sustainability

MDPI

Article

Sustainability and Resilience of Indigenous Siberian Communities under the Impact of Transportation Infrastructure Transformation

Maria Kuklina [1,*], Antonina Savvinova [2], Viktoria Filippova [3], Natalia Krasnoshtanova [4], Viktor Bogdanov [5], Alla Fedorova [2], Dmitrii Kobylkin [6], Andrey Trufanov [7] and Zolzaya Dashdorj [8]

1 Institute of High Technology, Irkutsk National Research Technical University, 83, Lermontova Street, 664074 Irkutsk, Russia
2 Laboratory of Electronic Cartographic Systems, M.K. Ammosov North-Eastern Federal University, 48 Kulakovsky Street, 677000 Yakutsk, Russia; sava_73@mail.ru (A.S.); fedas78@mail.ru (A.F.)
3 The Institute for Humanities Research and Indigenous Studies of the North SB RAS, 1, Petrovskogo Street, 677027 Yakutsk, Russia; filippovav@mail.ru
4 Laboratory of Theoretical Geography, V B Sochava Institute of Geography SB RAS, 1, Ulan-Batorskaya Street, 664033 Irkutsk, Russia; knesun@mail.ru
5 Laboratory of Cartography, V B Sochava Institute of Geography SB RAS, 1, Ulan-Batorskaya Street, 664033 Irkutsk, Russia; victvss@gmail.com
6 Laboratory of Geomorphology, V B Sochava Institute of Geography SB RAS, 1, Ulan-Batorskaya Street, 664033 Irkutsk, Russia; agrembrandt@inbox.ru
7 Institute of Information Technology and Data Science, Irkutsk National Research Technical University, 83, Lermontova Street, 664074 Irkutsk, Russia; troufan@gmail.com
8 Department of Software Engineering and Computer Science, Mongolian University of Science and Technology, 8th khoroo, Baga toiruu 34, Sukhbaatar District, Ulaanbaatar 14191, Mongolia; zolzaya.dashdorj@gmail.com
* Correspondence: kuklina-kmv@yandex.ru; Tel.: +7-9246246249

Abstract: Transport provision in remote territories is one of the most important factors in maintaining the sustainability of socio-economic and ecological systems. Indigenous peoples of Siberia have always been mobile using diverse traditional ways across the taiga. During the Soviet period, the transition to settled life, along with technological development and the emergence of new modes of transport, such as off-road cars, snowmobiles, and motor boats, significantly affected the level of population mobility, including remote areas where people are engaged in traditional nature management. With the collapse of the Soviet Union, there were significant changes and reductions in the subsidies of transportation systems for remote terrains that made them isolated. Transport connectivity has been realized through rare plane flights (once a month or less) or by cars on dirt roads (actually off-road) that take several days of travel. Siberian territories rich with natural resources, low population density, and weak infrastructure might be attractive for mining companies. Being difficult to access not only for the local population, but also for industrial companies, the territories imply the allocation of a significant share of road construction and transport costs in the cost items of miners and processors. The problems of sustainability and resilience of the indigenous peoples of Siberia require special attention when restructuring transport communications, but they have practically not been studied before. Methods of in-depth and group interviews with local residents were used. Based on comparative geographic and statistical analysis and generalization of data, network and problem approaches applied for various sources and field materials (including in-depth and group interviews), the factors of sustainability and resilience, which the indigenous communities of three remote Siberian territories pin their hopes on in the context of the transformation of transportation infrastructure, have been identified. If geographic remoteness remains an unchanged fact, the expansion of desired transport accessibility (mainly due to investments by industrial companies) is associated by locals with the possibility of additional income related to provision of services, the emergence of new types of employment of the population that have not been observed before, and the implementation of new transport modes to support traditional activities.

Citation: Kuklina, M.; Savvinova, A.; Filippova, V.; Krasnoshtanova, N.; Bogdanov, V.; Fedorova, A.; Kobylkin, D.; Trufanov, A.; Dashdorj, Z. Sustainability and Resilience of Indigenous Siberian Communities under the Impact of Transportation Infrastructure Transformation. *Sustainability* **2022**, *14*, 6253. https://doi.org/10.3390/su14106253

Academic Editor: Giovanni Leonardi

Received: 7 April 2022
Accepted: 18 May 2022
Published: 20 May 2022

Keywords: remote territories; transportation infrastructure; Siberia; indigenous communities; sustainable development; traditional activities; mining

1. Introduction

Remote hard-to-reach territories are often fraught with riches of various natural resources, such as minerals that are especially attractive for the economy. These areas with low population density and weak infrastructure are the focus of mining companies. It is not surprising that there are attractive and promising projects for the development of minerals and products of their processing, which are in demand on the Russian and world markets.

In many countries, remote areas make a significant contribution to the national economy [1], since they often contain the main resource and agricultural components. Remote areas face significant transportation challenges due to a combination of vast distances, sparse populations, harsh climates and complex geography—challenges that require a tailor-made approach to transportation regulation, infrastructure and service delivery. In this regard, a scientifically based platform is needed to address these problems by providing recommendations for practical cases faced by all participants involved in the organization and use of transportation systems, so that this vital component develops and contributes to the prosperity of local communities and the country in general.

In this regard, it should be noted that the Strategy for the Sustainable Development of Rural Territories of the Russian Federation for the period up to 2030 [2] and a number of other legal acts are aimed at improving the quality of life of rural residents, including through the development of transportation infrastructure.

The strengthening of the role of transportation infrastructure in territorial development is also noted in the Transportation Strategy of the Russian Federation until 2030 [3]. Despite the fact that researchers note the relationship of geographical distances with transport accessibility, the movement of local communities is still poorly understood, especially in remote areas [4].

It is important that there is no comprehensive and generally accepted definition of remoteness, however, remoteness refers to the lack of connectivity (or mobility as a MaaS service) due to geographic distance, terrain or travel time. While international, intercity and intracity transportation are currently at the center of research, everyday mobility in urban fringes, rural areas and remote regions is an understudied issue that attracts much less attention from experts.

For the most part, studies consider the development of remote territories as economic development [5]. However, recent works, relying on the concept of sustainable development, interpret the problem in the context of the socio-economic, technological and natural conditions of the territory [6].

Even though the definition of the Brundtland Commission is traditionally used in the context of sustainable development [7], sustainability assessments and criteria have still been open questions [8].

In this regard experts try to implement diverse sustainability metrics in contemporary environmental descriptions, just to share responsibilities between parties in their anthropogenic activities without compromising the needs of people living in other places or in other times [9].

The works embrace general meta-disciplinary issues of sustainability [10] and those that concern policy-making [11] and decision making in business [12].

Sustainability assessment is performed for elaborating balanced solutions in a space of socio-economic and environmental sectors, and also it goes beyond technical boundaries.

Not only experts and policymakers should be involved in the process, but also stakeholders, who further will be central actors and their opinion is thus of value.

Moral aspects and accepting the plural envisages of quality of life by taking into account the attitudes, values and beliefs of local individuals and communities have been emphasized beside socio-economic and environment sustainability dimensions [11].

While implementing appropriate transportation infrastructure the challenges encountered adjoin with other dimensions of remoteness [13] concomitant to transport connectivity such as: distances from markets, financing sources, political centers, and lack of digital connectivity. Others reflect geographical position and are presented by severe climate (permafrost, contrast temperatures), mountain landscape, and sparse population.

Nevertheless, studies of the social profile of the stated problem are still at an early stage.

Anthropologists note that isolation from the outside world in the form of abandoning roads can be a voluntary choice of individual local communities [14]. In the case of indigenous peoples with limited experience in participating in the world economy, scientists pay attention to the growing transportation accessibility of remote Arctic communities due to mining, which brings little profit to local communities in the short term, but significantly worsens their living conditions in the long term [15].

The problems of transportation accessibility are understood in a different way in nomadic cultures than in sedentary ones [16]. This topic is the focus of the latest works of ethnologists and anthropologists related to the study of the mobility of Arctic cultures. In [17,18], there is an analytical review of the key concepts of the rapidly developing anthropology, sociology and philosophy of mobility and movement. Here, accessibility is not an obstacle, for example, in Yamal [19], the fact of taking land from reindeer herders by mining companies is not the main subject of discussion. Reindeer herders are more concerned about the complexities of reindeer migration associated with the activities of these companies. Today, with the spread of global transport links, the human right to movement is considered one of the fundamental rights [20].

In this regard, in this work, it was assumed to be interesting and important to study the role of transportation infrastructure, which is formed primarily under the influence of the industrial development of natural resources, on the development of remote territories, and ensuring the stability and resilience of indigenous Siberian communities in them. Such a study was carried out on the examples of the Okinsky district, Republic of Buryatia, the Katangsky district, Irkutsk region, and the Olekminsky district, Republic of Sakha (Yakutia) of the Russian Federation.

2. Related Works

Transport accessibility is one of the important characteristics of territorial development, which makes it possible to assess the region's involvement in global economic processes, including the international division of labor flows. This characteristic is necessary when planning the socio-economic development of the territory. In recent years, transport accessibility studies have received various scientific directions depending on the specifics of the studied territories. For example, in large cities, qualitative characteristics come to the fore, such as issues of perception of space, ethnic segregation, social isolation, the creation of an accessible environment for people with disabilities [21], and relative transport accessibility [22].

Experts agree that rural areas are not a focus of sustainable transportation problems [23]. Realizing this, the authors conducted a study to explore alternative transport modes for commuting in Eastern Austria. Site visits and interviews were applied to clarify the issues.

In regional studies, the concept of "transportation accessibility" is associated with the concept of "remoteness". In particular, remoteness indices have been developed in Canada and Australia that determine the level of access to healthcare enterprises [24], and in Europe, accessibility is calculated for forecasting and calculating economic activity [25].

In domestic science, the topic of transport systems was developed in geographical works that studied transportation systems in general and passenger transportation in particular: the works of domestic scientists in regard to integrated and transportation

accessibility [26,27], the polarized landscape model [28], the morphological approach to the study of transport networks [29–31], and many others. The functioning of transport, closely related to the existing system of settlement, is presented in [32] and others.

There are a number of studies on the transportation systems of individual regions of the country. The geographical concept of regional transportation systems with the possibility of their typology and zoning was proposed by the author of [33].

On the basis of the grid of economic micro districts, a typology of local transportation systems was carried out based on indicators of the transport development of the territory, the topomorphological structure of networks, and the availability of local passenger traffic [34].

Summarizing the works on transportation in line with [35], we can say that most of the research is devoted to passenger transportation systems and transport networks, and not to qualitative and quantitative features that determine the level of passenger service. The Republic of Komi can be cited as an example of a detailed coverage of the problems of the development of passenger transportation in one of the regions of the country. The paper [36] used the example of this region to consider the economic and social prerequisites for determining the transportation accessibility of peripheral rural areas. A theoretical comparison of traditional transport accessibility indices and their calculation for municipal districts and urban districts of the Komi Republic were delivered in [37].

In connection with the tilt of the geography of transportation into the social features of the spatial organization in recent decades, works have begun to appear where transportation accessibility is considered as a set of costs that determine not only the theoretical, but also the realizable possibility of reaching points in space. However, such works are usually devoted to either one type of transport, a limited area (as a rule, a separate subject of the Russian Federation or a certain highway), or one of the aspects of transportation accessibility. There are almost no complex works that would consider all the factors affecting the transportation situation and accessibility in terms of the functioning of a single transport system over a large area, especially in recent years, when vehicles began to change drastically.

The method for calculating a comprehensive indicator of transportation accessibility as an indicator of the development of the region was proposed in [38].

A common feature for territories with limited transportation accessibility and great remoteness is their negative connotation, noted, in particular, in [28] as a process of "archaization" of the regions most remote from the cities.

The work [39] reflects the importance of a comprehensive study of the phenomenon of mobility as the most important factor in the new economic growth of Siberia and the Far East as a result of a set of regional analysis methods. In addition, the authors of [38] carried out an analysis of transportation anthropology, linking local transport systems, mobility and innovation. In the zone of off-road transport, it is the non-stationary points of temporary proximity that can radically affect the dynamics of the economic development process. In the analyzed works, a view "from below" is proposed instead of a unified approach "from above", when all transport systems of the country are assumed to be the same by default, revealing the monopoly nature of many transport systems in Siberia and the Far East.

In [40], the authors emphasize that a well-developed regional transport infrastructure contributes to the efficient functioning of industrial sectors and the successful development of the regional economy as a whole. In this regard, scientific research that contributes to the effective implementation of projects for the development of transport infrastructures to the needs of sustainable economic development of a particular region is of special relevance. Particular attention in this case is occupied by the issue of development of remote areas, and this is directly related to the topic of transport infrastructure and its compliance with the local conditions of the territories being developed.

3. Methods

The study used methods of comparative geographic and statistical analysis and generalization of data, approaches, and in-depth and group interviews with local residents. The theoretical and methodological base is based on the scientific works of authors from the Russian Federation and other countries on the subject and area under study. The territories of this study are the Olekminsky district of the Republic of Sakha (Yakutia) and the Okinsky district of the Republic of Buryatia.

Field studies were carried out in August 2020 in the Okinsky district of the Republic of Buryatia in the villages Orlik, Sorok, and Sayan, and in October 2021 in the Okinsky district in the villages of Orlik and Khuzhir. Field studies conducted in August 2016 in the village of Tyanya, in the Olekminsky district of the Republic of Sakha (Yakutia), were supplemented with materials for 2020-2021. The interviewees were found using the snowball method and ex-social media. The length of the interviews ranged from twenty-five to ninety minutes and averaged fifty to sixty minutes.

In the Okinsky district, 15 interviews were conducted in the village of Orlik, and 7 interviews were conducted in the village of Khuzhir. In the Olekminsky district, 24 interviews were conducted. The respondents were representatives of local communities, among whom were people of both sexes from 18 to 60 years old.

The recruitment of respondents was carried out using the snowball method and social networks in order to ensure a wide variety of experience and knowledge in the field of land use [41]. Interviews were conducted on the go (traveling and participating in local activities) as well as at respondents' homes and/or camps to capture the diversity of local experiences [42]. The duration of the interview ranged from thirty to one hundred and twenty minutes, with an average of fifty to sixty minutes. For analysis in this article, we included materials from the following cases: 15 in-depth interviews in the Okinsky district with local residents (4 interviews), community leaders (4 interviews), representatives of the education sector (3 interviews), administration (2 interviews), medicine (2 interviews), and culture (2 interviews); 24 in-depth interviews in the Olekminsky district with local residents (10 interviews), community leaders (1 interview), representatives of the education sector (4 interviews), administration (2 interviews), medicine (1 interview), culture (3 interviews), and reindeer herders-hunters (3 interviews).

The comparative geographical method was used for a comprehensive characterization of the study territories, which made it possible to identify geographical features and socio-economic factors for the development of transportation infrastructure in the territories. Application of this method made sense to identify and display qualitative and quantitative differences and analyze pertinent dynamic processes. A spatial feature of transport is the linear-network and nodal nature of the placement of transport objects in geographic space. To reflect the spatial features, the comparative geographic method was utilized in close connection with the cartographic approach. To compare three territories with their natural and socio-economic specificities, maps were designed that made it possible to elaborate a "portrait of a territory". The main factors for location and development of transport facilities were identified, the features that regulate the transportation situation in the study territories were named, and these can be used further to assess technological projects of building new roads and restoring historical and informal routes to improve the movement of the population.

4. Study Area

In our research, we focused on the terrains where indigenous peoples live. The map of the study areas is presented in Figure 1.

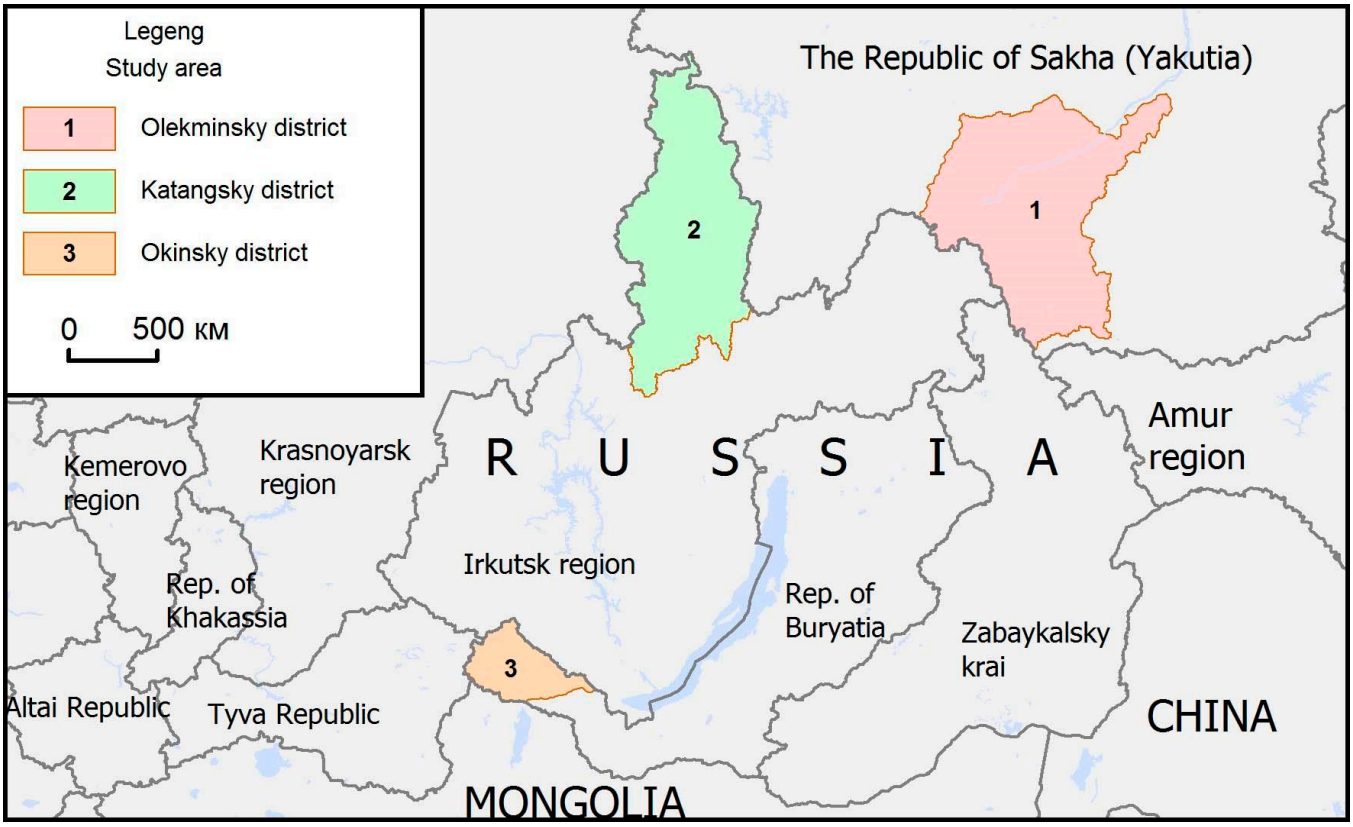

Figure 1. Map of Study Areas.

Case 1: Transformation of transportation infrastructure in the Okinsky district of the Republic of Buryatia.

Mountains of the Eastern Sayan form the landscape of the Okinsky district, Republic of Buryatia, RF.

The center of regional economic activity is represented by Ulan-Ude city, the capital of the Republic of Buryatia and the local people of the Okinskiy district have to cover 800 km in a northeast direction to reach it, while the travel time is more than 12 h.

The territory dimension: its length and width are 294 km and 190 km, respectively.

The district is surrounded [43] by the Russian lands of the Irkutsk region (in the north and east), the Republic of Tyva (in the west), and it shares border with Mongolian territory to the south. To the southeast one can observe the watershed of the Tunkinsky Goltsy ridge, which is a natural border between Okinsky and the Tunkinsky districts of the Republic of Buryatia.

The Okinskiy district is 26,594 square kilometers. The terrain has a climate similar to that of Eastern Siberia—short summers and very cold winters, which are windless and of little snow.

Due to the remoteness of the territory and harsh living conditions, traditional activities of indigenous peoples have been preserved here [44], such as, for example, nomadic cattle breeding with a vertical type of nomadism. The breed composition of animals adapted to local conditions has also been preserved.

In addition, experts noted [45] the following in the territory of the Okinsky district among the preserved occupations and land use: reindeer herding, hunting, fishing, and traditional gathering.

Nevertheless, the territory of the Okinsky district may lose its traditions of land use [46], and just counteracting this pertinent support could be realized through a special status formalized at the legislative and regulatory levels.

The area is unusually rich in minerals. So, it is worth mentioning the crystalline graphite deposit in the Botogol site, which had been developed for 150 years until 1992 [47]. In addition, industrial deposits of gold and rare metals have been discovered and explored. The subsoil also contains bauxites, phosphorites, quartzites, jade, and many other mineral reserves.

Large-scale mining in the Okinsky region started in the 1970s, which required the development of transport infrastructure, with concomitant laying, construction, and maintenance of the roadways.

The industrial development of the region continues, new mining enterprises are being built (including gold mining in the Kholba site, which has been operating for several decades), thereby improving the infrastructure along the way [48].

Not only the underground mineral reserves of the Okinsky district are of significant interest for third-party actors. Essential landscape diversity, natural beauty, as well as a unique ethno-cultural heritage are also important, and they attract both individual tourists and the tourism industry.

Interest in the study area is complemented by multiple mineral waters, a large number of mineral springs surrounded by intact wild nature and is promising from the point of view of health and medical tourism. With its high-altitude landscape, the Okinsky district is ideal for implementation of active types of tourism, such as mountaineering, as well as sports rafting on kayaks and rafts [49].

The paths maintained in the highlands are practically the only way to reach local natural attractions and popular recreation areas. The difficulty of transportation to the mineral springs is also a source of income for some local residents. So, an interview with a local resident testifies: "Some of our residents earn money, that is, by providing tourists with a truck to get from Orlik to the pass. Tourists also rent horses to cross the pass on horseback...".

Moreover, even 40 years ago, overland communication between the Okinsky district and the rest of Buryatia was carried out along the Okinsky trail on pack horses. It took four days to get from the nearest village of Mondy (Tunkinsky district, Republic of Buryatia) to the regional center Orlik (Okinsky district) [50]. Only in 1985 did the construction of a gravel road with numerous bridges across the right tributaries of the Oka River begin. The constructed automobile route Mondy–Orlik 81-OP-R3-81K-035 (134 km) is registered as a public road of regional significance.

The road was opened to traffic in 1993. The road, laid in difficult hydrogeological conditions, is destroyed by floods, but each time it is restored in a timely manner by gold mining companies. The route from the republican center of Ulan-Ude to Orlik is shown in Figure 2.

Recently, the reconstruction of the route was completed, work was carried out to expand it, and sections exposed to threats from adverse natural phenomena were strengthened [51].

The history of aviation communication in the Okinsky district began in 1951, when a the site was cleared and an airfield was equipped to receive PO-2 and AN-2 aircraft in the village of Orlik. Regular air communication was carried out until 1992. In 1970, the Oka airfield was built in the area of Sensyn Tala (Sayan village) (soil, length 1200 m, width 80 m) to receive aircraft of a larger class: Li-2, IL-14, and later AN-24. Airlines were associated with Orlik as the capital of the republic. The airports "Orlik" and "Oka" had been able to receive passenger, cargo, and ambulance aircrafts. The final closure of the regular service occurred after the liquidation of the main regional airline Buryat Airlines in 1993. At present, the Orlik and Oka airfields are not included in the register of airports and airfields, and the Oka airfield has the status of a landing site (registration number SP3-336) [52].

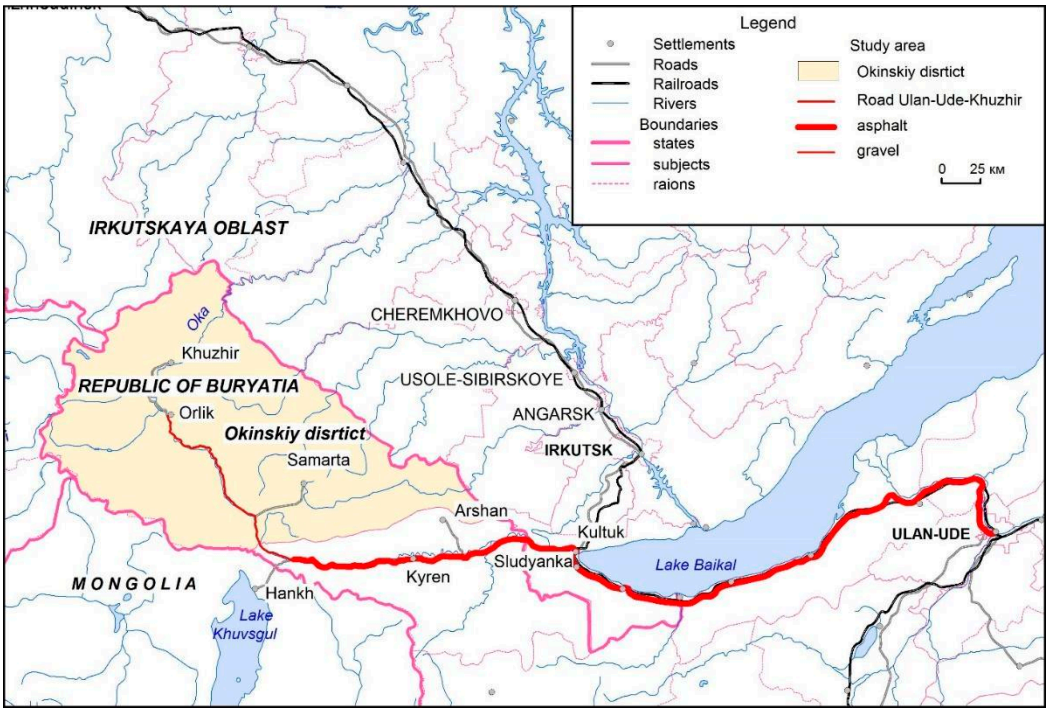

Figure 2. Map of Study Areas.

Case 2: Transformation of transportation infrastructure in the Olekminsky district of the Republic of Sakha (Yakutia).

The Olekminsky district is located in the southwest of the republic, borders in the north with Suntarsky and Verkhne-Vilyuisky, in the northeast with Gorny and Khangalassky, in the east with the Aldansky district and the territory subordinate to the city of Neryungri, in the south with the Amur and Chita regions, in the southwest with the Irkutsk region, in the west with the Lensky district. The district was formed on 9 January 1930. The area is 160.8 thousand square kilometers. As of 1 January 2021, the number of permanent employees is 24.4 thousand people. The distance from the district center to Yakutsk is 530 km.

The Olekminsk region and the city of Olekminsk have played and continue to play an important role in the development of the territory of the North-East of Russia. One of the first regular communication routes connecting Olekminsk with other regions is the Irkutsk-Yakutsk postal route, established in 1738. Thus, in 1738, with the establishment of regular communication between Vitim and Yakutsk, not only the Irkutsk-Yakutsk postal route began to fully function, but a land postal connection was established between St. Petersburg and the port of Okhotsk. The route within the boundaries of the Yakut province established in 1775 was divided into two sections: from Vitim to Olekminsk and from Olekminsk to Yakutsk. By the time of the formation of the Yakutsk region in 1822, the Irkutsk-Yakutsk tract was a well-populated road connecting the center of the region with the capital of Eastern Siberia. By the middle of the 19th century, the growth of the gold industry led to the need for cargo transportation along this route [53]. With the development of the gold industry in the Aldan region, the Amur-Yakut route became the leading one. The emergence of new modes of transport (automobile, aviation) finally brought to naught the Irkutsk-Yakutsk tract. In addition to the upper reaches of the Lena, separate sections and roads of intra-district significance remained in demand from it. So, the still-functioning winter roads from Lensk to Olekminsk and from Olekminsk to Yakutsk are laid along the old skeletons of the highway.

Even now, there is no year-round road communication on the territory of the Olekminsky district; in most areas, communication between settlements is carried out only through winter roads in the winter. Accordingly, a significant part of the territory of the

Olekminsky district is cut off in terms of transportation from other regions of Yakutia. Hard-surfaced roads are available only on the route between Neryuktyayinsk 1st and Solyanka. In total, there are 1657.1 km of public roads of local (district) significance in the Olekminsky district, of which 687.5 km are intensively exploited. A winter road passes through the territory of the Olekminsky district, which is part of the Umnas highway of republican significance. Every year from December, work begins on the arrangement of winter roads and ice crossings, which are put into operation at the end of December and operate until mid-April [54].

Intra-territorial communications in the summer period are carried out by river transport, as well as by small aircraft. The main transport artery of the region is the Lena River, which connects the region both with the capital of the republic, Yakutsk, and with the Irkutsk region, through which the main part of the cargo comes from Osetrov and Yakutsk. A short navigational period on the rivers (90–100 days) is a deterrent to the development of the region's economy. Passenger traffic in the Olekminsk region is carried out by hydrofoils from the Yakutsk River Port OJSC along the Yakutsk-Olekminsk-Yakutsk high-speed line and by steamers along the Yakutsk-Ust-Kut-Yakutsk line. Transportation by water transport (freight, passenger) in the area is carried out by the enterprise of the Lensk United River Shipping Company "Olekminsky River Port". The rural population of remote settlements use the services of private entrepreneurs who are engaged in transportation on motor boats along the Olekma, Chara, and Tokko rivers [55].

The appearance of air transport in the Olekminsk ulus is associated with the appearance of postal and passenger flights in 1928. Prior to the construction of the Olekminsk airport, an air station operated with attendants. The only regional airport "Olyokminsk" in the region is located 5 km northeast of the city of Olekminsk. It was opened in 1942 during the Great Patriotic War. More than eight thousand combat aircraft flying from the USA to the front were delivered through the Olekminsk airfield along the Alaska-Siberia air route [56].

In the 1950s in connection with the discovery of diamond deposits in the neighboring Mirninsky district, an airline for cargo transportation was based at the Olekminsk airport. By the beginning of the 1960s, almost all settlements in the region were connected by air. The Olekminskaya United Air Squadron was formed in 1981 in order to meet the increased volumes of air transport in connection with the formation and development of the Charo-Tokkinskaya and Solyanskaya geological exploration expeditions. In Soviet times, small aircraft operated in almost all settlements and there were airfields, which closed in the 1990s after the collapse of the USSR [57].

For example, the working settlement of Torgo, which arose in 1976 as a stronghold for the Charo-Tokkinskaya geological and exploration expedition, and which explored iron ore reserves in the Olekminsky district, was liquidated due to its unprofitability.

Currently, Olekminsk Airport is a branch of the Federal State Enterprise Airports of the North and is a transit point between the cities of Lensk, Neryungri, Irkutsk, and Ulan-Ude. The services of the branch "Airport Olekminsk" are used by the airlines "Yakutia", "Polar Airlines", and "IrAero". Airfield landing sites in the Olekminsky district are available in the settlements: Tokko, Chapaevo, Macha, Delgey, Daban, Uritskoye, Markha (Sanyyakhtakh), Byas-Kyuel, Kudu-Kyuel, and Tyanya [58].

There are also 11 helipads located mainly along the ESPO route, in the locations of mining enterprises and protected areas.

The development of the transportation infrastructure of the Olekminsky district corresponds to the natural resource potential of the territory. Settlements form a settlement system and are interconnected by a network of transport and communication lines (regional and local roads, technological roads of industrial companies, power lines, pipeline transport, telephone and postal communications, etc.).

Case 3: Transformation of transportation infrastructure in the Katangsky district of the Irkutsk region.

The Katangsky district is the northernmost district of the Irkutsk region and the only one with the status of the territory of the Far North. The largest in area (139 thousand km^2) and the most sparsely populated, at the beginning of 2021, 3214 people lived in this area. Compared to the 1990s, the population has decreased by almost three times. The area is a hard-to-reach territory, there are no year-round public roads. Regular passenger transport includes airplanes (connection with the regional center) and helicopters (intra-district communications and inter-district communications with the city of Kirensk). In winter, winter roads operate, through which annual supplies of fuel, food and other goods are brought to the settlements. According to official statistics, the five main areas of employment in the Katanga region include: extractive industry; professional, scientific and technical activities; construction; education; public administration and security. Of the presented list of predominant types of employment, the second, like the first, refers to the oil and gas industry, which mainly employs shift workers. A third type of employment can also be included in this area. The item "agriculture, forestry, hunting, fishing and fish farming" was not included in this list, since only 87 people are officially employed in this area. However, it is this branch of economic activity that is historically formed for the Katanga region, most of the indigenous people and old-timers are involved in it. The Katanga region is considered the territory of the most compact settlement of the indigenous small people, the Evenks, in the Irkutsk region, most of whom have preserved their traditional way of life based on commercial hunting, fishing and reindeer herding. In Soviet times, this type of activity was the main specialization of the region's economy; the population involved in traditional nature management was officially employed in state organizations, such as coop animal farms. After the collapse of the Soviet Union, these organizations fell into disrepair. Hunting activities and reindeer herding did not cease to exist, since they are the foundation of the way of life of the indigenous people and old-timers. In an attempt to protect the rights and interests of this population of the Katanga region, communities of indigenous peoples of the North were created. However, it has not yet been possible to assign territories of traditional nature management to them. Communities are not employers, they do not provide social packages to their members. According to statistics, members of such communities are not officially employed.

The territory of the district is located within the Central Siberian Plateau. Its landscape is a flat hill, a slightly undulating plateau. The climate of the Katanga region is sharply continental, with long, frosty winters and short, hot summers. The climate in most of the territory is unfavorable for agriculture. The rivers of the region are rich in fish resources, which are used for personal needs. In addition to rivers, lakes occupy a large place in water resources. The territory of the district is located in the middle taiga zone. Forests cover 82.5% of the territory. Coniferous species predominate, such as Dahurian larch, pine, spruce, with less cedar and fir. The forest is the main wealth of the region: it is the main type of fuel, building material, and it is also a pantry of natural products such as berries and mushrooms. It was here which was, and still remains, the sphere of traditional economic activity of the Evenks and Russians: the fur trade. Hunting is still the main source of income for the indigenous people.

The main river artery cutting through the territory of the region in the northern direction is the Nizhnyaya Tunguska, one of the most abundant tributaries of the Yenisei. Its length within the region is 1500 km. It is fed by numerous tributaries (the rivers Nepa, Teteya, Yerema, three Kochemy, etc.), as well as precipitation and mountain snowfields thawing by summer. Freeze-up occurs in mid-October, and the opening in mid-May. The rivers are full of water during the flood period (the water rise reaches 8–12 m in Tunguska) and become very shallow in summer, therefore the river is suitable for small navigation in the spring, during the month of May. From time immemorial, it has been and still is the only available mode of transport by which goods are delivered by high water.

The components of the natural resources of the region are minerals, the types of which are determined by the structure of the earth's crust (sedimentary and igneous rocks).

The territory of the district, in its separate sections, is included in the East Siberian oil and gas province (west), the Nepa potassium-bearing basin (south), the Tunguska coal-bearing basin (southeast), the Angaro-Tunguska iron ore province (northwest), the Siberian calcium-bearing province (north), and the Vilyui diamond platform.

Geological expeditions confirmed the presence of oil, gas, potassium salts, dolomites, coal, iron ore, Icelandic spar, diamonds, and colored and ornamental stones: chalcedony, jasper, marble onyx, agate, carnelian, amethyst, etc.

Large commercial oil reserves have been explored at the Verkhnechonskoye oil and gas condensate field. In addition, a number of other oil and gas condensate fields have been identified and are being exploited in the region.

Despite the rich natural resources, the region is economically and culturally in very difficult conditions. Due to its geographical position, it is isolated from the industrial and cultural centers of the region.

The largest cargo supplier is OAO Verkhnechonskneftegaz, a subsidiary of Rosneft, which produces hydrocarbons at the Verkhnechonskoye field. The lack of year-round roads and railways is a deterrent to the development of the region's natural resources.

Podvoloshino is the only settlement in the Katanga region that has a year-round road connecting it with the city of Kirensk. In winter (January-March), winter roads are cleared to all villages in the region. In summary, the length of the roads is 1499 km which comprises 660 km on the route Verkhne-Markovo (Ust-Kut district)—Nepa—Yerbogachen (regional center), the other 839 km are municipal roads.

Aviation is the only mode of transport that allows passengers, mail, pensions and other goods to be transported within the region. Flights are carried out in winter twice a month by the helicopter "MI-8" of the Kirensky Aviation Enterprise, and three times a month in summer. Flights to settlements are carried out on two routes: In a large circle linking Kirensk (regional center of the Kirensky district of the Irkutsk region) with Nepa—Preobrazhenka—Erbogachen—Kirensk. Flights to the most remote northern settlements of Hamakar and Nakanno are also carried out from the regional center. In a small circle linking Kirensk—Tokma—Bur—Ika—Kirensk. Communication between the regional center and the city of Irkutsk is carried out only by aircraft AN-24. During the functioning of the winter road, the regional center of Irkutsk can also be reached by commercial shuttle bus (travel time 2 days).

5. Result and Discussion

The study areas are located at distances of thousands of kilometers from each other (Figure 1). It is interesting that these regions in their remoteness are similar to small island developing states, SIDS [59]. As experts note territory remoteness, poor economy and environment fragility go hand by hand [13]. Six dimensions of remoteness were announced for SIDS and among them is connectivity due to existing transportation infrastructure [60]. Since there are no means for a territory of a state or a district to control its physical location, pertinent connectivity might be improved through organizing effective transport networks which promote setting and supporting numerous links of cultural and economical activities.

In the remote areas under consideration, the construction and provision of roads is supported and provided by extractive enterprises operating in these territories. For example, in the village of Khuzhir in the Okinsky district, if necessary, in case of flooding of the road, the road is restored by the company Khuzhir-Enterprise LLC.

Excerpts from the interviews for the study areas are presented in Table 1.

Table 1. The opinion of the local population on the state and development of transportation infrastructure.

Female, education worker, 50, Khuzhir, Okinsky district	"Khuzhir Enterprise is our partner. We opened a bakery at the school and Khuzhir Enterprise buys bread from us every day. Our school is autonomous and these are our non-budgetary funds, but it's true that a lot of money is spent on flour, because it's far to carry, and flour is expensive, but nevertheless we have some money. Last year we bought 3 TVs, and now we are ordering printers to provide all teachers with them. It helps a lot. This is also additional help for children when they go to the city for some kind of competition and we pay half of the costs from outside the budget".
Male, administration worker, 49, Orlik, Okinsky district	"The imprint is made by mountainous terrain, the landscape itself, medium mountains, over 1000 m, all settlements are located at an altitude of over 1000 m. It turns out that we are completely in the mountains, and accordingly we have our own specifics and nuances that leave an imprint in connection with the weather and climatic conditions and the landscape itself, well, in fact, our difficulties. . . . . And in this regard, we have many moments here that are not found in other regions. First of all, these are infrastructural aspects, the transportation component, energy, communications. Well, all this comes to us on the sly. The road appeared only in 1992".
Male, local, 60, Khuzhir, Okinsky district	"You see, we have three gold mining factories, we have jade everywhere. And simultaneously we have nothing. Everything leaves for Moscow. These are gold mining factories which belong to Muscovites".
Female, local, 40, Khuzhir, Okinsky district	"But there are also disadvantages. There, dust rises from the factory with the wind, it goes here, I guess. This summer, our cows and calves began to die for no reason. Everyone thinks they are due to emissions from the Khuzhir Enterprise".
Male, local, 57, Olekminsk, Olekminskiy district	"We used to get to our lands unhindered, but on deer. When the ESPO road appeared, we began to travel by car. This is good, because we can carry more cargo and travel more often. On the one hand, it's good that an alternative road has appeared, but on the other hand, it turns out that we need the permission of "foreigners" to get to our lands".
Male, local, 43, Olekminsk, Olekminskiy district	"In the first years of the ESPO, in order to travel to the hunting grounds and deer pastures, we issued a pass that was valid for one year. Now you need a pass for every entry. To do this, we send an application to the company and in three days we receive a pass. This is very inconvenient if you need to go urgently. We need to plan in advance, but we are used to what we wanted today—we left today. It's always been that way".
Male, administration worker, 58, Tyanya, Olekminskiy district	"There are no year-round roads; in winter, from January to April, a winter road operates along the Tyanya-Tokko-Chara-Olekma rivers, and in summer on motorboats along the same rivers. During the thaw (April-May, October-December), the AN-2 plane flies two times a week, tickets are subsidized, the ticket price is 3–4 thousand rubles. Planes may not arrive due to bad weather, rain, as the runway is unpaved. In 2006, a gas station was opened, fuel prices are expensive, we have to import fuel and lubricants by winter road for the whole year".
Male, reindeer breeder, 52, Tyanya, Olekminskiy district	"I work in the community as a reindeer herder, the herd is located near the border with the Trans-Baikal Territory, not far from Neryungri Metallik. We buy products from them, since I myself am from the village of Chapa-Ologo of the Trans-Baikal Territory, I go to visit my relatives along their route. It is 16 km from the Tabornoy deposit to the Ikabya railway station by car. If you go from the herd to the village of Tyanya, then first you need to go by all-terrain vehicle from Ivanakit to the mouth of the Usu, from there to the Charoda river and along the Tokko river for 2 days by motorboat".
Female, local, 62, Tyanya, Olekminskiy district	"Locals for sale, many take lingonberries, blueberries, blackcurrants on motorboats. In winter, from the village of Tyani to the village of Tokko, we drive one road in UAZs through the Dabayan-Chara River-Byas-Kyuel-Neftebaza-Chara River-Tokko River, and from there to the city of Olekminsk. By car 5 h to the village of Byas-Kyuel, then 2 h to the village of Tokko. In December, the winter road is not yet open, so we go on snowstorms to the village of Byas-Kyuel. The administration of the village and Neryungri-Metallik used to service the winter road, but now I don't know who wins the tender, they carry out the work".
Female, local, 68 years old, Tyanya, Olekminskiy district	"There is a lot of equipment, many have motorboats, gasoline is expensive, but there is no choice. To get to Olekminsk, 120–140 L of gasoline are required, depending on the engine. Boat motor power—25 hp only here it's not far to drive near the house, 30 hp normal for old people, 40 hp already for the young, for long trips to the city of Olekminsk and for those who carry passengers and cargo. When there is little water on the river, sometimes the motors break, although the locals know the river well".
Male, administration worker, 65 years old, Nepa, Katangsky district	"We live in a very remote area, and this puts a certain imprint on our existence here. In particular, on the development of entrepreneurial activity, it is impossible to develop entrepreneurial activity, because transportation logistics are not provided here, even the products that will be produced here cannot be delivered to the markets. This is the main obstacle to development of small and medium-sized enterprises. Large enterprises, of course, work here, this is the oil and gas industry, it is flourishing and developing. They have their own transportation logistics, their own roads, which they do not open for public use, they use only themselves".
Female, administration worker, 50 years old, Erbogachen, Katangsky district	"Now the issue of building a year-round road to Preobrazhenka, it is next to the oil field, but it is still worked out . . . There is the year-round technological road between the fields and from this road 17 km winter road to Preobrazhenka, but it is only if Preobrazhenka is connected, and we will be outside".
Male, Local, 60 years old, Erbogachen, Katangsky district	"Allow us to drive there [on the technological road], as if there were "a lot of" us, and there you can drive three times faster, on the winter road we were going 20 km/h, and on their road 60 without straining".

The excerpts presented are evidence that locally there are difficulties in the transportation provision of hard-to-reach settlements and indigenous people come to ambiguous and contradictory conclusions about the usefulness of mining in their places of residence.

On the one hand, the development of mineral deposits contributes to the development of transportation infrastructure, offering new opportunities for residents living in the territory.

On the other hand, doubts about the fairness of the exclusion of the local population from the distribution of profits in the production process and serious environmental threats create a cause for concern for the interviewees. However, all this is a matter of implementation of effective transportation infrastructure.

Recent works underline a series of negative impacts that can contribute to the implementation of transportation infrastructures especially through transport pressure on the environment with further distortion of traditional social relations and cultural components [61–65].

Contrary to expectations of only social cohesion pluses [66], it might stimulate changes to make communities disadvantageous e.g., to cause separation of locals from social networks [67,68].

One example of the restoration of old communications is the section along which the Sanyakhtakh-Aldan road ran, part of which belongs to the Eastern Siberia-Pacific Ocean (ESPO) main oil pipeline. Thus, this route was formed in 1925. In order to provide the gold mines with food, the delivery of goods was organized in winter on sledges along the Lena River to Sanyyakhtakh. Sanyakhtakh was a transshipment base for sending food products to the village of Nezametny (Aldan). Further, the cargo was transferred on horses, deer, bulls and camels over a length of 330 km. On the winter roads Sanyyakhtakh—Imperceptible, then Isit—Imperceptible. In the summer, the road became completely impassable. This road continued to exist as a seasonal road until the 1950s. This route received a new development in connection with the commissioning of the ESPO in 2012. Within the territory of the Republic of Sakha (Yakutia) ESPO crosses the Lena river in the vicinity of the village of Solyanka, Olekminsky district, and 247 more watercourses, including the rivers Nuya, Peleduy, Amga, Aldan and others. In 2013, in order to develop the energy and transportation infrastructure, the construction of an overhead power transmission line Lensk-Olekminsk-Aldan was built.

In 2011–2012 design and survey work was carried out on two options for the passage of the Power of Siberia gas pipeline. The first, in a single corridor of the already existing oil pipeline "Eastern Siberia—the Pacific Ocean", is convenient because infrastructure already exists in the places where it passes. The second option involved laying a gas pipeline along a shorter route through the territory of the Tyansky Evenk national settlement, in which case the Evenks, one of the indigenous peoples of the North, who have lived in these territories for centuries, would suffer the most [69].

During the discussions and debates, a decision was made to lay the gas pipeline according to the first proposal. In September 2014, Gazprom began construction of the first section of the Power of Siberia gas pipeline investment project along the Lensk-Skovorodino section, from the Chayandinskoye field in Yakutia to Blagoveshchensk (border with China). To date, a section of the Power of Siberia gas pipeline has been built, which runs along the ESPO oil pipeline over a length of about 2200 km from Yakutia to the border with China near the city of Blagoveshchensk.

At present, a technological road has been laid parallel to the pipeline, which is the property of Transneft-Vostok LLC, Bratsk, Russia. Technological driveways are primarily production and regime facilities designed to provide unhindered access to a deposit or facility during its operation and maintenance. Industrial companies, realizing the social significance of year-round road communication for the residents of Yakutia, are trying to ensure the possibility of unhindered travel along the technological road without charging any fee. For unhindered travel along the highway, local residents, as well as residents of other districts and regions, must submit a pre-executed application. In the first years of the implementation of the Eastern Siberia-Pacific Ocean (ESPO) oil pipeline, the population traveled freely along the technological road, having a passport with a residence permit. In subsequent years, community members issued a pass, which was valid for one year. Today, reindeer herders and hunters, in order to get to their lands, need to issue a pass for each entry [70].

Indigenous peoples of the North living in the Olekminsky district express concern in connection with the increasing cases of environmental violations. So, in the spring of 2021, in the territory of the Olekminsky district on the Tokko River, two kilometers upstream from the mouth of the Constantny stream, unauthorized ice crossings were discovered—two dams, one of which completely blocks the riverbed. A dirt road was laid along them for moving vehicles and there were fresh traces of automobile and caterpillar vehicles. This territory of a nomadic tribal community is a place for calving and keeping young deer in the spring and autumn. In connection with this situation, reindeer herders were forced to migrate to other places, away from industrial companies [71].

- In the Olekminsky district, there is a transformation of the transportation infrastructure and the heterogeneity of the network of transport communications on different time scales.
- Since the middle of the 17th century, the main supply route for Yakutia was the "water-land route from Tobolsk through Yeniseisk along the Angara-Ilim rivers, the Ilimsky (Lensky) portage and rafting from Ust-Kuta along the Lena to Yakutsk", which passed through the Olekminsky district, the Irkutsk-Yakutsk postal route established in 1738 allowed for the organization of regular postal communication and contributed to the emergence of new settlements (post stations) and an increase in the number of settlements in the form of machine tools, which led to an increase in the population in the area. The route, which ran along the Lena River, was year-round and served trade and postal traffic, as well as the transportation of passengers and exiles from Irkutsk to Yakutsk. In winter, transportation was mainly on the ice of the river. Lena to Yakutsk, in the summer, was by boat.
- In the post-Soviet period, many settlements were abolished after the administrative reform of 1963 in connection with the clarification of the concept of "permanent settlement". In particular, there were not many rural settlements located near the city of Olekminsk. There is a policy of enlargement of settlements here, when unpromising small villages were closed, and their population was relocated to larger settlements, which are mainly centers of collective farms and state farms. In Soviet times, an extensive network of scattered winter roads was created to supply artels, geological parties and meteorological stations that appeared here later.
- Since the early 2000s, there has been a change in the specialization of the region from a purely agrarian (agricultural) type, with the development of animal husbandry, reindeer husbandry, grain and fodder production, potato growing, vegetable growing, milk processing, etc., to an agrarian-industrial type, the development of agricultural and gold mining industries Neryungri-Metallik LLC (gold deposits "Tabornoe", "Gross", etc.), construction of oil and gas pipelines "ESPO" and "Power of Siberia", laying of power lines, exploration of hydrocarbon raw materials, development of the forest and woodworking industries, etc.
- At present, new types and categories of roads have appeared, and the construction of a network of technological roads for industrial companies operating in the region is being developed. In the territories of traditional nature management, technological roads have both positive and negative effects. The positive impact is the limited provision of access to travel and transportation of goods for the local population, both in personal transport and in transport provided by companies. The maintenance of technological roads is carried out by industrial companies themselves, which does not impose additional costs on the local budget. The negative impact is manifested in noise pollution by heavy equipment, which scares away the objects of hunting, as a result, the migration of game animals changes; there is an increase in cases of environmental pollution by fuel spills and the number of accidents. For example, in a number of cases, residents of the Olekminsky district, upon obtaining a travel permit, can use the technological road of the East Siberia–Pacific Ocean oil pipeline to access the Lena federal highway and travel to Yakutsk to receive social services.

- A significant part of the territory of the region, where the indigenous peoples of the North live, does not have a permanent year-round surface road network, which negatively affects the quality of life. Thus, in terms of transport accessibility, the Olekminsky district can be put on a par with the Arctic regions of the Republic of Sakha (Yakutia), which is one of the most inaccessible territories of the republic, given that the region does not have a program to subsidize airfare.

The presence of mining enterprises ensures the development of transport infrastructure in the studied remote areas. This consists both in the construction of the roads themselves, and in the participation in the socio-economic development of remote territories. As a result of the survey, it was revealed that the local population has a dual attitude towards the presence of mining companies on their territory. On the one hand, respondents note an improvement in transport accessibility, an increase in the transport mobility of the population, and the contribution of industrial companies to the socio-economic development of municipalities. On the other hand, the concern of local residents is mainly related to the environmental consequences of the work of industrial companies.

The development of transportation infrastructure in the Katanga region is constrained by difficult geographical conditions and a significant distance from industrial centers and major transport arteries. Modern development is due to the development of industrial activities, primarily oil and gas production and logging. As the direction is relevant and accessible (with the permission of industrial companies) for the local population, new technological roads are used by the residents of Katanga to travel to other settlements or to travel to their hunting grounds. The growing network of informal roads and its impact on local communities remains outside the control structures for the time being. However, field studies show significant transformations in the ways and means of mobility of settlements, especially in the southern part of the Katanga region. Local residents have different attitudes towards these changes, on the one hand, this contributes to the emergence of new opportunities for movement, on the other hand, this is an increase in the availability of remote settlements and territories for external (urban) visitors, hunters and fishermen, which has a negative impact on the productivity of hunting and fishing grounds of local residents for whom traditional activities are the main livelihood. Local residents are also concerned about the environmental impact of industrial development and the growing network of informal roads. Thus, industrial development and new linear infrastructures that open up new opportunities for the mobility of local residents, on the one hand increase the stability of local communities and adapt to new conditions, and on the other hand threaten the preservation of traditional forms of management in the future.

6. Conclusions

Most of the studies known to date are devoted to individual nonconnected elements of complex multifaceted transportation service systems. This paper reveals that, in reality, being encountered with socioeconomic and environmental tasks, the study systems embrace multiple structures (road networks, traffic flows, usefulness, efficiency and reliability, all of which should be assessed comprehensively). Moreover, the research clarifies that these assessments certainly depend on the interests of the parties of various communities, as well as individual actors (stakeholders), who determine the qualitative and quantitative signs of the need and level of services in the system as a whole.

In this regard, initially, this work focused on both the complexity of the systems, and the high sensitivity of remote Siberian and Northern territories and their population to the reorganization of transportation infrastructure, during industrial mining and processing of natural resources, and concomitant impact on sustainability and resilience of indigenous communities.

The identification of processes and conditions that ensure sustainable development of remote territories was based on real data prepared for the specific model areas covering the Okinsky district, Republic of Buryatia, the Katangsky district, Irkutsk region, and the Olekminsky district, Republic of Sakha (Yakutia), all in the Russian Federation.

These real data were collected through interviews and observations during field work.

The types of transport in the model areas are analyzed in retrospect with its diversity, capacity, seasonality and state up to the present day.

It was revealed that:

- remoteness of the territories promotes preservation of traditional activities of indigenous peoples.
- works related to exploitation of mineral deposits contribute to upgrading transportation infrastructure, offering new opportunities for residents living in the territory.
- a poor road network is concurrently conducive to generating additional income for the local population providing the missing transportation services.

At the same time, various economic and environmental factors and relationships, including complex ones, are defined and highlighted. These are contradictory and ambiguous, determining the transport situation of the study territories and circumstances for building new and restoring old routes.

In general, a significant set of scientific methods and original materials used in the work made it possible to come closer to the problem of planning further large-scale research on the way to solving the socio-economic and environmental problems of developing remote regions of Siberia and the Russian North, primarily in the interests of the indigenous population.

Author Contributions: Conceptualisation—N.K., M.K., V.F. and A.T.; Writing—original draft preparation, A.S. and A.T.; Writing—review and editing, N.K. and A.F.; Visualisation, V.B. and V.F.; Supervision, Z.D. and A.F.; Project administration, D.K.; Funding acquisition, A.S., N.K. and A.T. All authors have read and agreed to the published version of the manuscript.

Funding: The reported study was funded by RFBR and MECSS, project No. 20-57-44002 "Interdisciplinary network platform for modeling socio-economic and environmental processes in the transboundary territories of the Russian Federation and Mongolia with limited transport accessibility" in terms of collecting field data in the Okinsky district (Buryatia) and with the support of the Russian Science Foundation No. 21-17-00250 "Interregional and intraregional communications of the indigenous peoples of the North in the face of global challenges: history and modernity" in terms of collecting information on the Olekminsky district of the Republic Sakha. Research materials for the Katangsky district were prepared with the support of the Russian Science Foundation grant No. 21-78-00057 "The Northern regions of new development: prospects for sustainable development".

Institutional Review Board Statement: Approval for the study was not required in accordance with Russian national legislation.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.

References

1. National Remote and Regional Transport Strategy. Available online: https://dipl.nt.gov.au/__data/assets/pdf_file/0005/1032278/national-remote-regional-transport-strategy.pdf (accessed on 3 March 2021).
2. Strategy for the Spatial Development of the Russian Federation for the Period up to 2025. Approved by Decree of the Government of the Russian Federation Dated February 13 No. 207-r. 2019. Available online: http://government.ru/docs/35733/ (accessed on 3 March 2021).
3. Transport Strategy of the Russian Federation for the Period up to 2030 Dated November 22, 2018 No. 1734-r, Approved by the Government of the Russian Federation. Available online: http://www.consultant.ru/document/cons_doc_LAW_82617/12dbe84ab7402c41a061dee3399c090bf6932cc3/ (accessed on 5 November 2021).
4. Kuklina, V.V. Transportation Accessibility: Experience and Practices of Mobility of Residents of Settlements in the National Republics of Siberia. In *The Collection of Scientific Papers Based on the Results of the All-Russian Scientific and Practical Seminar: Republics in the East of Russia: Trajectories of Economic, Demographic and Territorial Development*; Breslavsky, A.S., Ed.; IMBT SB RAS: Ulan-Ude, Russia, 2018; pp. 222–237. Available online: https://doi.org/10.30792/978-5-7925-0522-3-2018-222-237 (accessed on 3 May 2022).

5. Development and Integration of Remote Areas in the APEC Region. APEC Policy Support Unit. November, 2018. Available online: https://www.apec.org/docs/default-source/Publications/2018/11/Development-and-Integration-of-Remote-Areas-in-the-APEC-Region/218_PSU_Remote-areas-development.pdf (accessed on 3 May 2022).
6. Kuklina, M.V.; Trufanov, A.I. Prospects for the development of sustainable tourism in the Okinsky district of the Republic of Buryatia. *Sustainability* **2021**, *13*, 8042. [CrossRef]
7. Jarvie, M.E. Brundtland Report. Encyclopedia Britannica. 2016. Available online: https://www.britannica.com/topic/Brundtland-Report (accessed on 3 May 2022).
8. Sala, S.; Ciuffo, B.; Nijkamp, P. A systemic framework for sustainability assessment. *Ecol. Econ.* **2015**, *119*, 314–325. [CrossRef]
9. Jacob-Lopes, E.; Zepka, L.; Depra, M. *Sustainability Metrics and Indicators of Environmental Impact. Industrial and Agricultural Life Cycle Assessment*; Elsevier: Amsterdam, The Netherlands, 2021. [CrossRef]
10. Jamieson, D. Sustainability and beyond. *Ecol. Econ.* **1998**, *24*, 183–192. [CrossRef]
11. De Vries, B.J.M.; Petersen, A.C. Conceptualizing sustainable development. *Ecol. Econ.* **2009**, *68*, 1006–1019. [CrossRef]
12. Five Environmental Metrics Worth Tracking. 2021. Conservice ESG. Available online: https://www.gobyinc.com/five-environmental-sustainability-metrics-worth-tracking/ (accessed on 2 May 2022).
13. Remoteness. Development Statistics and Information Branch. 2021. UNCTAD. Available online: https://sdgpulse.unctad.org/remoteness/ (accessed on 2 May 2022).
14. Schweitzer, P.; Povoroznyuk, O.; Schiesser, S. Beyond wilderness: Towards an anthropology of infrastructure and the built environment in the Russian North. *Pol. J.* **2017**, *7*, 58–85. [CrossRef]
15. Schweitzer, P.; Stammler, F.; Ebsen, C.; Ivanova, A.; Litvina, I. Social Impacts of Non-Renewable Resource Development on Indigenous Communities in Alaska, Greenland, and Russia//ReSDA Gap Analysis Report. 2016. Available online: http://yukonresearch.yukoncollege.yk.ca/resda/wp-content/uploads/sites/2/2013/09/2-Schweitzer-Gap-analysis-final.pdf (accessed on 3 May 2022).
16. Konstantinov, Y. Roadlessness and the Person: Mode of Travel in the Reindeer Herding Part of the Kola Peninsula. *Acta Borealia* **2009**, *1*, 27–49. [CrossRef]
17. Golovnev, A.V. Nomads of the North: Mentality and mobility. *New Stud. Tuva* **2019**, *3*, 15–26.
18. Golovnev, A.V.; Belorussova, S.; Kisser, T.S. *Essays on the Anthropology of Movement*; MAE RAN: St. Petersburg, Russia, 2020; p. 336.
19. Forbes, B.; Stammler, F.; Kumpula, T.; Meschtybd, N.; Pajunena, A.; Kaarlejarvi, E. High resilience in the Yamal-Nenets social–ecological system, West Siberian Arctic, Russia. *Proc. Natl. Acad. Sci. USA* **2009**, *106*, 22041–22048. [CrossRef]
20. Cresswell, T. The Right to Mobility: The Production of Mobility in the Courtroom. *Antipode* **2006**, *38*, 735–754. [CrossRef]
21. Kwan, M.P. Beyond Space (As We Knew It): Toward Temporally Integrated Geographies of Segregation, Health, and Accessibility. *Ann. Assoc. Am. Geogr.* **2013**, *103*, 1078–1086. [CrossRef]
22. Niedzielski, M.A.; Boschmann, E.E. Travel Time and Distance as Relative Accessibility in the Journey to Work. *Ann. Assoc. Am. Geogr.* **2014**, *104*, 1156–1182. [CrossRef]
23. Soder, M.; Peer, S. The potential role of employers in promoting sustainable mobility in rural areas: Evidence from Eastern Austria. *Int. J. Sustain. Transp.* **2017**, *12*, 541–551. [CrossRef]
24. Australian Population and Migration Research Centre. ARIA (Accessibility/Remoteness Index of Australia). Australian Population and Migration Research Centre. URL. Available online: https://www.adelaide.edu.au/apmrc/research/projects/category/about_aria.html.1 (accessed on 15 February 2022).
25. Nelson, A. Travel Time to Major Cities: A Global Map of Accessibility. European Commission. URL. Available online: http://forobs.jrc.ec.europa.eu/products/gam/ (accessed on 16 February 2022).
26. Bugromenko, V.N. *Transport in Territorial Systems*; The Science: Moscow, Russia, 1987; p. 112.
27. Bugromenko, V.N. Transport discrimination of the population: Ways to solve problems. *Ind. Policy Russ. Fed.* **2003**, *1*, 8–22.
28. Rodoman, B.B. Spatial polarization and reorientation. In *Where is Russia Going? Transformation of the Social Sphere and Social Policy*; Case: Moscow, Russia, 1998; pp. 178–192.
29. Tarkhov, S.A. *Evolutionary Morphology of Transport Networks*; Universe: Smolensk, Russia, 2005; p. 386.
30. Golts, G.A. *Transport and Settlement*; The Science: Moscow, Russia, 1981; p. 248.
31. Tarkhov, S.A.; Shlikhter, S.B. *Geography of Transport Systems: A Course of Lectures*; ROU, IG RAN: Moscow, Russia, 1995; p. 148.
32. Lazerovich, E.E. *Economic Microdistricts of Russia (Grid and Typology)*; Trilobite: Moscow, Russia, 2004; p. 128.
33. Krylov, P.M. Typologization of modern regional transport systems of Russia. *Reg. Res. Russia* **2007**, *4*, 66–75.
34. Privalovsky, A.N. *Typology of Local Transport Systems of Russia*; Transport: Moscow, Russia, 1985; p. 183.
35. Neretin, A.S. *Transportation Situation and Accessibility of the Territories of European Russia: Abstract of the Dissertation of the Candidate of Geographical Sciences, 25.00.24*; Institute of Geography RAS: Moscow, Russia, 2018; p. 26.
36. Bolshakov, N.M.; Zhideleva, V.V.; Rabkin, S.V. Transportation accessibility of peripheral rural territories: Theory, methodology, practice (case study of the Komi republic). *Proc. Komi Sci. Cent. Ural. Div. Russ. Acad. Sci.* **2015**, *2*, 95–103.
37. Bolshakov, N.M.; Eremeeva, L.E.; Popov, E.Y. *Methodological Approaches to Assessing the Transportation Accessibility of the Territory*ю *Actual Problems, Directions and Mechanisms of Development of the Productive Forces of the North: Materials of the Fifth All-Russian Scientific Seminar*; OOO "Komirepublican Printing House": Syktyvkar, Russia, 2016; pp. 135–242.
38. Lavrinenko, P.A.; Romashina, A.A.; Stepanov, P.S.; Chistyakov, P.A. Transportation accessibility as an indicator of regional development. *Probl. Forecast.* **2019**, *6*, 136–146.

39. Pilyasov, A.N.; Zamyatina, N.Y.; Goncharov, R.V. There is no creativity without mobility: Anthropology of transport in Siberia and the Far East. *Spat. Econ.* **2019**, *15*, 149–183. [CrossRef]
40. Marshalova, A.S.; Novoselov, A.S. Competitiveness and Development Strategy of Municipalities. *Region: Econ. Sociol.* **2010**, *3*, 219–236. Available online: https://www.researchgate.net/publication/46525363_Competitiveness_and_development_strategies_for_municipal_units/link/5e4cf94f458515072da8b53a/download (accessed on 5 November 2021).
41. Heckathorn, D. Comment: Snowball versus Respondent-Driven Sampling. *Sociol. Methodol.* **2011**, *41*, 355–366. [CrossRef]
42. Kusenbach, M. Street phenomenology: The go-along as ethnographic research tool. *Ethnography* **2003**, *4*, 455–485. [CrossRef]
43. Imetkhenov, A.B. (Ed.) *Atlas of the Republic of Buryatia*; Federal Service of Geodesy and Cartography of Russia: Moscow, Russia, 2000; p. 48.
44. Rassadin, I.V. Comparative analysis of animal husbandry of Soyots and Buryats. *Humanit. Vector* **2017**, *12*, 190–195. Available online: http://zabvektor.com/wp-content/uploads/080219030207-rassadin.pdf (accessed on 10 November 2021).
45. Kurdyukov, V.N. Traditional Soyot Economy and Its Dynamics. *Bull. Irkutsk. State Univ.* **2012**, *1*, 176–185. Available online: https://izvestiageo.isu.ru/en/article/file?id=5 (accessed on 10 November 2021).
46. Gulgenova, S.Z. The History of the Development of Traditional Nature Management in the Oka Mountains (Eastern Sayan). *Bull. Buryat State Univ.* **2009**, *4*, 24–26. Available online: https://cyberleninka.ru/article/n/istoriya-razvitiya-traditsionnogo-prirodopolzovaniya-v-gornoy-oke-vostochnyy-sayan (accessed on 10 November 2021).
47. Imethenov, O.A. Aliber Mine 2013—High-Rise Anthropogenic Landscape Park of Regional Importance (Eastern Sayan). *Bull. Buryat State Univ.* **2013**, *4*, 32–35.
48. Khamnaeva, S.L.; Torpinkeeva, S.L. Dynamics of the tourist flow and prospects for the development of tourism in the Okinsky district, Sustainable development of service technology. In Proceedings of the VII International Student Scientific and Practical Conference, Ulan-Ude, Russia, 12–14 June 2018; East Siberian State University of Technology and Management: Ulan-Ude, Russia, 2018; pp. 172–177.
49. Kropotkin, P.A. *Documents on the History of Literature and the Public 1923*; State Publishing House: Moscow, Russia, 1923; Volume 4, p. 291.
50. Kuklina, V.; Dashpilov, T. Constructing a transport communication map of the "Sayan Crossing". *Tartaria Magna* **2013**, *2*, 12–40.
51. Volkov, S. "Okinsky district. Baikal land./S. Volkov.—Text: Electronic// Baikal land [Electronic resource].—2004. Octobe URL. Available online: http://baikal.irkutsk.ru/php/statya.php?nomer=29.txt&razdel=buriatia (accessed on 10 October 2021).
52. Information About the Landing Sites on the Territory under the Jurisdiction of the Aircraft of the MTU of the Federal Air Transport Agency, as of 09/26/2018. [Electronic Resource]—URL. Available online: https://favt.gov.ru/aviaciya-obshego-haznacheniya-posadochnie-ploshadki-aerodromy/ (accessed on 10 October 2021).
53. Kazaryan, P.L. *Land Communications of North-Eastern Russia (XVII Century—1920)*; NEFU: Yakutsk, Russia, 2012; p. 143.
54. Olekminsk Residents Have Been Fighting for a Year-Round Road for More Than A Dozen Years, and Who is Still There. Available online: https://sakhaday.ru/news/olekminchane-byutsya-za-kruglogodichnuyu-dorogu-ne-pervyi-desyatok-let-a-voz-i-nyne-tam?from=copy (accessed on 26 February 2022).
55. The Official Website of the Municipal District "Olekminsky". Available online: https://mr-olekminskij.sakha.gov.ru/ (accessed on 19 January 2022).
56. Pesterev, V.I. *Formation and Development of Air Transport in Yakutia (1923–1945)*; YSC: Yakutsk, Russia, 1993; p. 20.
57. Olekminsk Air Harbor—65 Years. Available online: http://gazetaolekma.ru/news/2007-11-15-2444 (accessed on 18 February 2022).
58. The Official Website of the Federal State Enterprise "Airports of the North". Available online: http://sever.aero (accessed on 2 February 2022).
59. Small Island Developing States. DGFF2021. (2022) UNCTAD Development and Globalization: Facts and Figures 2021–461 Pages. Available online: https://unctad.org/system/files/official-document/dgff2021_en.pdf (accessed on 2 May 2022).
60. Cantu-Bazaldua, F. *Remote but Well Connected? Neighboring but Isolated? Measuring Remoteness in the Context of SIDS. UNCTAD/SER.RP/2021/10. UNCTAD Research Paper No. 67*; UNCTAD: Geneva, Switzerland, 2021.
61. Zubala, T. Effect of transport infrastructure development on selected components of the environment of inner-city river valley and the possibility of its revitalization. *Environ. Sci. Pollut. Resour.* **2022**. [CrossRef]
62. Wang, L.; Xue, X.; Zhao, Z.; Wang, Z. The Impacts of Transportation Infrastructure on Sustainable Development: Emerging Trends and Challenges. *Int. J. Environ. Res. Public Health* **2018**, *15*, 1172. [CrossRef]
63. Griškevičiūtė-Gečienė, A.; Griškevičienė, D. The Influence of Transport Infrastructure Development on Sustainable Living Environment in Lithuania. *Procedia Eng.* **2016**, *134*, 215–223. [CrossRef]
64. Laurance, W.F.; Clements, G.R.; Sloan, S.; O'Connell, C.S.; Mueller, N.D.; Goosem, M.; Venter, O.; Edwards, D.P.; Phalan, B.; Balmford, A. A global strategy for road building. *Nature* **2014**, *513*, 229–232. [CrossRef]
65. Palmer, M.A. Water resources: Beyond infrastructure. *Nature* **2010**, *467*, 534–535. [CrossRef]
66. Quigley, R.; Thornley, L. Literature Review on Community Cohesion and Community Severance: Definitions and Indicators for Transport Planning and Monitoring. Report to New Zealand Transport Agency. 2011. 52p. Available online: https://www.nzta.govt.nz/assets/resources/community-cohesion-and-community-severance/docs/community-cohesion-and-community-severance.pdf (accessed on 5 May 2022).

67. Impact of Transport Infrastructure Investment on Regional Development. OECD. 2002. Available online: https://www.itf-oecd.org/sites/default/files/docs/02rtrinveste.pdf (accessed on 5 May 2022).
68. Nimegeer, A.; Thomson, H.; Foley, L.; Hilton, S.; Crawford, F.; Ogilvie, D. Experiences of connectivity and severance in the wake of a new motorway: Implications for health and well-being. *Soc. Sci. Med.* **2018**, *197*, 78–86. [CrossRef] [PubMed]
69. The Yakut Evenks Asked Gazprom Not to Lay a Gas Pipeline Through Their Lands. Available online: https://www.newsru.com/finance/15feb2011/evenki.html (accessed on 26 January 2022).
70. Filippova, V.V. Access to territories of traditional nature management: Mobility of local communities in conditions of industrial development. *Kunstkamera* **2020**, *1*, 36–42. [CrossRef]
71. In Connection with the Damage to the Tokko River and the Surrounding Area, Materials are Being Prepared for the Initiation of a Criminal Case. Available online: https://yakutia.info/article/198787 (accessed on 25 February 2022).