlike the geographical space, the administrative space is filled with the realities expressed by administrative, political, spiritual, military, and economic lexicon that is primordially Russian (voivode, cossack, volost, law, letter, servitude, fortress memory, petition, etc.) and borrowed from the European languages (senate, archive, porter, department, magistrate, and city hall).

Time of Eastern Siberia development—seventeenth century, term less than 400 years, allows the Transbaikalians of different nationalities to feel time pulse, relying on the history of their families. The Transbaikalians, as a rule, try to learn the history of their generation and the reasons for resettlement behind the Baikal. Usually, it is connected with various resettlement waves or important historical events in the Russian state owing to which large diasporas of "semeyskie old believers", "descendants of convicts", "dowsers", and "railroad workers" have appeared in Transbaikalia. Also, diasporas were formed following national features.

Self-identification of the language personality in terms of administrative space assumes an accurate definition of a man in the hierarchical system of Transbaikalia. In the language picture of the world, there are various names of people differing in estate, origin, profession, and nationality. As a result, markers of the Transbaikalians as *One's own and Another's* are formed: *siberian, transbaikalian, bratskovaty, guran, white Buryat, person of Asian appearence, cossack,* "*western Ukrainian*", "*from the North*", etc.

As the result of fragment research of the language picture of the world of the ontological space of the Transbaikal pioneers, reflected in literary texts of business writing of Transbaikalia in seventeenth–eighteenth centuries and in the speech of the modern Transbaikalians, it is possible to call the representation of unique mental perception of the space of Siberia cultivated by the Russian pioneers. During the development of new lands, the language personality perceives geographical space as new, alien, and opposed to "*Rus*". In new administrative borders, the language identity of the Transbaikalians is identified in the system of the state hierarchical system.

Resources of oral speech language and the written text open boundless opportunities for an objectivization of primordial presentations and for studying an original reflection of a person of Siberia.

4 Wild Fauna in Traditional Buryat Notions

The idea of the wild fauna of South-East Siberia is an essential part of the mythological picture of the Buryat world. Zoomorphic images are reflected in different areas of their ethnic culture: they are present in the symbols of folk costume, ritualism, art, language, and, in particular, anthroponymy; they also make a part of the views on demonology, diseases, etc. This represented complex study makes it possible to discover the "zoological code" of folk culture. The works of Tokarev (1990), Gura (1997), Sokolova (1988), Vinokurova (2007), and others are devoted to this sphere of study in native science.

Our study aim is to reconstruct the traditional Buryat complex of notions about wild animals. Such methods of theoretical research as structural-semiotic analysis and typological method are used in this research.

Firstly, it should be noted that the complex of views under consideration was formed within the framework of the tripartite division of the Buryat shamanists into the Upper, Middle, and Lower worlds. *Deedezambi* "Upper world", otherwise the world of the Tengri celestials, is associated with the air space (*Ogtorgozambi*) in the traditional worldview. According to Buryats' notions, *Daydazambi* "Earth World" (Middle world) includes water and land surfaces. Probably, therefore, in their ceremony of feeding the ancestors' spirits, it was common to address simultaneously terrestrial and water essences: *Daydynubgad*, *Dalainhamgad* "Earth elders, sea old women" (Scagdarovand Cheremisov: 251). Besides, in the rituals dedicated to the deity of the earth and the rulers of the waters of Uhanhatam, there are many similar things. Finally, the *Doodozambi* Lower world (Underground world) was singled out. According to the Buryat-Buddhists' notions, *Dodododoloonsug* "Lower seven together, seven underground worlds" (Scagdarovand Cheremisov: 382).

The Buryats have developed a folk classification, according to which the *Amitanaimag* "animal world" is divided into different classes and groups of wild animals. Although this classification took into account the morphological features of the local fauna, the determining feature of the wild animal could be the sphere of

its habitat (sky, land, and water). Thus, animals that by virtue of a way of life were connected with different spheres were endowed with ambivalent qualities. Symbolic properties of the sky were immortality and divinity, in particular, reflected in the epithet of the supreme deity *huhemunhen* "eternal-blue", as well as air lightness and purity. It was believed that water was endowed with such properties as fertility, life, and death. So, according to the legends of the Bulagats and the Echirites, the lake Baikal was considered as a place of fetation and birth of their first ancestors Echirita and Bulagat (Fig. 2).

Let's name the main classes of wild animals singled out by the Buryats: *anamytad* "beasts"; *khorhoyshabhaynuud* "insects"; *mogoykhorhoynuud* "reptiles (serpentine)"; *gazaruhanayamitad* "amphibian" (animal of water-land); *hulganaatan* "muridae"; *dalitaan* "alate"; *zagahad* "fish".

According to the above classification, the classes were divided into groups. Thus, the alta classe included birds (*shubuunud*) and the cheiropterous batfish animals on the basis of such a zoological feature as the presence of wings (*dali).* At the same time, birds were also classified by their ability to make sounds in a special way (whistling, chirping, cackling, etc.). Not only snakes were considered "reptiles", but also lizards and "worms", based on the fact that they all have a long and thin body. A different criterion was followed when selecting the classes of "amphibians" and "fish": the animals included in them had the same habitat. Therefore, for example, it was believed that the Baikal seal belongs to the "fish" because it lives in the water body. As it can be seen, the criteria of this classification were different from those adopted in biological science.

Fig. 2 Bear paw—the Buryats' folk amulet (Wild fauna in traditional representations of the Buryat). Photos by A. A. Badmaev

The analysis shows that the boundaries of the above-mentioned classes were rather conditional and some animals could be arbitrarily assigned to different classes in the course of their development. According to the Buryat notions, "worms" were close to "insects" and "amphibians". The evolution of the caterpillar into a butterfly or a tadpole into a frog is a classical example of this fact.

It is necessary to point out that the species diversity of the fauna of South-East Siberia is poorly reflected in the traditional worldview of Buryats. In fact, in various folklore genres, only the main wildlife of the region is mentioned: for example, taimen and burbot are named from "fish", mouse—from "muridae", etc. This is explained by the use of generalized images of animals in Buryat folklore, which avoids concretization at the species level.

The image of each wild animal carried certain semantic values, and its estimation could not coincide with that of different subethnic groups of epy Buryats. In particular, by the Buryats of pre-Baikal races, fish was associated with fertility; it had genital symbolism, and from the point of view of edibility was perceived as a "pure" animal. Moreover, these Buryats have traces of a local burbot cult. Meanwhile, the South Selenginian Buryats gave negative connotations to fish and called it *uhanayhorhoy* a "waterworm" (referred to as "reptiles", i.e., chthonic creatures) and prohibited it for eating.

According to the traditional views of the Buryats, fishery animals have a hierarchy. For example, all fish is believed to be a herd of lord of waters, and taiga animals—a herd of the mythical master of the taiga. The Buryats believed that the favour of the latter depends on hunting luck or fishing catch. The other classes of wild animals were also considered to have guardian spirits. However, in relation to snakes, the pre-Baikal Buryats had other views: as if the latter have snakes-rulers, in ritualism, it was expressed in local reverence of a snake king (or king's couple).

So, the research has shown that the Buryats had a developed complex of traditional notions about the fauna world.

5 Man and Nature in the Traditional Khakas Culture

The historical and cultural development of the Khakas was closely connected with the peculiarities of natural and geographical conditions of the region and traditional methods of farming. The territory of this people's residence is a huge geographical area covering steppe, forest-steppe, taiga, and taiga zones with various microclimatic conditions and landscapes. Inhabitants of this territory in the process of long-term interaction with the environment and as a result of adaptation to it have formed the most adapted to these natural conditions culture. A significant place in it is given to traditions related to ecological views and norms.

The basis of ecological consciousness of these peoples was the idea of an inseparable connection of a man with the environment—homeland, i.e., with the place where he was born, lived, and died. In fact, it was the space in which all human activity was carried out.

In the traditional worldview, the idea of animating and spiritualizing natural objects and elements was fundamental. The traditional consciousness is characterized by the definition of a sufficiently delicate and mobile boundary between living and non-living objects. The concept of living included any person capable of moving, breathing, growing, changing, or having the form of a living being—a man, animal, plant, water, fire, or wind. This also includes objects made by the man.

In the traditional worldview, a man is not separated from nature. There is no rigid boundary between him and the surrounding world, which in mythological consciousness had partial or complete identification with a man. At the same time, we are talking not only about the resemblance to the external, but also about the internal, manifested in the properties of the mind, feelings, emotions, etc.

A special role in the formation of environmental attitudes of the Khakas was played by the mythological and ritual complex associated with the notions of the spirits, hosts of localities, and natural objects—*Eezi.* It was based on mental attitudes aimed at the formation of contractual, gift exchange forms of interaction between a man and the surrounding world with its invisible inhabitants. They were deeply convinced that depending on how the relationship with the world of spirits and deities would be built, the fate of not only one man and his family, but of the entire clan and the entire ethnic community living in the area would be fully determined.

Particular attention in the process of building good neighbourly relations with the spirits of nature was given to the circle of prohibitions. On their rational basis, they were aimed at preserving the environment. The bans primarily applied to those natural objects, which stood out as the main ones in the life of the people.

The most important in the system of man-nature relations was the principle of "doing everything in due time". So, a collection of wild herds was carried out in strictly defined periods to the extent of their full ripening. Environmentally aware norms also were applied to such types of traditional economic activities as hunting and fishing. Fishing was traditionally regulated by hunting and fishing seasons, reasonable needs of the bag, the balance of quantity in specific places, as well as the bans on the bag of totem animals. The gender and age of the animals were also taken into account.

An important worldview basis for the Khakas to regulate the rules, norms, and methods of bag industries in the past was the notion of a "share/norm" measured from above for every human being, with bright features of destiny. In the traditional consciousness, it was perceived as a kind of reserve of vital energy and material well-being. It had to be rationally used and spent by a man before death.

In the culture of the Khakas, this concept was denoted by the term *ÿlÿs.* They believe that *ÿlÿs* predetermines a person's psycho-physical potential, material status, and social status. In the religious and mythological consciousness of this nation, the possession of material values and use of natural resources were considered through the prism of the concept of *ÿlÿs.* Let us also note the next point. In traditional culture, a person was inseparable from society; therefore, apart from the personal concept of *ÿlÿs*, there was a broader one—the collective one, which is extended to *söök* (clan), *aal* (village), etc. Accordingly, *ÿlÿs* acted as a "collective predestination", a "group fate": *söök'a*, communities, villages, etc. The notion of *ÿlÿs* contributed to the development of a sense of responsibility, which is not only for one's own thoughts,

words, and actions, but also for the mental and physical activity of the people around them, and shaped the eco-friendly moods in society.

Environmentally friendly features of the traditional worldview are embodied in the allocation of sacred/protected areas. This space was realized as a sacred centre of the world, where the beneficial power of natural forces is realized to the maximum extent.

6 "Samokhody" is a Phenomenon of Ethno-Cultural Identity of Peasant Settlers in Siberia

Peasant migrations to Siberia in the second half of the nineteenth–early twentieth centuries promoted the emergence of new forms of ethno-cultural identity among its Eastern Slavic population. A vivid example of this is the use of the name "samokhody" in a number of Siberian regions in relation to settlers. In the "Explanatory dictionary of the living Great Russian language" compiled by V. I. Dahl and other sources of the first half of the nineteenth century, the word "samokhody" does not occur. It has been added into mass use not earlier than at the end of the nineteenth century. For example, N. D. Teleshov's story "Samokhody", written in 1894, describes how a large peasant family makes a hard, sometimes associated with deprivation, way to Siberia (Teleshov 1983).

Today, the etymology of the word "samokhody" remains unclear. The Dictionary of Russian Folk Parlance provides the following explanations collected in different regions of Siberia from 1905 to 1989: "a voluntary resettler, a settler in the Urals and Siberia"; "a pilgrim, a stranger in the village"; and "people who walked in bast shoes" (Sorokoletov 2002: 110). The same dictionary also mentions the use of the word "samokhod" in the Baikal region in relation to the exiled, but it is most likely only a late, distorted interpretation of the word. Analysing these definitions of the word "samokhod", it is evident that they are first of all peculiar ethno-cultural stereotypes of settlers, which have taken root in folk's consciousness. The field research conducted by us in a number of Siberian regions, added by the references' analysis of the word "samokhod" in literary sources, give a chance to trace a number of features of these ethno-cultural stereotypes' formation.

The analysis of oral stories indicates that the East Slavic settlers from the western and central provinces of Russia, as well as Ukraine and Belarus, arrived here in the late nineteenth–early twentieth centuries. They were originally called samokhody in the territory of Western Siberia. At the same time, in the stories of the settlers' descendants, it was often stressed that their ancestors arrived in Siberia on their own will and "in their own way", moving on the carts. This explanation can be considered as a starting point for the appearance of the name "samokhody". In Western Siberia, some informants stressed that in their area, the word "samokhody" originally meant only peasants who settled here at the turn of the nineteenth and twentieth centuries. Later, however, in some regions, this name was also used in relation to later Stolypin

settlers. This fact was reflected not only in the stories of informants, but also in literary sources. Thus, in the novel "Samokhody. Family Chronicle", the Krasnoyarsk writer N. S. Ustinovich describes the circumstances under which his parents resettled from Vitebsk province to the village of Gorely Borok, Kansk district, Yenisei province in 1907 as a result of the agrarian reform of P. A. Stolypin (Ustinovich 1963).

As a rule, the use of the word "samokhody" in relation to settlers is fixed in those areas, where the name "cheldons" was actively used along with it. The Russian old-timer population, formed in the period from the seventeenth century to the middle of the nineteenth century, was usually called "Cheldon" in Siberia. The circumstances of the origin of the name "Cheldon" as well as the name samokhody remain unclear. Most likely, this word could have a narrow meaning originally. For example, there are fairly consistent explanations, according to which the cheldon were the people, who moved to Siberia from the rivers Chal and Don; but some of the settlers associated the appearance of this name with the fact that the Cheldon used many words with the letter "Ch" in their speech. As M. L. Berezhnova noted, "The word 'cheldon' now means Russian old-timers in Siberia. Apparently, they were teased in such a way by the late settlers, i.e., the word in its modern sounding is no more than 150 years. During this time, the expressive assessment of the word has changed from a negative to a positive one, and now the word is considered to be the name of one of the Russian population groups by many scientists, i.e., ethnonym" (Berezhnova 2012: 46). As a result, the names "cheldon" and "samokhody" can be considered as mutually conditioned ethno-cultural stereotypes of old-timers and settlers. This hypothesis is supported by a number of observations made in the course of field research. For example, on the territory of the Middle Angara region, the name "cheldon" in relation to Russian old-timers was used only in those places where late settlers lived nearby.

The differences between the cheldons and samokhody were due to their socio-economic status, regional peculiarities of traditional culture, as well as mental and philosophical attitudes. Having passed their way of adaptation in Siberia, the cheldons considered themselves full-fledged masters of the places where they lived, which often resulted in an open struggle of old-timers and settlers for the best economic lands. Speaking about ethno-cultural differences between these two groups of the East Slavic population of Siberia, it should be noted that due to the historical peculiarities of the geography of migration processes, the cheldons were more often the bearers of the North Russian traditions. These traditions were enriched by some borrowings made from the Siberian peoples, as well as innovations that appeared in the process of adaptation to new conditions. The samokhody most often brought to the Siberian territory the peculiarities of traditional culture, typical for the southern and central regions of Russia, as well as Ukraine and Belarus. Speaking about the mental component, K. A. Razgon noted that "the individualized personality of the Siberian-owner" was oriented to a life of prosperity. The settler with his "greed for the land" was perceived as a competitor who invaded the sphere of his life interests and disturbed the usual economic way. This difference has led to mutual alienation and often to "hostility in relations" (Razgon and Pozharskaya 2012: 46). The above circumstances contributed to the fact that up to the middle of the twentieth century, in some parts of Siberia, one could see the desire of the cheldons and samokhodyto

live separately from each other, including the disapproval of united marriages. Nowadays, when economic and social contradictions between the cheldons and samokhody remain in the distant past, their descendants often no longer see each other's serious ethno-cultural differences.

According to the observation results made in the course of field research, the area of mass distribution of the names "samokhody" and "cheldon" mainly extends within the agricultural zone starting from the Trans-Urals (eastern regions of the Sverdlovsk region) and ending with the Baikal region (Irkutsk region). It is important to note that not in all regions of Siberia the names "samokhody" and "cheldon" have a symmetrical existence. For example, in many districts of the Krasnoyarsk Region, Irkutsk Oblast, and a number of other Siberian regions, the name "cheldons" was widely used in relation to the Russian population of old-timers. But among the settlers living nearby the regional identity, it was associated with their identification with the places of exit, according to which they could call themselves "Mogilev", "Chernigov", "Ryazan", etc., dominated more often.

In general, the existence of the name "samokhody" on the territory of Siberia can be regarded as a vivid example of a new identity formation of settlers' communities in the process of their self-identification and comprehension of the "alien".

7 Biopolitics and Cultural Health of Siberia

Global society is a "Western idea", world culture is compared with the Americanization of "peripheral" national cultures, and economic and political modernization is reduced to the transformation of "catching up countries, including Russia, into an object of exploitation". This approach attaches great importance to the resource allocation problems in the context of the lack of resources, to the problems of power redistribution, especially to geopolitical and geo-economic projects. All this makes it possible to understand and express the meaning of man and mankind's modern coding as a social community that has ceased to be an ethnos.

Globalization has made our world so unstable that the most popular part of synergetic is called the theory of catastrophes. Philosophers no longer dare to build systems that cover the different regions of existence studied by specific scientific disciplines. If human nature, way of thinking and belief, language, law, and morality are largely determined by biological, geographical, and even climatic factors, it is a question of identifying a "place of thought".

The content of the concept of "colonization" (from English colonization; German Kolonisierung) can be interpreted as a settlement and economic development of the outskirts of foreign or native countries. In historical retrospective, the main form of colonization is territorial expansion, often an undefined social community, undertaken with the military, political, and economic goals of adoption and further use of attractive resources, often explicitly or secretly supported by an individual state.

The reasons for colonization include the political and religious persecution phenomena, overpopulation and petering-out the resources of "old-developed"

places, geopolitical intentions, and state policy. These were settlements founded by ancient peoples (Phoenicians, Greeks, and Romans). The colonies were used by the Greeks, on the one hand, to rid of excess population and, on the other hand, to spread Greek culture. In each ethnic group's history, one can find evidence of the geographical environment's influence on it and the ways of adaptation and optimization of its life activities. The latter is clearly defined and enshrined in the traditional way of life, customs, beliefs, and culture. However, history has also often seen the territory's development through the "erasure" of other peoples' life sustenance arenas.

In the liberal economy, the notion of human capital, which is defined as a productive economic development factor, is used instead of previous land and family codes. The former slave, proletarian, is now becoming a capitalist himself. A person should be allowed to get a good education and maintain a high health level. On the one hand, such a program is humane: the state helps a person realize himself. The individual and his or her life become a resource of the economy, which implies a longer use of capital called "human life". M. Foucault noted in his "Birth of Biopolitics" that in contrast to the old power, which included a "right to die", the modern power obliges to live (Foucault 2010). An individual who has learnt the imperative of a healthy lifestyle becomes self-governing.

M. Foucault called the transformation of modern power biopolitics, the art of population management. According to the classical scheme, capitalism generates alienation and turns everything into a commodity. Medical institutions, fitness clubs, and healthy eating restaurants are all purely capitalist enterprises that develop new markets. So, what is biopolitics—a new form of power or liberation?

According to M. Cacciari, "A state with similar goals would not be able to remain so, it would kill itself politically" (Cacciari 2004: 123). In the 1990s, the Asian phase of history was believed to have ended. In the era of globalization, it is useless to call upon the nomos of the earth. There is no God hidden in the machine of the state. Besides, the utopian values based on the priority of values had severe consequences. They were based on the silent assumption that the Other was the enemy to be destroyed. This is the price of eternal peace. Today, in the digital age, unity is achieved by other means. However, the strength of words, control over mediums of communication, and management of social networks destroy the other and alien even more effectively than war (Said 2016a, b) Although the image of the man in liberal biopolitics is not the worst, however, the youth subcultures resist the transformation of human life into the resources of the economy. There remains the question: will humanity realize a universalist utopia, if the conflict between own and alien is recognized as a risky one?

The past decades have shown that liberal values have lost priority. K. Schmitt regretted that the Earth's nomoses and the sea, forests, and steppes are going to oblivion, and there remains a single mind, operating in all territories. (Schmitt 2008) However, according to the rule of law formula, the liberal conversion of the state has only accelerated the crisis in Europe. The flow of migrants is forcing a renunciation of the liberal values of multiculturalism and tolerance. Therefore, the former image of the enemy was revived. Everything went according to Schmitt's scenario, not Habermas's. But Europe remains the sacral centre of globalization.

Biopolitics can be viewed from the perspective of genetic engineering achievements, which proposes to redesign the so-called "human nature". Advances in medicine and virology are usually considered for epidemic control. For a long time, plague (pestilence) has claimed millions of lives. It is believed that its source is dangerous microbes imported with oriental goods. There are European diseases that are dangerous to other peoples. For example, a large tribe of Cherokee Indians, including warriors, has almost entirely died from measles. If every nation and person has its viruses, which are dangerous for others, and, conversely, there is no immunity against others, then the thesis of political virology follows. If strangers in the places of migration live in their customs, not corresponding to the norms and codes of the host country, they destroy its order.

The theory of aliens sounds even harder as parasites, weakening the vitality of the people. Sacrifice and purification rites existed in the early stages of any nation's development (Girard 2010). The distinction between the pure and the impure was transferred to the aliens who were called evil creatures. Even in folk Christianity, there is a belief in evil spirits. Not surprisingly, dictatorial regimes resort to purges from internal enemies. Goebbels compared the Jew to a louse and, thus, determined their way into the gas chambers. In addition to taking care of the "cleanliness of the ranks", another direction of strengthening society was identifying disruptors. Thus, political virology is based on a metaphor of purity, which is essential and widely used in various spheres. Where there are evil creatures, there must be places where they are isolated and purified. The most radical spaces of this kind have been modelled in Catholic theology. This is hell and purgatory. The camps of the twentieth century were built on the model of a hell camp.

Antibodies are not only enemies, many microorganisms are defenders. For example, the peoples of the North considered frequent washing to be the cause of disease. Skin is a membrane that protects against dangerous influences and absorbs nutrients. G. Plessner was more emollient in describing the boundary between own and alien (Plessner 2004). The body exists in the environment, eating food that must be processed and absorbed. There are connection channels for this. The same is true of relations with other organisms, which are connected not only by struggle, but also by cooperation. Indeed, there are predators, parasites, and microorganisms that are particularly dangerous as they are not filtered out by the skin membranes and penetrate the inside.

Russian scientist L. Mechnikov has developed the theory of favourites in immunology and studied the human body's ageing process. For this, he received the Nobel Prize. Watching how the body surrounds a foreign body and pushes it out, Mechnikov divided the microorganisms into own and alien, isolated antibodies, and described their struggle. At the same time, he discovered microorganisms that can affect heterogeneous cells and called them phagocytes. Today, genetics has been connected to immunology, thanks to that the body's own immune systems were discovered in addition to the antibiotics that contribute to their rapid start.

Cultural health is determined by the high immunity to aliens and at the same time the ability to perceive useful external factors. Of course, the biological model of virology should be used in culturology with some precautions, but do not forget

about immunity. The body's safety depends not only on the impermeability of the border, but also on internal resistance. Organisms, including cultural ones, are open systems; alien, external, on the one hand, is dangerous and, on the other hand, useful for internal development. For example, staying behind the Iron Curtain resembles a preventive zone purified of alien viruses. Nevertheless, its inhabitants lose their immunity and become defenceless if the walls are destroyed. The lack of internal immunity is manifested in the fact that people look at themselves through alien eyes.

It is impossible to assert that the influence of genetic, climatic, geological, and other "capital" disappears in the digital age. Adaptation to nature still remains a condition for human survival. At the same time, cultural differences play an increasingly important role in people's relations, which were previously divided by geographical, state, and ideological boundaries, in the epoch of a new "migration of peoples". According to sociological research, migrants in Europe are preserved based on the Artophorion principle, i.e., they live compactly in urban ghettos or refugee camps. In Russia, the previous inclusion model is still working, providing, if not "remelting", the interaction of different cultures. It is difficult to say what is better—calls for preserving small ethnic groups in places of historical residence, multiculturalism, or ghetto practices? So far, there has been a revival of religious cultures in the form of shamanism and other cults, and the spread of media installations aimed at inflating the extinct passionately. What this will lead to depends on the peoples themselves.

Scholars' task is to study traditions, norms, and rituals that preserve traditional societies from disintegration and reconstruction of traditional techniques that can still be used today to overcome the fear of alien and preserve identity.

8 Transformation of the Siberian Lifestyle as an Eco-oriented Future Strategy

According to our research, peoples living together for a long time in the same territory, climate, and cultural and political semiotics form a common soul base. Siberia's territory is a union based on cultural and geographical space, national character, historical memory, religious experience, and unity of the main Russian language. However, involvement in the small homeland is not limited to these contents, and it is more profound and more prominent. It has a unique spiritual character. It is "the awareness of the common destiny".

Siberia's s unique territory gives rise to a quite definite type of personality with its intrinsic internal spiritual structure—a mentality that includes the structure of the intellect, scale of values, and algorithm of the spirit. G. Gachev writes that every nation was born with specific ideas, visions, intuitions, schemes, and models, in which it is peculiar for it to represent all the phenomena of its life (Gachev 1998: 42). These ideas are structured by a paradigm characterizing national integrity: Cosmo-Psycho-Logos = Body − soul − mind = Local nature − Character of the people − Way of thinking.

The totality of traditional and fundamental attitudes of people is formed for a long time during centuries. A certain hierarchy of spiritual values is fixed in the national model of the world of linguistic personality; these spiritual reference views are based on the nation' s historical experience and concentrate people's ideas about the goals and norms of their existence. Spiritual (nuclear) values of a culture are fixed at the deep level of public consciousness; being a backbone (not a dynamic) part of the mentality, they are genetically stable.

Every civilization and culture has its function; this reasonable distribution makes the life of humankind meaningful and complete. On the one hand, Siberia prefers the well-regulated old, holy traditions, and centuries-old spiritual foundations. On the other hand, Russia's centuries-old pride in Siberia is its vast, undeveloped spaces which have given rise to an inspirational character, frank and broad, uninformed, and smoothly going to the extremes. N. Leskov in his folk art defended the idea of the dichotomy of our soul, equally capable of sinful falls and spiritual ups and downs. We are a centaur image—a visible image of ambivalence: evil and good; elements and harmony. The list of qualities of the Russian mentality is quite contradictory: compassionateness coexists with cruelty, humility with the rebellion of the essence against injustice. However, the most fundamental property of our spirit is the absence of a centre between the poles. The nature of the Russian man in all its paradoxical contradictions was expressed in Leo Tolstoy ("fighter" and "hysterical wimper"), Fedor Dostoevsky (thirst for absolute freedom and slave obedience), and in the image of "Mother—Russia" Nikolay Nekrasov (dull and abundant).

In modern society, the fundamental concepts of culture, such as spirituality, kindness, asceticism, nonpossessors movement, love, and sincerity, are undergoing specific changes. Traditional categories are being rethought, artificially "filled with the most profound, new content" (transformed).

The Russian man is alien to the skeptical criticism of the Western man. F. Dostoevsky described this ability as "a terrible freedom of spirit". D. Merezhkovsky continued: "In this terrible freedom of spirit, in this ability to suddenly break away from the ground, from life, from history, to burn all their ships, to break all their past in the name of an unknown future—in this arbitrary groundlessness lies one of the deepest features of the Russian spirit" (Merezhkovsky 1991: 36). The "mysterious" Russian soul is conditioned by the extreme openness of our culture. It tends to be subjected to Polish-Lithuanian, German, French, and American influence. Nevertheless, as a rule, the conceptual meanings of the language picture of the world remain unchanged as long as the root system of the language is preserved and the archetypical ideas cannot be destroyed. We observe the unevenness (two levels) of the value's representation. On the one hand, the indicated transformation, on the other hand, national identity activates with ideas of several conceptualized schemes. Thus, the Russian spirituality original values are taking root from the concepts of "power", "fame", "patriotism", "conciliarity". (Erofeeva 2009).

The modern image of Siberia retains the features described by the first explorers and theorists of Pan-Slavism and Eurasians. At the same time, the time of history precedes the time of ideas. Therefore, it is necessary to offer a new image of Siberia, based on the reconstruction of both the industrialized landscape and new social,

cultural, and educational institutions and institutions that determine people's lives in the Siberian cities. Undoubtedly, it is necessary to restore people's cultural memory and describe the ways of memorizing the past. The question is how the small peoples of Siberia can maintain their identities in the era of globalization must be raised and discussed in the light of new realities.

In the conditions of a globalizing society it turns out to be very difficult, and it is practically impossible to correctly address the understanding of the real role of ethnic communities. On the basis of a deep revision of the voluminous and diverse empirical material, new views about the language, myths and customs, archetypes, and primordial images that guided our ancestors are formulated. Unfortunately, under the onslaught of civilizational changes, the space of indigenous peoples is collapsing. The peoples are losing the space for traditional life activities. The loss of their territory and former way of life is followed by "cosmic punishment", and the people themselves cease to exist, assimilate, dissolve, and become a part of another, as a rule, a larger "meta-ethnos". There are many examples of this—Ainu, Kety, Uilta, etc. Ethnological and sociological literature is well aware of the very problem of "indigenous minorities peoples'"(IM) disappearance, unification and simplification of culture, and loss of languages and traditional forms of life. Indigenous minorities are a special creation of the United Nations, in particular in terms of expressing the legal aspect of their environment and livelihoods, which was particularly relevant under the previous strategy of sustainable development of the "western type".

Many ethnographic works successfully prove that local names and toponyms are based on "appropriation". And here we will notice that in relation to the present, we are becoming more and more homeless, changing, transforming, and losing our planet, breaking individual and social ties with a particular place.

One thing is clear to us living and doing our research in Siberia. Humanity is polyphonic and multifaceted; the world and planetary civilization are attractive only to the extent that we have preserved the significant realities of the native space and its national identity—the cultural code of Siberia.

Acknowledgements The Study Section 6 was financially supported by the Russian Foundation for Basic Research (grant No. 18-09-00,028) and performed under the state assignment of IPOS TyumNTs SB RAS, project No. AAAA-A17-117,050,400,150-2.

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Epilogue

Siberia is one of the world's most resource-rich and ecologically attractive regions. The book reviewed Siberia's development through the centuries: Siberia's archeologist treasure, Siberia's incredible projects, Siberia's indigenous people's life-style, Siberia's wilderness, and Siberia's cultural heritage. The authors considered and discussed Siberia's ethnic groups' principles and patterns with the natural, social, and cultural environment. There are some general questions for discussion throughout this book. What was the main reason for the change in Siberia's ethnic groups in different historical periods? What part of the Earth's fresh waters is concentrated in Siberian Baikal Lake? What should efforts be directed to accelerate the development of Siberia? Immediate attention was paid to the "Russian period" of Siberia (approximately 1500\1520–2000\2020). Nevertheless, the "archeological–historical" inserts were essential for understanding the "temporal dynamics" of Siberia's social and environmental development.

In the book, more than 80 Russian scientists from Siberia propose paying attention to history, culture, landscapes, and living conditions in one of the most nature-oriented parts of the world. Preparatory work was carried out for about three years. The work of the entire team was hardworking and enthusiastic. The authors' team believes the book could give a unique understanding of Siberia's historical, cultural, and environmental background.

The modern world is sinking deeper into something universal, similar, standard, and predictable. The digital age in which we live is increasingly replacing the reality of space and time for people in big cities. The Internet, smartphones, and televisions are killing the romantic adventures, and the time with digital technologies occupies the years of our virtual lives. Siberia has a rich history, but even in the digital era, there is much of the real, unique, and eternal. The authors are sure that everyone who reads this book will never be able to forget about Siberia's original beauty. The authors hope that unique Siberian ethnical and cultural stories will never disappear from people's memory.

V. N. Bocharnikov and A. N. Steblyanskaya (eds.), *Humans in the Siberian Landscapes*, Springer Geography, https://doi.org/10.1007/978-3-030-90061-8

Vladimir Bocharnikov was the ideologist of the idea to publish this book about Siberia's heritage. His idea concerns how Siberia preserved traditions in the cultural, social, environmental, and everyday spheres of life, considering various ethnic groups' historical practices.

The book's creation became possible thanks to the long-term work of Russian scientists representing the Russian Academy of Sciences and leading Russian universities, only part of which is reflected in this book. The authors thank the colleagues and students who shared their theoretical ideas, processed data and information, and contributed significantly to the book's preparation with great help, kind heart, and tremendous support in any case.

It is also essential to note that the book's preparation has benefited from an efficient and responsible team, including our families, who show a great understanding to support our work. Here, we would like to express our sincere appreciation to the Springer Editors and senior and young members of the Editorial team for their generous support in preparing the book.

Vladimir N. Bocharnikov,

Alina N. Steblyanskaya.

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