

NORTHERN AND ARCTIC SOCIETIES

Arctic and North. 2023. No. 52. Pp. 130–140.

Original article

UDC 332.1(=511.2)(985)(045)

doi: 10.37482/issn2221-2698.2023.52.153

Current Problems of Indigenous Minorities of the Russian Arctic in the Context of Climate Change

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Abstract. The article describes the current problems of small indigenous peoples of the Russian Arctic in the context of climate change, the main of which are: the food problem, the problem of transport accessibility, the problem of economic activity and the problem of health. Because of global warming due to the increase in the average annual temperature, there is a high probability that the above-mentioned problems will only increase and significantly affect all life support systems of small indigenous peoples of the Russian Arctic. The article uses analysis and synthesis, induction and deduction to show the interconnection and mutual influence of the existing problems on the economic activity and health of small indigenous peoples in the conditions of climate change in the Arctic. In order to solve the current problems of the Russian Arctic indigenous minorities in the context of climate change, the following is required: 1) development of laws, strategies and/or state programs for the protection of indigenous peoples to minimize the adverse effects of climate change by sectors (reindeer herding, fishing, hunting and gathering); 2) creation of a system for assessing the impact of climate change on the economic activity and health of indigenous peoples; 3) participation of indigenous peoples in environmental monitoring and implementation of environmental projects in the Arctic.

Keywords: *current problem, indigenous peoples, Arctic, Russian Arctic, climate change, climate*

Introduction

Any climatic changes affect life support systems of the small indigenous peoples of the North, Siberia and the Far East of the Russian Federation (hereinafter referred to as the SIPN): both traditional economic activities, traditional nature management, and living conditions. “According to Roshydromet data, the average rate of increase in the average annual air temperature in Russia in 1976–2018 was 0.47°C over 10 years, which is 2.5 times higher than the average rate of global indicators...”¹ In addition, “to date, it has been established that increase in the average temperature of the Earth’s surface (increase of 0.8°C since the middle of the 20th century) is accompanied by the melting of glaciers, the rise in the level of the world ocean, oxidation and heat-

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For citation: Matvienko I.I. Current Problems of Indigenous Minorities of the Russian Arctic in the Context of Climate Change. *Arktika i Sever* [Arctic and North], 2023, no. 52, pp. 153–166. DOI: 10.37482/issn2221-2698.2023.52.153

¹ Spetsproekt. Kak izmeneniya klimata povliyayut na ekonomiku Rossii [Special project. How climate change will affect the Russian economy]. URL: <https://sber.pro/publication/kak-izmeneniia-klimata-povliiaut-na-ekonomiku-rossii> (accessed 06 March 2023).

ing of sea water ..." ². Global warming poses a significant threat to indigenous peoples in the Russian Arctic.

Changes in climatic characteristics in the Arctic may lead to the loss of traditional knowledge of the indigenous peoples and threaten their way of life, and may also lead to the disruption of economic sustainability in their habitats. A fairly large number of indigenous peoples live in the Russian Arctic, and climate change will primarily affect all their life support systems, including their number. The website of the Ministry of the Russian Federation for the Development of the Far East and the Arctic stated in 2020 that "...the Russian Arctic is home to 19 small indigenous peoples and their heritage sites, which are of historical and cultural value of global significance. According to the All-Russian population census of 2010, the number of indigenous peoples in the Arctic zone of the Russian Federation is 102 thousand people..." ³. The Clean Arctic website says that in 2023 "... out of 2.500.000 people living in the Arctic zone of the Russian Federation, 82.500 are representatives of the indigenous peoples of the North, Siberia and the Far East ..." ⁴. We can already observe a negative trend in the number of indigenous minorities in the Arctic, which is also due to climate change.

As a result of global warming due to the increase in the average annual temperature, there is a high probability that transport and food security problems will arise in the Russian Arctic in the future. Both land (winter roads and crossings will become less reliable), water (melting ice in the Arctic creates icebergs that can be dangerous for ships), and air transport (unstable weather conditions with many snowstorms) are threatening the delivery of food to remote areas. As a result, reduction of sea ice, thawing of permafrost, changes in terrain and shifts in climatic seasons will make the transportation process more complicated. Consequently, the issues of food security and transport accessibility will become relevant in the future. The issue of food security of SIPN has already been raised in the scientific works of Russian scientists, for example, Tatarkin A.I. [1, pp. 573–587], Pilyasov A.N. [2, pp. 64–81], Ragulina M.V. [3, pp. 78–84], Kondrashev A.A. [4, pp. 61–69], Nikitenko M.E. [5, pp. 33–37], etc. The issue of transport accessibility for the indigenous peoples of the North was discussed by a large number of domestic authors, for example, Tatarkin A.I. [6, pp. 99–109], Filippova V.V. [7, pp. 36–42], Kuklina M.V. [8, pp. 453–466], Slipenchuk M.V. [9, pp. 7–27], Sviridov D.V. [10, pp. 46–48], Korobov V.B. [11, pp. 70–77], etc.

² Global'naya klimaticheskaya ugroza i ekonomika Rossii: v poiskakh osobogo puti [Global climate threat and the Russian economy: in search of a special path]. URL: https://energy.skolkovo.ru/downloads/documents/SEneC/Research/SKOLKOVO_EneC_Climate_Primer_RU.pdf (accessed 06 March 2023).

³ Podgotovlen proekt programmy podderzhki traditsionnoy deyatelnosti v Arktike korennykh malochislennykh narodov [A draft program to support traditional activities of indigenous peoples in the Arctic has been prepared]. URL: <https://minvr.gov.ru/press-center/news/podgotovlen-proekt-programmy-podderzhki-traditsionnoy-deyatelnosti-v-arktike-korennykh-malochislenny-28308/> (accessed 06 March 2023).

⁴ Clean Arctic. Peoples of the Arctic. URL: <https://cleanarctic.ru/peoples-of-the-arctic> (accessed 06 March 2023).

Problems of economic activities of indigenous peoples in the context of climate change

Climate change in the Arctic leads to problems in the economic activities of indigenous peoples in such key sectors as reindeer herding, fishing, hunting and gathering (mushrooms, berries and medicinal plants).

Reindeer herding is one of the main types of traditional economic activities of SIPN, which plays a significant role in preserving their culture and identity. Reindeer breeding is the only branch of traditional nature management in which only indigenous peoples are engaged [12, Neustroeva A.B., Samsonova I.V., Malysheva M.S., Semenova L.A., pp. 220–245].

The Arctic territories with the leading reindeer population, according to the Ministry of Agriculture of the Russian Federation for 2016, are the Yamalo-Nenets Autonomous Okrug, the Nenets Autonomous Okrug, the Republic of Sakha (Yakutia) and the Chukotka Autonomous Okrug. They account for 76.7% of the total number of reindeer in the Russian Federation, with the Yamalo-Nenets Autonomous Okrug holding the leading position (46.5% of the total number of reindeer). Reindeer herding is less practiced in the Krasnoyarsk Krai, the Komi Republic and the Murmansk Oblast (16.7%)⁵. The total number of reindeer in the Arctic zone of the Russian Federation is 2.9 million species⁶.

Under the leadership of V.M. Makeev⁷, a study on the impact of climate change on the state and economic use of wild and domestic reindeer populations was conducted in 2011, as a result of which it was proved that significant losses in the number of domestic and wild reindeer were observed during abnormal weather events in the periods especially important for the population cycle: calving, graziery, cattle driving, migration. It is also noted that the number of animals decreases in the phases of climate warming. The study was conducted in the Yamal-Nenets Autonomous Okrug and Taimyr, since the number of deer is maximum there: domestic deer in Yamal, wild reindeer in Taimyr.

The negative trend in the number of domestic reindeer has continued for several consecutive years since 2017. “The average annual decrease in the number of reindeer in the Arctic zone, which accounts for 90% of the population, from 2017 to 2021 is 2.49%...”⁸. The reduction in the

⁵ Proekt Strategii razvitiya olenevodstva Rossiyskoy Federatsii do 2030 goda. Tablitsa № 1 [Draft Strategy for the Development of Reindeer Husbandry in the Russian Federation up to 2030. Table No. 1]. URL: <https://dprea.admnao.ru/media/uploads/userfiles/2021/05/25/.pdf> (accessed 06 March 2023).

⁶ Spetsialisty «Vostokgosplana» nazvali prichiny sokrashcheniya pogolov'ya severnykh oleney [Vostokgosplan specialists named the reasons for the reduction in the number of reindeer]. URL: <https://www.eastrussia.ru/news/spetsialisty-vostokgosplana-nazvali-prichiny-sokrashcheniya-pogolovya-severnykh-oleney/> (accessed 09 March 2023).

⁷ Issledovanie vliyaniya izmeneniy klimata na sostoyanie i khozyaystvennyye ispol'zovaniya populyatsii dikogo i domashnego severnogo olenya dlya realizatsii ustoychivogo razvitiya. Regional'nyy grant [Study of the impact of climate change on the state and economic use of wild and domestic reindeer populations for the implementation of sustainable development. Regional grant]. 2011. URL: <https://www.rgo.ru/ru/grant/issledovanie-vliyaniya-izmeneniy-klimata-na-sostoyanie-i-hozyaystvennyye-ispolzovaniya> (accessed 20 December 2022).

⁸ Spetsialisty «Vostokgosplana» nazvali prichiny sokrashcheniya pogolov'ya severnykh oleney [Vostokgosplan specialists named the reasons for the reduction in the number of reindeer]. URL: <https://www.eastrussia.ru/news/spetsialisty-vostokgosplana-nazvali-prichiny-sokrashcheniya-pogolovya-severnykh-oleney/> (accessed 09 March 2023).

number of domestic reindeer is due to various reasons, not only climate change, but also “... lack of personnel, degradation of pastures, diseases of various etiologies and injuries by predators (attacks by wolves, etc.) ...” [13, Kalitin R.R., pp. 28–39]. In order to preserve reindeer husbandry in the Arctic and ensure employment for indigenous peoples, it is necessary to develop a separate intersectoral program at the federal level to support reindeer husbandry in the Arctic in the context of climate change. Without state support, reindeer herders will lose their traditional source of food and traditional income from the sale of meat, which will negatively affect the economic sustainability of their livelihoods, because the state policy to support reindeer husbandry is one of the conditions for the sustainable development of indigenous peoples in the Arctic, as noted by P.A. Sofronov and Yu.G. Stepanova [14, pp. 96–103].

Climate change, due to the early ice debacle and late ice freeze-up, has also disrupted the traditional routes of reindeer herders; the formation of ice crusts, frequent thaws and freezing of lichens (reindeer moss, the main food for deer) have led to the problem of preserving the reindeer population, which ultimately affects the preservation of meat as a traditional food product and the income of the indigenous peoples when selling it. It is worth noting that reindeer herders have recently faced an urgent problem of choosing routes for nomadic migration, as it is increasingly difficult to predict the weather with cold winds and heavy snowfall. In addition, the transition of reindeer to winter pastures and the extraction of reindeer moss become more problematic due to the later onset of cold weather as a result of global warming. Consequently, the issue of food security (for reindeer meat) in the face of climate change is becoming more acute. The problem is especially urgent for those Arctic territories that have traditionally lived off reindeer herding — the Yamalo-Nenets Autonomous Okrug, the Nenets Autonomous Okrug, the Republic of Sakha (Yakutia) and the Chukotka Autonomous Okrug.

The issue of conservation is not only for deer meat, but also for fish. Fishing also ensures that indigenous peoples maintain their traditional way of life and traditional economic activities. In fact, fishing is the basis of existence for indigenous peoples, as fish is the basis of the diet of SIPN, rich in vitamins and minerals necessary for living in harsh conditions. However, due to global warming in the Arctic, the hydrological regime of rivers is changing, the timing of the summer and autumn fish runs is being disrupted, leading to a shift in the seasons for harvesting certain species of fish and the emergence of idle periods when fishing is not carried out by indigenous peoples. In addition, there are changes in the composition, abundance and species diversity of fish, as well as decrease in the number of marine animals, which deprive SIPN of their usual diet. Indigenous peoples from ancient times caught and harvested fish in a short summer period for the entire long winter, and in the context of global warming, due to fish migration, the timing and volumes of catch were significantly reduced.

According to Zilanov V.K., “climate change has already had a negative impact on the Arctic fishery” [15, pp. 56–70], and the warming of the water temperature led to the growth of boreal fish species. This fact was also confirmed by K.V. Drevetnyak, noting that “a sharp warming in the

Arctic and a decrease in the area of ice greatly affects resources”⁹. The above statements support the fact that climate change has already led to the situation, in which the indigenous peoples are experiencing great difficulties in their traditional way of life and diet in terms of fish.

In addition, there is a legal problem in the Arctic fishing for indigenous peoples, as the current legislation contains gaps and conflicts [16, Dorzheeva V.V., Sleptsova O.Yu., pp. 106–113] in implementation of the rights of SIPN in terms of issuing and obtaining permits for fishing. Indigenous peoples have the right to fish freely and free of charge only to meet their own needs within the framework of traditional fishing [17, Tortsev A.M., Studenov I.M., Semushin A.V., pp. 266–276], but for the purposes of selling fish resources within the commercial fishing, obtaining permits on a general basis is required. Due to gaps and conflicts, it is sometimes problematic for SIPN to obtain permits (quotas) necessary and sufficient for their livelihoods, which directly or indirectly affects their income and health.

Consequently, the problem of food security for fish is also relevant for indigenous peoples in the Arctic, which, due to further climate change, will lead to the consumption of their main food product in smaller volumes and will affect their health due to a lack of essential vitamins and minerals.

The reduction of traditional food products (deer meat and fish), necessary in the difficult climatic conditions of the Arctic, in the diet of the indigenous peoples worsens their immunity and increases heart and respiratory diseases. For example, a study of the diet of the indigenous peoples and its negative impact on immunity was carried out by a group of scientists on the basis of scientific and literary data of the past, as well as the results of modern research in 2013–2018. Scientists interviewed 985 people living in the villages and tundra of the Yamalo-Nenets Autonomous Okrug on the coast of the Ob, Taz and Gydan bays of the Kara Sea¹⁰. The study proved the negative impact on the immune system of a decrease in the diet of deer meat and fish.

The diet of the indigenous peoples of the North includes not only deer meat and fish, but also mushrooms with berries. Gathering and processing of berries, mushrooms and medicinal plants (wild plants) is a traditional type of economic activity of SIPN, carried out within the boundaries of the territories of their traditional nature management. Gathering provides habitual nutrition for indigenous people and allows them to earn money from the processing and sale of wild plants.

Climate change has a multidirectional effect on wild plants: on the one hand, warming has a positive effect on the diversity and productivity of wild resources [18, Mikhailova G.V., pp. 95–106], on the other hand, fires and droughts have become more frequent due to the increase in the

⁹ Drevetnyak K.V. II mezhdunarodnaya konferentsiya «Rybolovstvo v Arktike: sovremennyye vyzovy, mezhdunarodnye praktiki, perspektivy». *Izmenenie klimata negativno vliyaet na arkticheskoe rybolovstvo* [The 2nd international conference “Fishing in the Arctic: modern challenges, international practices, prospects”. Climate change is negatively impacting Arctic fisheries]. URL: <https://bellona.ru/2015/03/18/1426690150-77/> (accessed 06 December 2022).

¹⁰ Uchenye rasskazali o vliyaniy izmeneniy klimata v Arktike na zdorov'e korennykh narodov [Scientists spoke about the impact of climate change in the Arctic on the health of indigenous peoples]. URL: <https://nauka.tass.ru/nauka/12097081> (accessed 15 December 2022).

average annual temperature, which destroy wild plant harvests. Besides, large areas with wild plants are trampled down by domestic and wild deer, forced to migrate due to the loss of their habitual territories as a result of climate warming. In addition, the diversity and productivity of wild resources adversely affects the health of mushroom and berry pickers, as physical activity increases due to an increase in the volume of wild plants.

Consequently, in the future, the issue of food security will also arise for wild plants. Gathering, processing and sale of wild plants are a type of entrepreneurial activity that also requires state support, like reindeer herding and fishing [19, Loginov V.G., Ignatieva M.N., Balashenko V.V., pp. 763–779].

Hunting is a traditional form of wildlife use for the indigenous peoples and an established way of life support in the harsh natural and climatic conditions of the Arctic. In recent years, most indigenous hunters have been hunting animals for family consumption. Climate change in the Arctic leads to a deterioration in the availability of hunting resources and a shortening of the hunting period in the spring, while natural changes are not taken into account when regulating hunting, first of all, when setting its timing [18, Mikhailova G.V., pp. 95–106]. The negative results of hunters are affected by the change of routes and the timing of migration of animals and birds, due to which the commercial catch is lost. Late ice freezing also prevents hunters from gaining timely access to fishing grounds. Consequently, the indigenous peoples of the North have less and less opportunities to feed themselves and earn money by selling the results of their hunting.

Fishing, hunting and gathering are branches of economic activity of the indigenous peoples, climate problems in which are traced in all Arctic territories, but they are especially relevant for the Yamalo-Nenets Autonomous Okrug, the Nenets Autonomous Okrug, the Republic of Sakha (Yakutia), the Chukotka Autonomous Okrug and the Krasnoyarsk Krai, where the majority of Nenets, Evenk, Chukchi and Khanty live; there are less problems in the Republic of Karelia, the Republic of Komi, the Arkhangelsk Oblast and the Murmansk Oblast due to the small number of other SIPN.

Thawing permafrost may force the indigenous peoples to move, as the landscape and terrain are changing dramatically, which leads to subsidence of house foundations. Thus, scientists from NEFU Svinoboev A.N. and Neustroeva A.B. conducted a study in which they noted strong subsidence of house foundations in the in the river regions of Central Yakutia due to climate change [20, pp. 28–38]. The scientists came to this conclusion on the basis of a formalized interview with household members and a survey of their residential buildings, houses and courtyards in 2017. House foundation subsidence is primarily relevant for the indigenous peoples of the Republic of Sakha (Yakutia), where more than 300 buildings in the city of Yakutsk have suffered serious damage due to frozen ground subsidence over the past 30 years¹¹. The problem with building

¹¹ Vozdeystvie izmeneniya klimata na rossiyskuyu Arktiku: analiz i puti resheniya problemy. WWF Rossii [Impact of climate change on the Russian Arctic: analysis and solutions to the problem. WWF Russia]. URL: http://www.arcticandnorth.ru/upload/medialibrary/2af/vozdeistvie_na_arcticu.pdf (accessed 09 March 2023).

foundations is also critical in the Yamalo-Nenets Autonomous Okrug (Tiksi), Krasnoyarsk Krai (Dudinka, Norilsk), Chukotka Autonomous Okrug (Pevek) and Nenets Autonomous Okrug (Amderma).

Not only the problem of house foundations subsidence is a consequence of permafrost thawing, roads also suffer from summer thawing, as the ground surface is not perfectly flat and the ground subsides unevenly. Consequently, the maintenance and construction of roads and buildings in the future will become quite costly and will contribute to the migration of the indigenous peoples to more comfortable places to live, which will affect the economic sustainability of the territories.

Thus, the traditional economic activities of indigenous peoples are the most important basis for their livelihood and a significant factor influencing the preservation of their traditional way of life, language and culture. Changes in the traditional way of life of the indigenous peoples of the Russian Arctic are primarily influenced by:

- shift of climatic seasons;
- terrain changes;
- "... change in the area of settlement and migration of commercial animals;
- changes in snow cover and river ice parameters, availability and structure of pastures;
- increase in the infection of animals, birds and fish, displacement of northern species by representatives of the fauna and flora of other regions, etc." ¹²

In the context of climate change, the economic activity and living conditions of the indigenous peoples of the North are under threat, which requires immediate support from the state in relation to the indigenous peoples for further sustainable development of all life support systems.

Health problems of indigenous peoples in the context of climate change

Negative changes in all sectors (reindeer herding, fishing, hunting and gathering) in the future will affect not only the economic activity of the indigenous peoples of the Russian Arctic, but also their health. Because of climate warming, traditional ways of life and nutrition have to be changed. The health of the Nenets, Evenk, Chukchi and Khanty is at risk, as they are the most numerous peoples of the Russian Arctic. According to the 2020 All-Russian Population Census, about 47.000 Nenets predominantly live in the Yamalo-Nenets Autonomous Okrug, the Nenets Autonomous Okrug, the Krasnoyarsk Krai and the Arkhangelsk Oblast. About 28.000 Evenk live in the Republic of Sakha (Yakutia) and the Krasnoyarsk Krai, about 13.000 Chukchi live in the Chukotka Autonomous Okrug, and about 10.000 Khanty — in the Yamalo-Nenets Autonomous Okrug ¹³.

¹² Boyakova S.I. Vliyaniye izmeneniya klimata na vedeniye traditsionnogo obraza zhizni i traditsionnoy khozyaystvennoy deyatel'nosti v mestakh traditsionnogo prozhivaniya korennykh malochislennykh narodov Severa [The impact of climate change on the traditional way of life and traditional economic activities in the places of traditional residence of indigenous peoples of the North]. URL: https://www.s-vfu.ru/universitet/rukovodstvo-i-struktura/instituty/unesco/news_detail.php?SECTION_ID=&ELEMENT_ID=101173 (accessed 08 December 2022).

¹³ Rosstat. Itogi Vserossiyskoy perepisi naseleniya 2020 goda. Tablitsa 17 [Rosstat. Results of the 2020 All-Russian Population Census. Table 17]. URL: https://rosstat.gov.ru/vpn_popul (accessed 09 March 2023).

Due to problems with transport accessibility, the SIPN have problems not only with food security, but also with obtaining qualified medical care, and with the delivery of medical goods [21, Revich B.A., pp. 395–408]. It does not contribute to a decrease in mortality and morbidity of the indigenous peoples, but, on the contrary, provokes their increase. In addition, one should not forget that the life expectancy of the indigenous peoples of the North is lower than the all-Russian indicator throughout the country [22, Bogoyavlenskiy D.D., pp. 14–17].

The indigenous peoples, whose mortality significantly exceeds the average level in Russia, may get additional injuries due to ice thinning [23, Revich B.A., pp. 11–16]. Traumatic injuries are the cause of a significant number of deaths among indigenous peoples as a consequence of untimely receipt of medical and drug assistance due to problems with transport accessibility. The increase in accidents associated with a decrease in the safety of movement due to changes in the parameters of ice and weather conditions is a medical threat in the new reality for SIPN. The availability of healthcare facilities, the provision of hospitals with modern diagnostic equipment, the level of qualifications and the number of doctors and paramedical personnel in the Arctic settlements directly affect the health of the indigenous peoples. A decrease in the number of doctors, a reduction in medical facilities, outdated medical equipment and difficult transport accessibility of qualified medical care adversely affect the health of people living in difficult natural and climatic conditions of the Arctic. This situation is especially relevant for the indigenous peoples of the Yamalo-Nenets Autonomous Okrug, the Republic of Sakha (Yakutia) and the Chukotka Autonomous Okrug. The problem of health is aggravated by the long distances and difficulties of traveling in these Arctic territories, since it is very difficult for residents of remote Arctic settlements to reach a medical facility at any time of year, especially in the off-season.

Climate warming in the Arctic has a direct impact on the level of infectious morbidity of indigenous peoples and natural focal diseases. The risk of infectious diseases is increasing: tick-borne encephalitis, tick-borne borreliosis, tuberculosis, viral hepatitis, parasitosis, etc. There is already a significant increase in tick-borne encephalitis in the Arkhangelsk Oblast and the Komi Republic due to climate warming¹⁴. The growth of especially dangerous natural focal diseases (tularemia, anthrax, cholera, smallpox, plague, West Nile fever, etc.) significantly increases the mortality rate of indigenous peoples. Clear examples are a large-scale anthrax epidemic in 2016 in the Yamal-Nenets Autonomous Okrug¹⁵ and an outbreak of tularemia in 2017 in the Republic of Karelia¹⁶.

It is also worth noting that climate change is increasing the risk of natural disasters (floods and forest fires), which provoke certain infectious diseases (for example, intestinal infections and

¹⁴ Sluchaev kleshchevogo entsefalita v Komi i Pomor'e stalo bol'she [Cases of tick-borne encephalitis in Komi and Pomorie have increased]. URL: <https://tass.ru/obschestvo/4155577> (accessed 09 March 2023).

¹⁵ Ochag sibirskoy yazvy na Yamale lokalizovan [The outbreak of anthrax in Yamal has been localized]. URL: <https://www.interfax.ru/russia/521600> (accessed 09 March 2023).

¹⁶ V Karelii za dva goda rezko vyroslo chislo zaboлевshikh tulyaremiy [In Karelia, the number of cases of tularemia has increased sharply in two years]. URL: <https://ptzgovorit.ru/shortread/v-karelii-za-dva-goda-rezko-vyroslo-chislo-zaboлевshih-tulyaremiy> (accessed 09 March 2023).

tick-borne diseases). All of the above diseases do not contribute to reducing mortality among the indigenous peoples and increasing their life expectancy.

Conclusion

The food problem, the problem of transport accessibility, the problem of economic activity and the problem of health are a tangle of modern problems of the indigenous peoples of the Russian Arctic in the context of climate change, which need to be addressed immediately. But these are not all the problems. Changes in all life support systems of SIPN due to climate warming also give rise to interpersonal conflicts, depression and other forms of social stress that affect the socio-psychological adaptation of the indigenous peoples to modern realities. Conflicts and stress among indigenous peoples have a negative effect not only on their psychological state, but also on their physical health. We should not forget about the state of the environment, which is the territory of the traditional nature management of SIPN. Environmental pollution and climate changes are interrelated, which directly affects the economic activity and health of the indigenous peoples.

As noted previously, the situation with the economic activities of the indigenous peoples and their health is very different in different Arctic regions in the context of climate change. The health of the Nenets, Evenk, Chukchi and Khanty in the Yamalo-Nenets Autonomous Okrug, the Republic of Sakha (Yakutia), the Chukotka Autonomous Okrug, the Nenets Autonomous Okrug and the Krasnoyarsk Krai is under threat. Infectious and natural focal diseases due to climate warming are already observed in the Yamalo-Nenets Autonomous Okrug, the Arkhangelsk Oblast, the Republic of Karelia and the Komi Republic. There is a huge problem with building foundations due to frozen ground subsidence in the Republic of Sakha (Yakutia), the Yamalo-Nenets Autonomous Okrug, the Krasnoyarsk Krai, the Chukotka Autonomous Okrug and the Nenets Autonomous Okrug. The development of reindeer breeding in the Yamalo-Nenets Autonomous Okrug, the Nenets Autonomous Okrug, the Republic of Sakha (Yakutia) and the Chukotka Autonomous Okrug, where reindeer breeding is the basis of traditional economic activity, causes difficulties. Fishing, hunting and gathering are branches of economic activity of the indigenous peoples of the North, subject to climate change, which can be observed in all territories of the Arctic zone of the Russian Federation to a greater or lesser extent.

In order to solve modern problems, it is necessary:

- firstly, to develop laws, strategies and/or state programs for the protection of the indigenous peoples of the Russian Arctic, required to minimize the adverse effects of climate change by sectors (reindeer herding, fishing, hunting and gathering);
- secondly, to create a system for assessing the impact of climate change on the economic activity and health of the indigenous peoples of the North;
- thirdly, to involve indigenous peoples in monitoring the state of the environment and implementing environmental projects in the Arctic.

Without government support, the livelihood of the SIPN is under threat, since the sustainable development of the indigenous peoples directly depends on the solution of existing problems.

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*The article was submitted 18.01.2023; approved after reviewing 04.03.2023;
accepted for publication 13.03.2023*

The author declares no conflicts of interests