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Increasing the Multiplier Effect of the Agro-Industrial Complex in the Northern Region: New Guidelines for Strategic Development [*]

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Abstract. The article discusses the problems of increasing the multiplier effect of the agro-industrial complex of the Komi Republic as a result of investment, as well as ways to accelerate the economic growth of its spheres and individual enterprises. The problems of motivation to increase capital investments in order to increase production and competitiveness of marketable products remain without due attention. The aim of the study is to substantiate the transition of the agro-industrial complex of the Komi Republic to an innovative and investment path of development, to more active methods of using advanced technologies and resource provision of investments, increasing the share of the intellectual component in their composition. The subject of the study is to determine the level of the multiplier effect of the agro-industrial complex of the Komi Republic as a method for assessing its effectiveness and competitiveness. Research methods — quantitative assessment of the effectiveness of total costs, scientific abstraction, analysis and synthesis, systems approach, historical and logical method, statistical observations. The article reveals the main trends of the multiplier effect in the agro-industrial complex of the Komi Republic. It is proposed to increase the multiplier effect of the agro-industrial complex for business entities to focus on the tasks of coordinating the flows of available investment resources.
Keywords: *Agro-industrial complex, Komi Republic, strategy, investment, output, multiplier effect, competitiveness, efficiency, growth, ratio.*

Introduction

We proceed from the position that the multiplier effect regulation of the agro-industrial complex of the region contributes to its sustainable long-term development and eliminates random errors in the long-term strategic development of agro-industrial spheres.

Due to the spread and strengthening of the digital economy within the agro-industrial complex in the Komi Republic, the high level of competition in the regional food market, instability in the world ones and Western sanctions against the Russian Federation, investors' uncertainty about the effectiveness of their investments increases. The relevance of their request to assess the multiplier effect of investment in the agro-industrial complex of the Komi Republic is growing.

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We proceed from the assumption that investments are a basic element in the development of the agro-industrial complex of the Komi Republic, a key factor in increasing its share in meeting the needs of the population in food, improving its competitiveness and strengthening the financial stability of organizations of the regional agro-industrial complex. In this regard, the increase in the multiplier effect (multiplier coefficient) of the agro-industrial complex (AIC) of the region is one of the indicators of its investment climate.

We understand the multiplier effect as the dependence between the increase in gross product (gross income) of an economic unit and the increase in investment. Quantitatively, the multiplier effect is expressed through the investment multiplier — a coefficient reflecting the ratio between the volume of output or income received, on the one hand, and the amount of investment, on the other hand. As a rule, the multiplier is more than one.

The analysis of the multiplier effect of investments allows to determine the directions of more effective use of investments by identifying the competitive advantage of investments, improving the coordination and organizational components of economic activity, enhancing the balance of capital, land, climatic, labour and marketing resources.

Estimation of multiplier effect of investments involves generalization or detailed elaboration of consistently arising investment cycles, which allows increasing the level of regulatory activity of the state and business organizations in market processes.

In the regulation of market processes aimed at eliminating spontaneous and unforeseen violations of the proportionality of material and cash flows, the most important role is assigned to the regulation of proportionality between production potential and output. An emphasis on output leads to its decline in the long term, while an emphasis on potential leads to a slowdown in the turnover of capital and working capital of economic organizations. Ultimately, the imbalance between capacity and output leads to instability in the commodity, financial and labour markets.

We agree with O. Melyukhina and I. Khramova that regional food markets are currently facing the loss of mutually beneficial ties at the regional level between producers and buyers of food products due to territorial specialization of production, improvement of transport and supply and marketing infrastructure, enhancement of storage conditions of food resources [1, Melyukhina O., Khramova I., p. 398].

In our opinion, the strategy of investment development of the Komi Republic up to 2035 is developed in a fragmented way. In addition to geological exploration and mining, the key areas of development of the Komi Republic include the development of agriculture and farming [1]. The following districts with a promising specialization in the sphere of agro-industrial complex have been identified: municipal district (MD) “Kortkerosskiy”, MD “Sysolskiy”, MD “Koigorodskiy”, MD “Syktyvdinskiy”. The Strategy sets the goal to form a strong economy with an attractive investment

[1] O strategii sotsial'no-ekonomicheskogo razvitiya Respubliki Komi na period do 2035 goda. Postanovlenie Pravitel'stva Respubliki Komi ot 11 aprelya 2019 g. № 185 [On the Strategy of Socio-Economic Development of the Komi Republic for the Period up to 2035. Decree of the Government of the Republic of Komi dated April 11, 2019 No. 185].

climate in the region. The task was set to increase the level of self-sufficiency of the Komi Republic in basic foodstuffs with an appropriate level of quality and safety to the following levels: milk and dairy products — 35.3%, meat and meat products — 47.7%, potatoes — 100%, vegetables — 38.7%, the preservation of the reindeer livestock in agricultural organizations is expected to be at the level of 21 thousand. However, investments in the agro-industrial complex of the region have been determined without proper detailing and coordination across regions.

An assessment of the multiplier effect from investments in the agro-industrial complex of the region will contribute to a more complete version of the Investment Development Strategy of the Komi Republic.

Literature review on boosting and spreading of economic growth during the investment cycle, investment multiplier and accelerator

Thomas Aquinas saw the fulfillment of social and religious duties as an impetus for the growth of wealth [2, Thomas Aquinas].

Mercantilists considered trade to be the main factor of economic growth. The difference between the inflow and outflow of gold specifies the relationship between the impetus and the spread of economic growth in trade itself [3, Lapteva E.V.].

Physiocrats saw the relationship between the impetus and the spread of economic growth in the growth of land productivity [4, Drozdov V.V.], A. Smith — in the division of labour, as well as in the absolute and relative advantages of exchange [5, Smith A., p. 110].

K. Marx defined the impetus of capitalist economic growth as the desire of capitalists to increase profits and increase the output of means of production in order to attract more workers [6, Marx K., Engels F., p. 596].

G.A. Feldman believed that the growth rate of national income is determined by capital expenditures for expanding production and their ability to increase the volume of national income according to the formula:

$$T = \frac{dНД}{dt} \cdot \frac{I}{НД}, \text{ where (1)}$$

T= economic growth rate;

$dНД$ – increase in national income per unit of time; dt — time; I— investments in the expansion of production; $НД$ — national income.

The rate of economic growth is directly proportional to the effect of investments and the share of investments in national income [7].

M. Kalecki proposed the following formula for revealing the nature of the economic growth impetus:

$$P+W= C_w + C_p + I, \text{ where (2)}$$

P — gross profit of capitalists; W — total wages of workers; C_w — consumption of workers; C_p — consumption of capitalists; I — investments in the expansion of production.

The gross income of society is divided into consumption of capitalists, consumption of workers and investment [8, Kalecki M.]

At the centre of Frisch's analysis of national economic growth is the multiplier-accelerator. The multiplier expresses the causal relationship between the initial change in investment and subsequent changes in demand. The equation in the relationship between national income and investment is as follows:

$$Y_t = cY_{t-1} + I_t, \text{ where (3)}$$

Y_t — income in period t; c — coefficient of propensity to consume; I_t — investment in the period t in the expansion of production.

Changes in capital investment cause changes in income.

The consumption equation is as follows:

$$C_t = cY_{t-1}, \text{ where (4)}$$

C_t — consumption in period t; c — coefficient of propensity to consume (share of consumption in national income); Y_{t-1} — national income in the previous period.

According to the principle of acceleration, any increase / decrease in income causes an increase / decrease in capital investments. Formally, it can be written as follows:

$$I_t = v(Y_t - Y_{t-1}), \text{ where (5)}$$

I_t — investment of the period t; v — acceleration coefficient, based on the marginal capital / product ratio according to the production function.

The combined action of the multiplier and the accelerator can be written as follows:

$$Y_t = cY_{t-1} + I_t + v(Y_{t-1} - Y_{t-2}) \text{ (6)}$$

The formula for the combined action of the multiplier and the accelerator shows that the income dynamics has a wave-like character. When v = 1, the oscillations are uniform, at v> 1, the oscillations become stronger, at v <1, the oscillations become fainter.

The multiplier-accelerator mechanism reflects a hypothetical economy which is far from the real one [9].

J. Hicks believes that fluctuations in income growth are uniform, since income movements in any direction cannot continue indefinitely. They run into barriers that income cannot cross. Income reaches the maximum level, is pushed away from it and starts moving in the opposite direction [10, Hicks J.R.].

E. Domar characterizes the relationship between the impetus and the spread of economic growth by the equation:

$$\frac{Y_{t+1}-Y_t}{Y_t} = \frac{I_{t+1}-I_t}{I_t} = \alpha\sigma \text{ (7)},$$

where

Y — income; t — period; I — investment; α — marginal propensity to save; σ — potential average public investment productivity.

The growth rate of national income is directly proportional to the product of the marginal propensity to save and the average productivity of investment [11, Domar E.].

R.F. Harrod's model of the impulse and spread of economic growth is as follows:

$$\frac{Y_t - Y_{t-1}}{Y_{t-1}} = \frac{Y_{t-1} - I_{t-2}}{Y_{t-2}} = \frac{S}{C_r - S}, \text{ where (8)}$$

Y — income; t — period; S — increase in production capabilities per unit of investment; C_r — marginal capital / product ratio.

There is a limit to income growth that, once achieved, tends to be constantly reproduced. However, if this tendency is violated, the equality of supply and demand is also violated.

In R. Solow's model, employment growth is taken as the impetus for economic growth. The economy strives for full employment and thus causes economic growth. Formally, R. Solow's model has the following form:

$$\frac{dK}{dt} = s\,F(k,1) - nk, \text{ where (9)}$$

$\frac{dK}{dt}$ — capital growth per unit of time; s — savings rate; F(k,1) — output per person employed; n — growth in number of workers; k — capital per person employed.

The increase in capital due to employment growth is directly proportional to the productivity of one worker and the savings rate adjusted for the growth in the number of workers and the amount of capital per worker.

The savings rate that gives the maximum consumption level is called the optimal savings rate. The formula for the optimal savings rate is as follows:

$$s^* = \frac{k^{**}}{f(k^{**})} \cdot \frac{df(k^{**})}{d(k^{**})}, \text{ where (10)}$$

s^* — optimal savings rate; k^{**} — capital-to-labour ratio per unit of effective labour; k — amount of capital per employee.

The optimal savings rate is equal to the capital elasticity of output.

In the long term, the main factor of economic growth is the development of machinery and technology. It gives an increase in the efficiency of labour and capital without an increase in employment [12, Solow R.M.].

In J. Mead's model of economic growth, savings are the result of economic growth. The model has the following form:

$$\frac{sY}{K} = \frac{Ql + r}{1 - U}, \text{ where (11)}$$

sY — savings; k — capital; l — labour growth rate; r — growth rate of national income, determined by the formula

$$r = \frac{\Delta Y}{Y}, \text{ where (12)}$$

r — growth rate of national income; ΔY — increase in national income;

Y — national income; Q — total labour product.

It is determined by the formula:

$$Q = \frac{F_L L}{Y}, \text{ where (13)}$$

F_L — marginal product of labour; L — quantity of labour; Y — income.

U — share of capital in national income. It is determined by the formula

$$U=\frac{F_K K}{Y}$$

F_K — marginal product of capital; K — mass of capital.

The share of savings in total capital is directly proportional to the mass of labour product and is inversely proportional to one minus the share of the product of capital in the national income [13, Mead J.].

Profit/savings make oscillatory movements. Profit / savings depend on the marginal productivity of labour and the marginal productivity of capital. If the marginal productivity of capital grows, it runs into an obstacle and turns back, causing fluctuating movements in profit (savings).

If the rate of capital accumulation becomes stable, the national income grows at a rate equal to (Ql + r) / (1-U). This growth of national income remains constant over time. The higher the income level, the greater the propensity to save [14, Pesenti A. pp. 835–836].

D.M. Keynes saw investment as the main impetus for economic growth. This can be written down as follows:

$$\frac{\Delta Y}{Y}/\frac{\Delta I}{I}=\frac{\Delta Y}{Y}\cdot\frac{Y-C}{\Delta Y-\Delta C}=\frac{1-\frac{C}{Y}}{1-\frac{dC}{dY}}, \text{ where (14)}$$

Δ — growth; Y — national income; I — investments; C — consumption.

Economic growth increases or decreases depending on how consumption increases or decreases: in a greater or lesser proportion than income [15, Keynes J.M., p. 193].

L. Balcerowicz and A. Zhonca believe that the main impetus for economic growth is the country's institutional system. Institutions are understood as all non-material and relatively stable factors that are external to a person and are able to influence his or her behaviour. A distinction is made between institutions that are responsible for economic vulnerability and resilience, and those that create a concentration of systemic development forces. The main acceleration institutions are property rights, the level of property protection, the degree of competition between producers, and the fiscal policy of states.

Economic growth occurs on the basis of innovation, but institutions can restrain or, conversely, accelerate economic growth [16, Balcerowicz L., Zhonca A., p. 56–61].

J.Yu. Stiglitz focuses on income distribution when analyzing the relationship between push and spread of economic growth. A simple redistribution of income from the rich to the poor can increase the wealth of a society, since the rich may lose less utility than the poor gain. The sum of utilities from redistribution may increase [17, Stiglitz J. Yu., P. 100].

Overview of publications on investing in agriculture in the Far North

E.V. Kudryashova, L.A. Zarubina, I.A. Sivobrova draw attention to the need to form bioeconomy and bioindustry in the Arctic zone [18].

The state authorities of the Komi Republic are actively helping the region's investment development in agriculture. According to the Resolution of the Government of the Komi Republic dated October 31, 2019 No. 525 "On the State Program of the Komi Republic "Development of Agriculture and Regulation of Agricultural Products, Raw Materials and Food Markets, Development of the Fishery Complex of the Komi Republic", the volume of investment in fixed capital in agriculture of the Komi Republic is expected to increase by 36.5% by 2025 [2].

In 2019, the degree of depreciation of fixed assets in crop and livestock production in the Komi Republic amounted to 40.2%, the share of fully depreciated fixed assets of commercial organizations (excluding small businesses) in the region's agriculture was 9.4%, the renewal rate — 7.0% [3].

In 2019, the degree of depreciation of fixed assets in crop and livestock production in the Komi Republic amounted to 40.2%, the share of fully depreciated fixed assets of commercial organizations (excluding small businesses) in the region's agriculture was 9.4%, the renewal rate — 7.0% [4].

V.A. Ivanov, V.V. Terentyev, I.S. Maltseva consider it necessary to constantly modernize the fixed assets of producers of agricultural products, raw materials and foodstuffs in the Komi Republic. The authors believe that it is necessary to increase the renovation rate of fixed production assets; in particular, it is important to introduce from 600 to 100 cattle-breeding facilities annually [19].

A.S. Ponomareva considers it necessary to increase the state's contribution to financing innovative activities in the agro-industrial complex of the Komi Republic, in particular, to compensate for the losses of agricultural producers due to rising prices for gasoline, diesel fuel, electricity, gas, mineral fertilizers, machinery, seeds, and concentrated feed [20].

A. Nikitin believes that the development of agriculture in the Far North and the Arctic will continue on the basis of experimental technologies (greenhouse farming, hydroponics). This will require a lot of investments. These investments are justified if the country wants to bring people back to the Arctic and regions of the Far North [5].

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[2] Postanovlenie pravitel'stva respubliki Komi ot 31 oktyabrya 2019 g. № 525 «O gosudarstvennoy programme Respubliki Komi «Razvitie sel'skogo khozyaystva i regulirovaniya rynkov sel'skokhozyaystvennoy produktsii, syr'ya i prodovol'stviya, razvitie rybokhozyaystvennogo kompleksa Respubliki Komi» [Decree of the Government of the Komi Republic dated October 31, 2019 No. 525 "On the state program of the Komi Republic "Development of agriculture and regulation of agricultural products, raw materials and food markets, development of the fishery complex of the Komi Republic"].

[3] Doklad «Sotsial'no-ekonomicheskoe razvitie Respubliki Komi v 2019 g.». Syktyvkar, Ministerstvo ekonomiki Respubliki Komi. 2020. S. 45 (77 s.) [Report "Socio-economic development of the Komi Republic in 2019". Syktyvkar, Ministry of Economy of the Komi Republic. 2020. S. 45 (77 p.)].

[4] V Komi v 2019 godu ob"em investitsiy v osnovnoy kapital sel'skogo khozyaystva sostavil 135%. 28 avgusta 2020 g. [In Komi in 2019, the volume of investments in the fixed capital of agriculture amounted to 135%. August 28, 2020]. URL: https://kominform.ru/news/202852 (accessed 01 March 2021).

[5] Nikitin A. Zona surovogo zemledeliya [Zone of harsh agriculture]. Parlamentskaya gazeta [Parliamentary newspaper]. URL: https://ww.pnp.ru/social;/zona-surovogo-zemledeliya-html (accessed 01 March 2021).

N.V. Voroshilov considers it necessary to develop various forms of cooperation of agricultural producers in the implementation of investment activities [21, Voroshilov N.V.].

However, we should state that there is no consensus on the advisability of developing investment activities in the agricultural sector of the Arctic and the Far North.

In Alaska, 95% of food is imported from abroad and from other parts of the United States. The average growing season has increased by 45% over the past 100 years. It takes 60 hours to deliver fresh produce from California to Anchorage. The delivery of fresh produce from Anchorage to remote settlements in Alaska takes another 7 days. In Alaska, agriculture itself takes place, with enthusiastic single farmers developing agriculture. The number of farms increased by 62% from 2007 to 2014. These farms sell products directly to consumers. As of 2014, the USDA has subsidized the construction of greenhouses in the amount of $4 million. However, the issue of investment in Alaska agriculture remains controversial [6].

We have not found any researchers explicitly disagreeing with investment in Arctic and Far North agriculture. But indirectly, the existence of such an opinion and its strength is evidenced by the following fact: on April 15, 2009, the Office of the Federal Antimonopoly Service in the Komi Republic (Komi OFAS of Russia) found the republican Ministry of Agriculture and Food to be in violation of the Law "On Protection of Competition". Eighteen antitrust cases were initiated. It was claimed that in 2007–2008, the Ministry provided state assistance in the form of budget subsidies to the regional agricultural enterprises without the consent of the antimonopoly body. This is a violation of Article 20 of the Law "On Protection of Competition" dated July 26, 2006 No. 135-FZ. Assistance was provided for 18 types of subsidies. Separate proceedings were initiated by the Komi Administration of the Federal Antimonopoly Service for each failure to agree with the Komi Administration [7].

The decision of the Office of the Federal Antimonopoly Service for the Komi Republic dated April 15, 2009, was invalidated by the Arbitration Court of the Komi Republic [8].

N.V. Rodnina shows that the traditional branches of the agro-industrial complex of Yakutia do not show investment activity [22].

Research materials

The analysis performed to determine the multiplier effect in agriculture in the Komi Republic for 2010–2018, calculated on the basis of formula (1), shows that in some years the multiplier coefficients are unstable, they range from -0.6 to 0.4. This indicates unstable (unsustainable) fi-

[6] Vopreki klimatu. Alyaska aktivno razvivaet sel'skoe khozyaystvo 30.09.2017 [Against the climate Alaska is actively developing agriculture 09/30/2017]. URL: https://propozitsya.com/vopreki-klimatu-alaska-aktivno-selmskoye-hozyaystvo (accessed 01 March 2021).

[7] Minsel'khozprod Respubliki Komi priznan vinovnym v narushenii antimonopol'nogo zakonodatel'stva. 15.04.2009. [The Ministry of Agriculture and Food of the Republic of Komi was found guilty of violating the antimonopoly law. 04/15/2009]. URL: https://komi.fas.gov.ru/news/7206.28.02.2021 (accessed 01 March 2021).

[8] Reshenie Arbitrazhnogo suda Respubliki Komi ot 02.03.2010 po delu № A29-3700/2009 [Decision of the Arbitration Court of the Republic of Komi dated March 2, 2010 in case No. A29-3700/2009]. URL: https://zakon-region3.ru/39247/ (accessed 28 February 2021).

nancing of investments in agriculture in the region. Over the specified period, with a significant variation in investments in fixed assets (from -37.7 to +68.7%), the production of agricultural products in some years fluctuated from minus to plus, fluctuations occurred in the range from 2.4 to 28.0% (Table 1). It should be noted that the positive index of production is to a greater extent associated not with an increase in the physical volume of production, but with an increase in value due to an increase in prices.

The investment effect multiplier can be determined by the formula

$$M = \frac{\Delta Выпуск_{с/х}}{\Delta Инвестиции_{с/х}} \quad (15)$$

Where M — multiplier,

$\Delta Выпуск_{с/х}$ — output dynamics in comparison with the previous year;

$\Delta Инвестиции_{с/х}$ — investment dynamics in comparison with the previous year.

Indicators of the investment effect multiplier by type of activity “Agriculture and provision of services in this area” in the Komi Republic for 2010–2018 are reflected in table 1.

Table 1

Dynamics of production and investments by type of activity "Agriculture and provision of services in this area" in the Komi Republic for 2010–2018 [9], % to the previous year

Indicator / years	2010	2011	2012	2013	2014	2015	2016	2017	2018
Investments in fixed assets of the sector “agriculture and the provision of services in this area” in % to the previous year	68.7	23.2	93.1	37.7	52.1	24.4	29.5	22.2	32.2
Agricultural output in % to the previous year	28.0	90.0	18.1	14.5	24.4	24.2	84.1	13.3	33.2

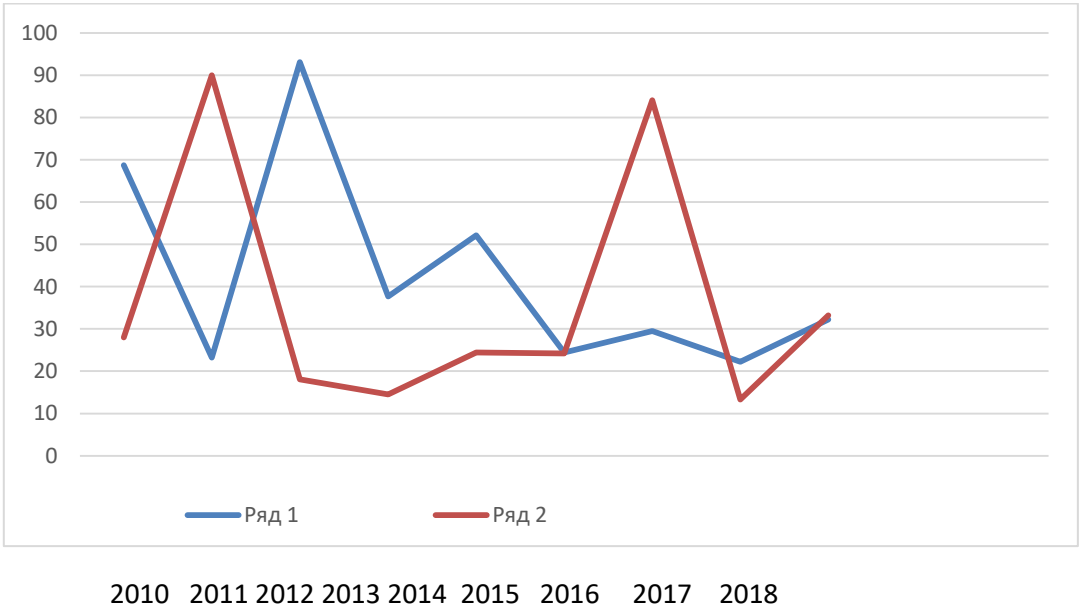

Fig. 1. Row 1 — Investments in fixed assets of the sector “agriculture and the provision of services in this area”, in % to the previous year; Row 2 — Agricultural production in % to the previous year.

[9] Authors' calculations according to the data of the State Statistics Committee of the Republic of Komi.

As shown in table 1, the dynamics of agriculture in the Republic of Komi in 2010–2018 was unstable. In 2010, the agricultural production index in relation to 2009 was 28%, in 2016, compared to 2015, — 84.1%. Investments in 2010, compared to 2009, increased by 68.7%, and in 2012 — by 93.1%.

Dynamics of the investment effect for 2010–2018 in the Komi Republic is shown in table 2.

Table 2

Dynamics of the investment effect for 2010–2018 in the Komi Republic

Indicator / years	2010	2011	2012	2013	2014	2015	2016	2017	2018
Multiplier, units (agricultural output / investments in fixed capital	0.4	0.38	0.19	0.38	0.46	0.99	2.85	0.59	1.03

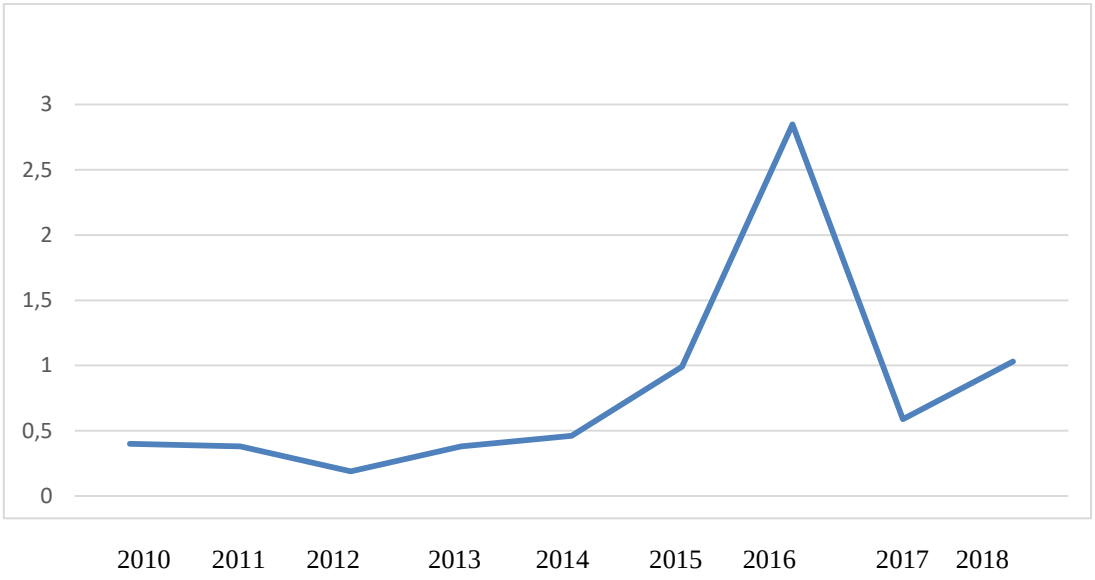

Fig. 2.

The effect of investments in agriculture and services in this area ranged from 0.4 in 2010 to 2.85 units in 2016. The dispersion of agricultural products for the period 2015–2018 amounted to 848.1. The variance of the multiplier was 1.526. The dispersion in the dynamics of investments was even greater — 1771.1.

The correlation coefficient between the dynamics of output and investment in fixed assets in agriculture for 2010–2018 amounted to 0.117, i.e. it is very low.

The sum of percentage growth for 2010–2018 of agricultural output accounted for 301.8%, the amount of investment growth percent was 214.5%. The total investment multiple was 1.4.

The unsustainable dynamics of investments in the agrarian complex and the output of agricultural products require managing the multiplier effect from investments. The task of balancing the investment cycle — ensuring the normative proportionality of investments in fixed assets and obtaining a corresponding income in subsequent years. It is important to use modern and high-tech management technologies, such as project management, program management, risk management, and the application of key indicators.

It should be emphasised that investment is just a prerequisite for production growth. Today, most of the technologies introduced into production in the agro-industrial potential of the region are industrial technologies, weakly affected by digitalization; investments are accompanied by only minor modifications of previous technologies. At the same time, insufficient attention to improving the quality of land and raising the professional level of workers also does not contribute to an increase in the multiplier effect of investments. The poor state of land and labour resources leads to a decrease in the return on investment resources used.

However, there are examples of successful implementation of investment projects in the agricultural sector of the Komi Republic. These include investment in the development of greenhouse facilities in Sosnogorsk. Direct investments in the greenhouse complex in the city of Sosnogorsk were initially assumed to amount to 3.2 billion rubles. Construction began at the end of 2017.The complex was put into operation in the fourth quarter of 2018. 5th generation greenhouses were built. The complex is specialized in growing vegetables; deep automation of plant growing processes has been developed. Test sowing was carried out on March 28, 2019. The assets of the "Sosnogorsk" Greenhouse complex as of 31.12.2019 amounted to 4.068 million rubles, revenue for 2019 — 68 million rubles. Net assets as of 31.12.2019 amounted to 83.4 million rubles, net profit for 2019 — 170 thousand rubles. The average number of employees in 2019 was 54 people. The long-term goal is to achieve production of 10 thousand tonnes of vegetables per year [10].

Integral efficiency index

We propose to introduce the integral efficiency index. It is based on the assumption that the investment multiplier depends on return on assets, land productivity, and labour productivity.

The general view of the integral efficiency index in the presence of N initial indices will take the following form:

$$Jиэ = (И_{ФО}+И_{ЗО}+И_{ПТ}) / 3, \text{ where: (16)}$$

Ифо — change in capital productivity (ratio of gross output and used fixed assets);

Изо — change in the ratio of gross output to investments in land improving;

Ипт — change in the ratio of gross output to the wages fund of employed workers.

Labour productivity growth results in lower wage intensity of production, which compensates for the decrease in capital and land productivity and, ultimately, provides a multiplier effect of investment. This effect is fully compensated if weights of capital productivity and land productivity indices are equal.

We transform formula (16) into the formula

$$Киэ = (К_{ФО}+К_{ЗО}+К_{ПТ}) / 3, \text{ where: (17)}$$

[10] Finansovoe sostoyanie OOO «Teplichnyy kompleks «Sosnogorskiy» [Financial condition of Sosnogorsky Greenhouse Complex LLC]. URL: https://www.test/firm.ru/result/1108023823_ooo-teplichnyy-kompleks-sosnogorskiy (accessed 23 March 21).

ККиэ — combined integral efficiency coefficient of investment defined in terms of asset productivity, land productivity, and labour efficiency;

Кфо — capital productivity (ratio of output and fixed assets);

Кзо — ratio of output to land area;

Кпт — ratio of gross output to number of employees (labour productivity).

We have established the following value of the combined coefficient of integral investment efficiency in the Komi Republic for 2010–2018.

Jиэ = (0.901+0.842+1.504) / 3= 1.082

ККиэ= 0.901+0. 842+1.504=1.082

The closeness of ККиэ to unity shows that the growth of labour productivity as a result of investment almost completely compensates for the decrease in asset and land productivity.

During the years of economic reforms since 1991, the number of workers in the agricultural and services sectors in the Komi Republic has decreased by almost 10 times. However, positive shifts are still observed in a small range of individual large enterprises.

In order to increase the efficiency and competitiveness of the regional agro-industrial complex, individual investment projects should be integrated into investment clusters with full-fledged technical and technological complexes corresponding to modern agro- and biotechnologies. It is necessary to transform the structural composition of the fixed capital of economic entities towards digitalization and an increase in the share of mental labour, respectively, to increase human capital of the agro-industrial complex of the Komi Republic [23, Mustafaev A.A.].

E.V. Chaplygina and S.N. Mikhaylov believe that in the practice of managing agricultural enterprises it is necessary to use a wide range of methods for assessing competitiveness, taking into account the marketing environment of the regional food market [24, Chaplygina E.V., Mikhaylov S.N., p. 23].

The level of acuteness of competition depends on the availability of production and social infrastructure facilities, the use of effective methods of management, therefore, the development of investment strategy for economic entities should begin with the analysis of the competitive environment and identification of free market niches. At the same time, it is important to carry out predictive calculations of changes in natural and climatic conditions.

It should be noted that the agro-industrial complex sectors are characterized by low investment attractiveness. However, long-term investment in agricultural enterprises is necessary due to the need to ensure food security and sustainability of the region's food market.

For the period 2010–2018, fluctuations in the growth of investments in fixed assets between individual types of agricultural activities ranged from 1.5 to 15 times (according to our estimates). Thus, a retrospective analysis shows a significant volatility of investment in agricultural enterprises. This leads to the conclusion that there is no scientific basis for the investment needs of the economic entities in the agro-industrial complex of the region. This is a gap in the investment strategy of the region, and it needs to be filled.

There is a periodic revaluation of operating production assets in the agricultural enterprises of the region. We believe that this practice of revaluing fixed assets causes artificial price increases.

The revaluation of exploited assets means an increase in the statutory fund of enterprises. However, the regular revaluation of fixed assets complicates the calculation of depreciation deductions for enterprises, thereby making it difficult to generate investment resources and increase the effect of investments.

For example, the physical volume of used machinery and equipment decreased in the Republic of Komi in 2010–2018. It was 23.8% for tractors of all brands, 27.4% for tractor trailers, 24.4% for ploughs, 41.6% for sowing machines, 50.1% for cultivators, 10 and 60% for solid and liquid organic fertilizers, respectively. The number of grain and potato harvesters was reduced by 2.4 times, spreaders of solid mineral fertilizers — by 60.5%, sprayers and dusters — by 77%. Over the years, the energy capacity in the agricultural sectors of the republic has decreased from 302.1 to 266.3 thousand hp or 13% (authors' estimations). The decrease in the physical volume of the used machinery and equipment is explained by such factors as increased competition among suppliers in the food market, decline in agricultural output in the region, and drop in investment activity. Under these conditions, although the investment effect remains positive, it is unstable.

The condition and movement of livestock in agricultural organizations of the republic should be considered unsatisfactory. For 2010–2018, apart from reindeer breeding, a decrease in the number of all types of animals is observed: horses — 1.7 times, sheep — 10.3 times, birds — 1.4 times, and pigs — by 10%. A decrease in the number of livestock was also observed in households during this period. The number of cattle decreased by 1.5 times, including cows — by 1.6 times, pigs — by 2.1 times, sheep — by 1.3 times, goats — by 1.2 times, horses — by 1.3 times. The number of birds has noticeably increased (1.3 times), the number of bee colonies has increased from 252 to 375 units, or almost 1.5 times (authors' estimations).

If we pay attention to the gross harvest of crop products, we can see that all types of agricultural products do not have a stable dynamics of development, and in general, the area for sowing is decreasing. Hence, the conclusion is that investment in agriculture in the Komi Republic has so far been accompanied by a noticeable multiplier effect, but it is not sufficient to ensure the competitiveness of agricultural enterprises in the regional market of agricultural and food products.

The way out of this situation is, in particular, as follows: the capital resources of the agro-industrial complex should be assessed not by the cost of their acquisition and use, but based on the assessment of "income-generating" factors, such as access to external regional markets, new types of raw materials processing, new types of cultivated plants, including medicinal ones [24, Chaplygina E.V., Mikhaylov S.N., p. 88].

It should be noted that in terms of production activities, resource turnover and the current system of pricing, taxation, and debt repayment, the agricultural sector of the region's economy

differs significantly from other sectors. This makes it impossible to use in the agricultural sector such a system of pre-calculation, which is used in industry. The system of preliminary calculations of the investment multiplier effect does not give an opportunity to assess the sustainability of the multiplier effect of the agro-industrial complex.

Conclusions and recommendations

1. The new image of the economic life of the agro-industrial complex of the region requires the resumption of an active regime of investment and innovation activities, a transition to expanded reproduction;

2. It is important to consolidate the basic financial and economic principles of investment in legislative acts, differentiated by industries (focus on meeting the needs of the market and the population, efficiency, balance, unity of interests of society, enterprises, workers, development of efficiency standards by branches) [25, Mustafaev A.A., p. 477];

3. Dynamic production growth is possible only on the basis of an increase in investment activity. It occurs in three aspects: intellectualization of production, motivation for investment, compliance with environmental needs;

4. Reduction of inflation “to zero”, increase in the amount of collected taxes, nominal increase in production volumes obscures the real problem: how to ensure sustainable growth of real sectors of the agro-industrial complex of the Komi Republic;

5. Ensuring a high multiplier effect of investments is an important area of regulation of the investment cycle in the agrarian-industrial complex of the Komi Republic;

6. It is advisable to formulate the category of economic responsibility of business entities and state regulation bodies of investment activity in the agro-industrial complex for the state of the investment cycle [26, Begzhanov B.N.]. The economic responsibility of business entities and regulatory bodies in the investment sphere refers to organizational, financial and tax measures to increase the stability of the investment sphere in the agro-industrial complex of the Komi Republic.

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The Food Security Doctrine: Regional Aspects *

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Abstract. The article discusses issues of the state of the agro-industrial complex of the region in connection with the need to fulfill the targets approved in January 2020 by the new edition of the Food Security Doctrine of Russia. The purpose of the study is to identify the problems of the northern region and to develop proposals for changing the situation for the successful implementation of the Doctrine. The scientific problem discussed in the article relates to the determination of the methodological foundations of the most relevant areas of agrarian policy for the current state, ensuring the implementation of the Food Security Doctrine of Russia and increasing the level of self-sufficiency of the region. The author's research develops the theory of determining the socio-economic role of effective interaction between authorities of different levels, scientific justification of the prospects for the further development of the agro-industrial complex due to the transformation of the industry development management system, innovative approach to training personnel for the agricultural sector, and introduction of new technological solutions as highly relevant. It has been established that such factors as the lack of effective interaction between the state and municipal authorities, and also the lack of young qualified personnel, whose competence meets the modern requirements, have a negative impact on the economy of agricultural production and food self-sufficiency of the region as a whole. The article draws attention to the underestimated opportunities for improving the situation in the agro-industrial complex due to a change in the scheme of interaction between the state and municipal authorities during the implementation of the program-targeted method of regulation and strategic planning, as well as the creation of a scientific and educational complex in the region for the training of competitive specialists for the agro-industrial complex. In order to improve the situation, it is necessary to consolidate the formation of a regional agricultural system on the basis of a set of similar systems developed by the municipalities themselves, based on the relevant climatic conditions, financial, material and labor resources of these areas. Besides, it is necessary to start the training of personnel for the agroindustrial complex system from school, applying new educational standards, based on scientific developments.
Keywords: *food self-sufficiency, northern region, agro-industrial complex, municipality, training, project management, agrarian policy.*

Introduction

Food supply of remote areas is a complex multi-factorial problem concerning the availability of food, its accessibility to the local population and the ways of using this food in nutrition [1] and one of the main tasks of the national state policy. This is most relevant for the northern and arctic regions of the Russian Federation. At the same time, it must be considered from two perspectives. Firstly, it has a direct impact on the health of the population, and secondly, it affects the financial and economic indicators of the regional and municipal economy. It should be taken into account that the food system of the northern regions consists of the internal capabilities of agricultural production, the potential volume of food from hunting and fishing activities, and the import of food from other regions and countries [2]. Therefore, modern agrarian policy should create conditions for growth of agro-industrial production and thereby increase the level of regional food

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self-sufficiency. The task is not simple, since agriculture should also be preserved as a vital sector, which performs an important socio-economic function in the countryside, the basis of the traditional way of life of the rural population.

The food supply of territories in Russia, such as the Republic of Sakha (Yakutia), is a rather complex and multifactor problem and consists of internal agricultural production capabilities and food imports from other regions and even countries.

At the same time, food supply for the population has always been the primary state task, since it affects all aspects of the economy and social policy. Thus the issue of increasing the share of regional production in the food supply of the population remains relevant for a long time. This problem formed the basis of the new Food Security Doctrine of Russia, approved by the Decree of the President of the Russian Federation on January 21, 2020.

Despite the fact that there have been a lot of scientific works and publications on the implementation of modern national agrarian policy in recent years, they do not sufficiently reflect the objective nature of the development of the agrarian sphere and the ongoing transformation in rural areas [3].

Over many years of reform, the management structure of the agro-industrial complex in the Republic of Sakha (Yakutia) has changed; now municipal districts and urban okrugs have been vested with certain powers to support agricultural production. This is especially relevant for those areas, where large industrial projects that involve the inflow of additional population are already being implemented or are planned to be implemented.

In this regard, it is necessary to consider the following questions: “How effective is the new system of interaction between the state and the municipality, and what else needs to be done to achieve the objectives of the new Food Security Doctrine?”

Research methods

The study within the framework of the system approach to the analysis of socio-economic phenomena in the agrarian sector and development of rural areas included the review of individual indicators that characterize the trends of agro-industrial complex of the northern and arctic region on the example of the Republic of Sakha (Yakutia), as well as factors that affect the formation of effective functioning of agriculture and the entire agro-industrial complex.

The methodological basis was formed by the works of Russian and foreign scientists in the field of agriculture, regional economics, state and municipal administration.

In order to solve the tasks set in the study, the author used scientific methods, different at each stage. Thus, the theoretical base was formed by searching for scientific publications and other scientific literature in international and Russian databases. In addition, websites of scientific organizations dealing with food security and food self-sufficiency in the regions were reviewed.

The study has been conducted using statistical data from the Territorial Body of the Federal State Statistics Service, as well as information from state executive authorities of the Republic of Sakha (Yakutia).

However, it is necessary to note the complexity of assessing the effectiveness or efficiency of regional and / or municipal authorities, as well as the state agrarian policy as a whole. This is primarily due to the complexity of measuring this result, as well as the presence of both objective and subjective factors. Therefore, the assessment is made on the basis of comparing the actually operating mechanisms for regulating the industry and the final results obtained, including socio-economic parameters.

Research results and their analysis. Current state of the agro-industrial complex of the Republic of Sakha (Yakutia)

The food security of a country or a separate region is the main direction of agricultural policy; specific features of agricultural production are the explanation for the increased attention of most countries to the agricultural sector of the economy. Taking these circumstances into account, many market economies have developed multi-channel support systems for agriculture [4]. The agri-food sector is not self-sufficient and requires significant investments. However, there is simply no other alternative for food production in the modern economy [5]. At the macro level, agricultural production does not fit into the modern model of a market economy and can develop successfully only with state support and integration reforms [6].

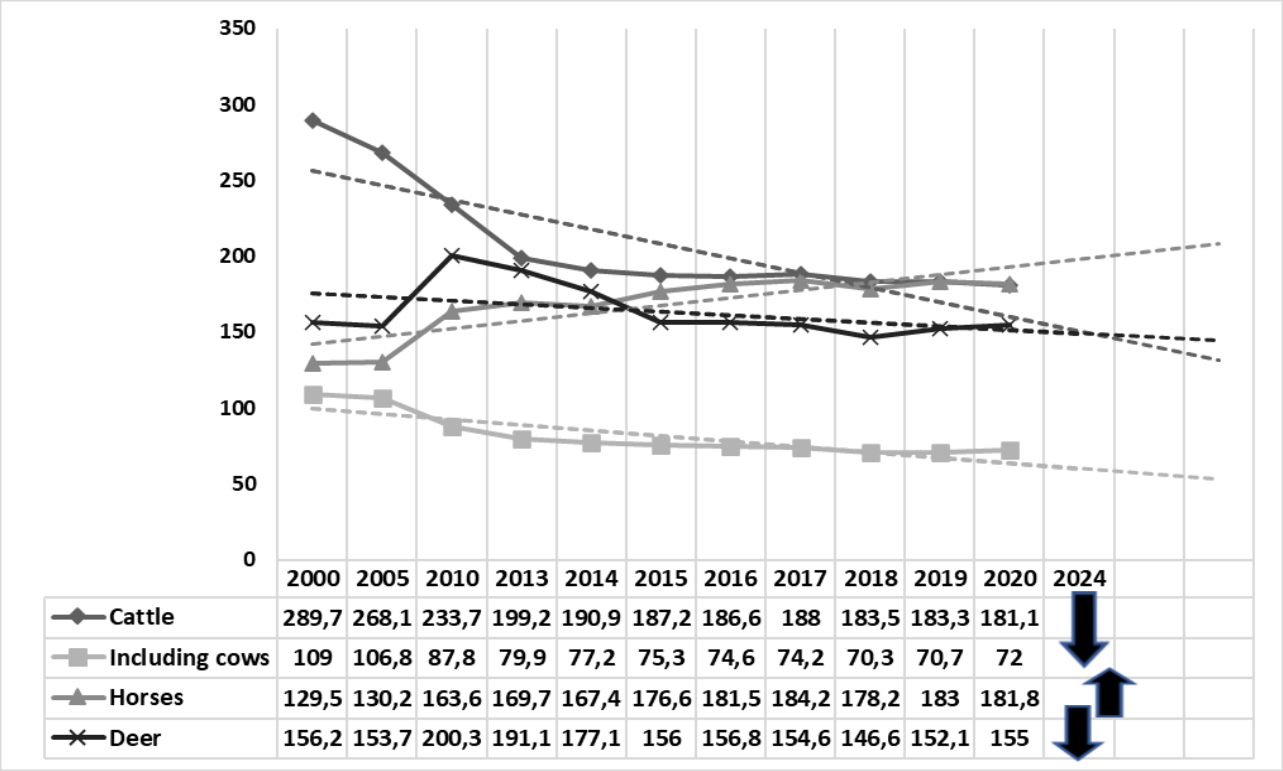
Over the past two decades, the Republic of Sakha (Yakutia) has taken lots of measures to restore the volume of agricultural production, which allowed stabilizing it slightly by increasing production in household farms (Table 1).

Table 1

Indices of production of agricultural products by categories of farms, %

Year	Farms of all categories	Including		
		Agricultural enterprises	Peasant farm enterprises, IE	Population farms
2000	98.4	100.6	97.9	97.8
2005	103.6	106.6	118.6	97.9
2010	97.0	121.8	91.9	93.1
2015	97.2	91.0	99.0	98.8
2016	101.2	98.8	104.1	100.5
2017	103.1	103.4	104.3	102.2
2018	100.1	101.3	97.5	101.1
2019	101.7	102.1	97.5	104.1
2020	100.6	99.8	101.1	100.6

However, the agro-industrial complex retains the instability of the livestock of farm animals (Fig. 1), which negatively affects the level of food supply in Yakutia.



	2000	2005	2010	2013	2014	2015	2016	2017	2018	2019	2020	2024
Cattle	289,7	268,1	233,7	199,2	190,9	187,2	186,6	188	183,5	183,3	181,1	
Including cows	109	106,8	87,8	79,9	77,2	75,3	74,6	74,2	70,3	70,7	72	
Horses	129,5	130,2	163,6	169,7	167,4	176,6	181,5	184,2	178,2	183	181,8	
Deer	156,2	153,7	200,3	191,1	177,1	156	156,8	154,6	146,6	152,1	155	

Fig. 1. Dynamics of change and forecast of the number of certain types of farm animals in the Republic of Sakha (Yakutia) at the end of the year, thousand heads.

The analysis of agricultural indicators reveals the shortcomings in forecasting and strategic planning of the agricultural sector development. Studies have shown that the main forecasting method in determining the strategy for the agricultural development in Yakutia is the extrapolation method, i.e. the transfer of past and present development trends to the future. The application of this method leads to errors and significant deviation from the forecast indicators. Thus, for the period from 2012 to 2020, the forecasting accuracy for meat production was 9.1%, and for milk — 5.4%.

In this regard, the urgent task of the industry is the need to build management work on a new methodological and procedural basis, ensuring an increased level of forecasting and analytical approach not only to determine the indicators of industry development, but also to identify its internal problems and work out effective management decisions.

The dynamics of the Republic's agriculture reflects the need to form new approaches to the development of the agroindustrial complex in order to increase the level of food security in the region. It is necessary to create such a mechanism of state regulation, which would make it possible to comprehensively solve the issues of increasing the volume of agricultural production with their direct connection with the development of rural areas [7].

Main directions of solving the problems of the agro-industrial complex of the Republic of Sakha (Yakutia)

Increasing the volume of agricultural production and, consequently, increasing the level of food self-sufficiency in the region should be achieved by changing the relationship between the regional and local authorities.

One of the mechanisms for managing the agro-industrial complex in many regions of the Russian Federation is the practice of developing the Agricultural Management System. A similar practice exists in Yakutia. In fact, this System should "legitimize" a set of measures aimed at organizing expanded reproduction by improving organizational, economic, technological, social and other mechanisms and measures. The basis of the System, of course, should be a section on the strategic development of agriculture and assessment of the possible results of its implementation. In fact, as experience shows, the system of farming in the region is currently limited to the analysis of the current state and the mechanisms used in the current period, not relying on the totality of farming systems in districts and urban districts.

At the same time, the development of industry is considered only from the position of state support and without sufficient analysis of the differences of agricultural producers by territorial location, technological level, availability of qualified personnel, especially in the subjects of small forms of entrepreneurship, etc.

To solve these problems in the republic, it is necessary to develop an effective management system, which would create conditions for increasing and expanding the production of competitive food products. In order to change the situation, the author proposes to modify the planning process for the development of the agro-industrial complex of the republic and, first of all, to assign the formation of agricultural systems to municipalities (urban districts), as shown in Fig. 2.

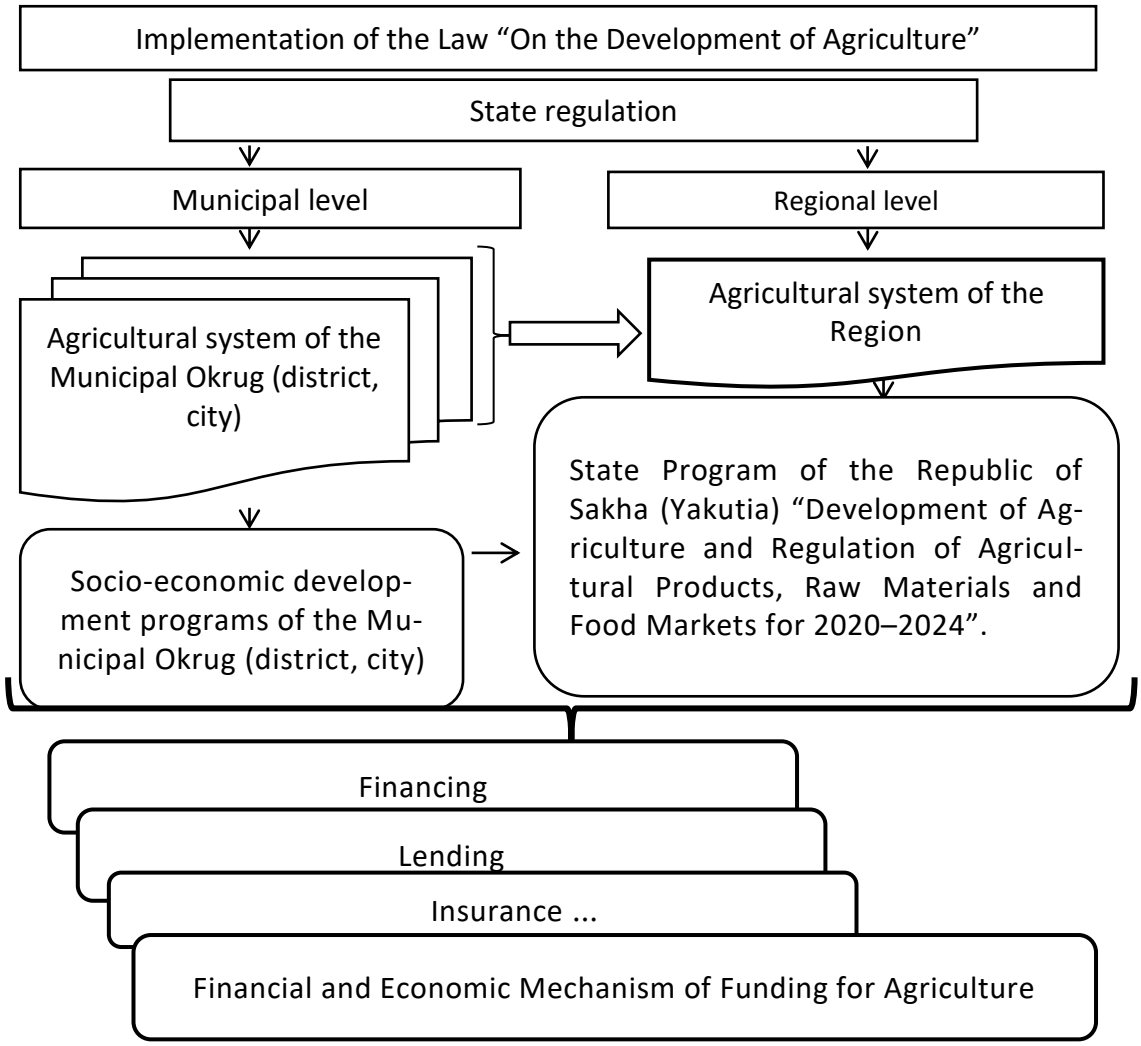


Fig. 2. Block diagram of interaction between state and municipal authorities in determining the ways of development of the agro-industrial complex of the region.

It is necessary to change the overall system of forecasting the development of the agroindustrial complex with a transition to the use of combined methods, including the “foresight” method.

At the same time, not only the subjects and municipalities, but also the federal center should be involved in solving the issues of food supply.

For example, it is advisable to determine the threshold values of the level of food self-sufficiency for subjects, located in the Arctic, and to provide the missing part of food (deficit) at the expense of federal compensation resources [8].

Agriculture is a vital sector both in the municipal economy and social life in rural areas [9]. One job in agriculture accounts for eight to ten jobs in other sectors of the economy, such as industry, transport, trade [10].

When planning the development of the agro-industrial complex, the territorial structure of the regional economy cannot be ignored, especially where the implementation of large industrial projects and possible population growth are expected. The points of industrial growth and the

creation of agro-industrial zones in these territories should be taken into account in municipal agricultural systems.

The Strategy for Sustainable Development of Rural Areas of the Russian Federation for the period up to 2030 defines the creation of favorable socio-economic conditions for rural areas to fulfill their national functions and to solve the tasks of territorial development [11]. Socio-economic policy for the development of rural areas should be considered as a sphere of mutual responsibility of the state, municipalities, science, business and civil society for ensuring a decent quality of life [12].

The difficult situation with the outflow of qualified personnel from rural areas is exacerbated by the reduction in the number of trained agriculture specialists. In 10 years (from 2009 to 2019), the output of specialists in the programs of higher education "Agriculture and Fisheries" decreased by almost 50% in the republic (table 2).

Table 2

Personnel training for 2009–2019

	2009	2010	2011	2012	2013	2014	2016	2017	2018	2019
Total	6688	6498	6856	6027	6935	7138	6432	6136	4323	4306
Areas of training: agriculture, forestry and fisheries	375	436	458	365	351	376	340	301	252	265

By Decree No. 2209 of August 16, 2013, the President of the Republic of Sakha (Yakutia) declared 2014–2018 as the Five–Year Plan for Sustainable Rural Development. In order to create comfortable living conditions in rural areas, increase the participation of citizens living in rural areas in the implementation of socially significant projects and form a positive attitude towards rural areas and rural lifestyles, it was determined that the implementation of effective and simplified mechanisms for the preparation and consolidation of qualified personnel in rural areas will be based on targeted training and distribution of graduates of professional educational organizations and educational institutions of higher education in specialties in demand in rural areas through the state order.

Meanwhile, the planned indicators for the employment of graduates are not fulfilled annually. Thus, in 2017, only 57% out of 200 planned agricultural specialists went to the villages.

Human resources have a significant impact on the development of rural areas and the agricultural sector. Knowledge has become a key economic and dominant resource, source of competitive advantage [13]. The modern agrarian reform shows that of all the directions of modernization of the agro-industrial complex, personnel is the most difficult. The problem of young professionals' retention in the village remains. The situation is unfavourable with the management of the industry. There is a lack of managers who meet the new requirements, i.e. who are able to develop and implement new technologies both in production and management of the industry.

The Strategy for Sustainable Development of Rural Areas of the Russian Federation for the period up to 2030 defines the task of creating favorable socio-economic conditions for rural areas to fulfill their national functions and solving the tasks of territorial development. Furthermore, foreign companies forecast that in the medium and long term the main focus of scientific and technological development will be on information, bio- and nanotechnology. Therefore university graduates should be equipped with the competencies necessary for the innovation economy without additional retraining. Deep integration of science, education and production is necessary [14].

The improvement of the personnel training system should begin with special education in schools, in specialized agricultural classes of rural schools.

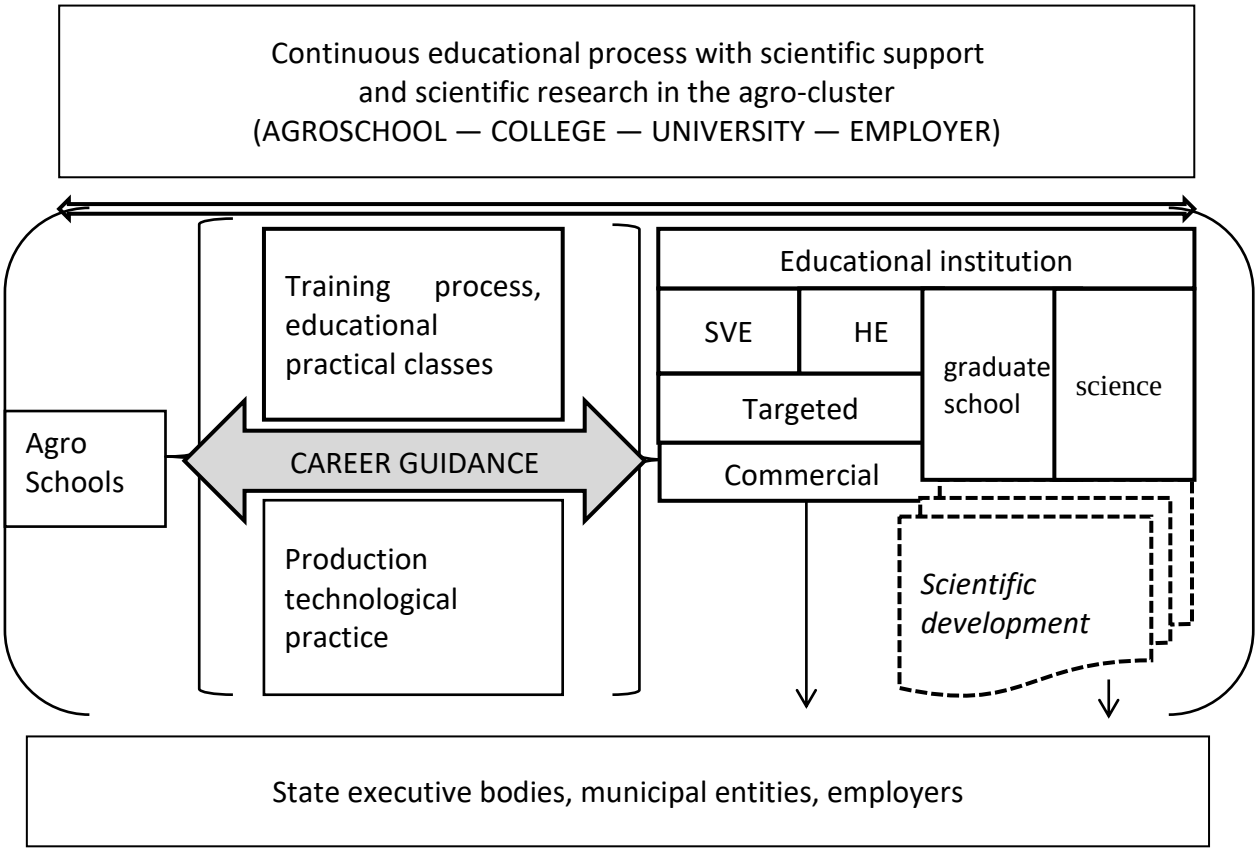


Fig. 3. Block diagram of the scientific and educational complex.

The personnel problem can be solved by creating a scientific and educational complex (SEC), which includes all stages of specialist training, starting from a school (agricultural school), ending with the beginning of work with a direct employer — an agricultural producer (Fig. 3). Such complex is a kind of cluster. S. Rosenfeld considered clustering as the basis of modern economic development [15].

Therefore, the strategic task of the SEC is to determine the formation of continuous education with a multi-stage system of training specialists. At the same time, its main advantage is the coordination and continuity of educational programs, their linkage with the real needs of production.

Employers, in turn, become direct customers for educational institutions and set requirements for the specialists they hire. Relations between the enterprises of the agro-industrial complex and the university will provide an opportunity for students to undergo practical training, internships, as well as to develop long-term plans or strategies for the development of an enterprise-employer as a graduate qualification work.

The problems and negative factors considered in the article are not exhaustive. The project management, as the practice and assessment of the President of Russia V.V. Putin showed, is characterized by the realization of the country's national interests. The food security doctrine is also a national project, and the application of effective methods and mechanisms for its implementation can improve the quality and standard of living of Russian citizens.

The principle of project management should be based on the inseparability of the development of rural areas and agriculture. Certainly, the construction of modern housing in rural areas, boiler houses, hospitals, schools, kindergartens and sport facilities should be the measures that provide the population with qualitative and safe food, and also the sustainable development of rural areas. All these measures should help to change the situation and bring the agro-industrial complex out of stagnation. At the same time, all projects should include an innovation component, aimed at genetics, breeding, and new biotechnologies.

Against the background of solving the problem of securing youth in the Far East, new incentives and measures are needed for the employment of local residents and young people at the enterprises of the agro-industrial complex. These should include higher and/or specialized secondary education from public funds, compensation for assignment to work in agricultural organizations similar to the “Zemskiy Doctor” and “Zemskiy Teacher” programs, discounted rates for bank loans and a number of others. These measures should also be included in the relevant projects.

In addition, it is necessary to strengthen the focus of fiscal policy on directing financial resources to achieve the goals defined in the Food Security Doctrine, which has become the main line of state agrarian policy. This is how it is defined in the Food Security Doctrine: “The executive authorities of the subjects of the Russian Federation, in cooperation with the federal executive authorities, implement a single state socio-economic policy in the field of ensuring food security, taking into account regional characteristics” [1].

Conclusion

Changing the situation in the agro-industrial complex requires a transformation in its management system and, accordingly, the development of new models of interaction between the regional and municipal authorities.

[1] Ukaz Prezidenta Rossiyskoy Federatsii ot 21 yanvarya 2020 goda № 20 «Ob utverzhdenii Doktriny prodovol'stvennoy bezopasnosti Rossiyskoy Federatsii» [Decree of the President of the Russian Federation of January 21, 2020 No. 20 "On Approval of the Doctrine of Food Security of the Russian Federation"].

The results of the research have strengthened the author's position in recognizing the need for constructive interaction between the branches of government. The consistency of their positions in the development of the agro-industrial complex is the main condition for positive changes in the agrarian sector and in the development of rural areas. There must be balanced unity of views on the system of forecasting and strategic planning of agroindustrial complex development, as it is defined by Russian Food Security Doctrine.

The successful functioning of the regional agroindustrial complex largely depends on the proper identification of those factors and trends that hinder its effective development. In this connection the measures of regional and municipal programs, agricultural systems should be synchronized that will undoubtedly promote the agrarian sector of the republic to a higher level.

The study also showed the need to reform the agricultural education system and approaches to training personnel for the agro-industrial complex of the region and the country as a whole. There is a need for conceptual training of agrarians starting from school, including agroschools. All levels of education should be included in a single complex according to the scheme "school — secondary vocational education — university — employer" and be aimed at a single result, i.e. to train a competitive specialist.

Summarizing the results of the conducted research, the author identifies the directions contributing to the initial stage of development of the agroindustrial complex and increasing the level of food self-sufficiency:

- strengthening the interaction of state-municipal partnership aimed at improving the efficiency of the agro-industrial complex, with scientific and methodological support of organizational and economic mechanisms of these relations;
- improvement of state management of the agroindustrial complex and transition to project management;
- regionalization of the state policy in the field of agro-education and its orientation to the specific needs of the regional agrarian sector and non-medium agricultural producers.

The results are expected to be applied in the interests of the Republic of Sakha (Yakutia) to improve the efficiency of agrarian sector management.

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Peculiarities of Financing Road Activities in the Arctic Region: the Experience of the Murmansk Oblast *

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Abstract. The article presents the results of a study of the peculiarities of financing the road economy of the Murmansk Oblast — the Arctic region, the development of transport, including road, infrastructure of which acquires particular importance in the light of the implementation of national interests and priority directions of Russian state policy in the Arctic. In the course of work, the author considered the dynamics of spending funds from the Road Fund of the Murmansk Oblast for 2012–2020. It has been determined that the existing volume of financing of the regional road infrastructure does not allow the region to fully implement the tasks of developing road infrastructure and improving the quality of highways (primarily local ones). It is concluded that additional funds are needed to finance the road infrastructure of the Arctic regions, including through the use of public-private partnership mechanisms. The results of the study can be used in the formation of a policy in the field of road facilities in the Murmansk Oblast, as well as in further research on the financial support of road activities and the functioning of road funds.
Keywords: *Murmansk Oblast, arctic region, road facility, road fund, highway.*

Introduction

Financing of road activities is one of the most capacious and significant investments of national importance, since a developed road infrastructure, along with other infrastructure sectors, plays a key role in sustainable economic development [1, Deng T.; 2, Ng C.P. et al.], formation of a favorable investment climate [3, Martinkus B., Lukasevicius K.] and improving the quality of life [4, Berman N.].

Road funds are one of the most common mechanisms for financing road activities in the world [5, Kirk R.S., Mallet W.J.; 6, Kosov M.E.; 7, Dung N. et al.]. In Russia, this mechanism began to be used in the early 1990s at the federal and regional levels [1]. Sources for the targeted off-budget road funds formation were the following: tax on economic entities as users of highways at a rate of 2.5% of their revenues (enterprises engaged in the production of agricultural products were exempted from payment), tax on vehicles purchase, tax on vehicle owners, and tax on the sale of fuels and lubricants. Subsequently, the land tax, excise tax on petroleum products, excise tax on car sales, etc. were also transferred to road funds.

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[1] Zakon RF ot 18 oktyabrya 1991 g. № 1759-1 «O dorozhnykh fondakh v Rossiyskoy Federatsii» (iznachal'no nazyvalsya «O dorozhnykh fondakh v RSFSR») [Law of the Russian Federation of October 18, 1991 No. 1759-1 “On Road Funds in the Russian Federation” (originally called “On Road Funds in the RSFSR”)]. URL: https://base.garant.ru/3958223/ (accessed 20 January 2021).

In 2001, taxes on fuels and lubricants sale and vehicles purchase were abolished [2], which resulted in ceasing of the Federal Road Fund financing and its liquidation. Two years later, the tax on road users, which was the main source of territorial road funds, was abolished as well, and, as a result, their operation was also terminated.

The law "On road funds of the Russian Federation" was abolished in 2005. [3] After that, financing of the road sector was carried out directly from the budget, without the allocation of separate revenue sources [8, Golovanova N.V.; 9, Protasenia S.I.]. The result of the road funds liquidation was a chronic underfunding of the transport industry and, as a consequence, a slowdown in the development of road facilities [10, Korobitsyn T.G.; 11, Konvisarova E.V., Uksumenko A.A.]. Thus, if in 1992–2000 Russia built about 6.1 thousand km of paved roads annually, then in 2001–2009 the average increase was only about 2.85 thousand km per year [12, Afanasyev R.S.].

The revival of the road fund system was initiated in 2011, when Article 179.4 [4] was introduced into the Budget Code, defining road funds as "part of the budget funds to be used for the financial support of road activities in relation to public highways, as well as capital repairs and repairs of yard territories of apartment buildings in residential districts" [5]. After the Federal Road Fund was established on January 1, 2012, regional road funds were created in each constituent territory of the Russian Federation, and since 2013, municipal road funds were created as well. Thus, the system of financing road activities has been restored.

The purpose of this study was to identify the main trends and features of funding road activities in the Murmansk Oblast — the Arctic region, where the development of transport, including road infrastructure, is of particular importance in the light of the implementation of Russia's strategic priorities to create a unified Arctic transport system and integrate it into the country's transport system. [13, Leksin V.N., Profiryev B.N.; 14, Kikkas K., Romashkina E.; 15,

[2] Nalogovyy kodeks RF (Chast' 2) ot 5 avgusta 2000 g. № 117-FZ [Tax Code of the Russian Federation (Part 2) dated August 5, 2000 No. 117-FZ]. URL: https://base.garant.ru/10900200/a9a754f9362cc6d913de8ff6886b8c4c/ (accessed 20 January 2021).

[3] Federal'nyy zakon RF ot 22 avgusta 2004 g. № 122 «O vnesenii izmeneniy v zakonodatel'nye akty Rossiyskoy Federatsii i priznanii utrativshimi silu nekotorykh zakonodatel'nykh aktov Rossiyskoy Federatsii v svyazi s prinyatiem federal'nykh zakonov «O vnesenii izmeneniy i dopolneniy v Federal'nyy zakon «Ob obshchikh printsipakh organizatsii zakonodatel'nykh (predstavitel'nykh) i ispolnitel'nykh organov gosudarstvennoy vlasti sub"ektov Rossiyskoy Federatsii» i «Ob obshchikh printsipakh organizatsii mestnogo samoupravleniya v Rossiyskoy Federatsii». Stat'ya 156 [Federal Law of the Russian Federation of August 22, 2004 No. 122 "On Amending the Legislative Acts of the Russian Federation and Recognizing Some Legislative Acts of the Russian Federation as Invalid in Connection with the Adoption of Federal Laws "On Amendments and Additions to the Federal Law "On General Principles Organizations of Legislative (Representative) and Executive Bodies of State Power of the Constituent Entities of the Russian Federation" and "On the General Principles of Organizing Local Self-Government in the Russian Federation". Article 156]. URL: https://base.garant.ru/12136676/ (accessed 20 January 2021).

[4] Federal'nyy zakon RF ot 6 aprelya 2011 g. № 68 «O vnesenii izmeneniy v Byudzhetnyy kodeks Rossiyskoy Federatsii i otdel'nye zakonodatel'nye akty Rossiyskoy Federatsii» [Federal Law of the Russian Federation of April 6, 2011 No. 68 "On Amendments to the Budget Code of the Russian Federation and Certain Legislative Acts of the Russian Federation"]. URL: https://base.garant.ru/12184487/ (accessed 20 January 2021).

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Korchak E.A., Serova N.A.; 16, Gagiev N.N. et al.]. The main role in solving this complex task is assigned to the Northern Sea Route (NSR) as a key connecting element of the support development zones created in the Arctic zone of the Russian Federation (AZRF), based not only on the administrative-territorial division [6], but also on the functioning of transport and logistics hubs [17, Smirnova O.O. et al.; 18, Samarina V.P., Samarin A.V., Skufina T.P., Baranov S.V.]. Onshore connectivity of the Arctic territories with the rest of the country will be ensured by port infrastructure and "air and land transport communications gravitating to the NSR" [19, Serova N.A., Serova V.A.]. For this purpose, a number of large-scale projects are being implemented in the AZRF to modernize and increase the capacity of seaports, to create transshipment complexes, to build new and to reconstruct existing railways and highways, airport infrastructure, etc. [20, Socio-economic development...]. For example, in the Murmansk Oblast, the reconstruction of the road access to the administrative center of the region with a length of over 15 km has been completed, the sea passenger terminal has been repaired, and the construction of a new terminal for domestic airlines has begun at Murmansk airport. In addition, as part of the implementation of infrastructure projects included in the Advanced Development Zone (ADZ) "Arctic Capital", the region is building a specialised coal transshipment complex "Lavna", a specialised marine terminal for bulk cargo in the port of Murmansk, a sea terminal and a service for fishing vessels and delivering fish products; the technical re-equipment of the Vitino seaport and the Belomorskaya oil depot in the Kandalaksha region began. The implementation of these and dozens of other infrastructure Arctic investment projects requires the consolidation of efforts of all levels of government and the business community to effectively interface the NSR routes with the routes of other types of transport on land, which will ensure the comprehensive development of the Arctic transport system as a whole. In this study, only one aspect of this global task is considered — the development of road transport in one of the Arctic regions, which not only does not reduce its relevance and practical importance, but also determines the groundwork for future research in this area.

Characteristics of the road network in the Murmansk Oblast

Numerous studies [21, Kondratov N.A.; 22, Biev A.A.; 23, Ulchenko M.V., Bashmakova E.P.; 24, Matveev A.S. and etc.; 25, Kozmenko S.Yu., Ulchenko M.V.], including the author's ones [19; 26–27], repeatedly emphasized that the territory of the Russian Arctic, occupying about half of the country's area, lags several times behind the average Russian indicator by the level of availability of motor roads.

[6] The creation of support zones (SZ) is expected in nine subjects that are fully or partially included in the Russian Arctic: in the Murmansk Oblast - the Kola SZ, in the Arkhangelsk Oblast - the Arkhangelsk SZ, in the Nenets Autonomous Okrug — the Nenets SZ, in the Republic of Karelia - the Karelian SZ, in the Republic of Komi - the Vorkuta SZ, in the Yamal-Nenets Autonomous Okrug - the Yamalo-Nenets SZ, in the Krasnoyarsk Krai - the Taimyr-Turukhanskaya SZ, in the Republic of Yakutia (Sakha) - the North Yakutskaya SZ, in the Chukotka Autonomous Okrug - the Chukotskaya SZ.

However, in comparison with other Arctic territories [7], the road network of the Murmansk Oblast can be characterized as sufficiently developed (Table 1). The region is crossed by about 1.17 thousand public roads with a length of 3585.1 km (9.9% of the total length of the AZRF roads), more than 95.2% of which are paved. Of these, 561.2 km are of the federal highway R-21 “Kola” (St. Petersburg — Petrozavodsk — Murmansk), about 2 thousand km — of regional roads, and 971.8 km of local roads. In 2021, two regional roads to multidirectional automobile border crossing points (MABCPs) on the border with Finland — Lotta highway with a length of 228 km (Kola — Verkhnetulomskiy — Lotta checkpoint) and Salla highway with a length of 166 km (Kandalaksha — Alakurtti — Salla checkpoint) will be transferred to federal ownership.

Table 1

Level of the road network development in Russia's Arctic territories, 2020.

	Public roads		incl. paved surfaces	
	Share in AZRF, %	Provision ratio [8]	Share in AZRF, %	Provision ratio [9]
AZRF, including:	-	0.318	-	0.125
Republic of Karelia (Arctic part)	7.4	0.976	16.9	0.869
Komi Republic (Arctic part)	8.2	0.671	5.5	0.175
Arkhangelsk Oblast (Arctic part)	14.4	0.408	19.3	0.214
Nenets Autonomous Okrug	1.1	0.137	2.0	0.101
Murmansk Oblast	9.9	0.347	24.0	0.331
Yamalo-Nenets Autonomous Okrug	7.7	0.135	16.6	0.115
Krasnoyarsk Krai (Arctic part)	8.0	0.180	3.7	0.032
Republic of Sakha (Yakutia) (Arctic part)	37.3	1.291	6.0	0.081
Chukotka Autonomous Okrug	6.0	0.358	6.0	0.142

Despite the fact that the density of highways in the Murmansk Oblast is almost three times higher than the same indicator for the whole AZRF (24.7 km per 1000 km^2 of the region territory versus 7.3 km per 1000 km^2 of the AZRF territory), only about 20 % of the area can be considered transported (Fig. 1):

- along the federal highway R-21 “Kola”, which crosses the oblast from south to north to the Borisoglebsk checkpoint on the border with Norway (Pechenga highway);

[7] Hereinafter, the Arctic territories of Russia are understood as the land territories of the Arctic zone of the Russian Federation (AZRF), which are enshrined in the Federal Law of July 13, 2020 No. 193 "On State Support for Entrepreneurial Activity in the Arctic Zone of the Russian Federation": Murmansk Oblast, Nenets, Chukotka and Yamalo-Nenets Autonomous Okrugs, as well as municipalities of the Republic of Karelia (Kostomuksha, Belomorsk, Kalevala, Kemskiy, Loukhskiy and Segezha municipal districts), the Komi Republic (Vorkuta, Inta, Usinsk and Ust-Tsilemsky municipal district), Krasnoyarsk Krai (Norilsk, Taimyr Dolgano-Nenets municipal district, Turukhansk district, Evenki municipal district), Arkhangelsk Oblast (Arkhangelsk, Novodvinsk, Severodvinsk, Novaya Zemlya, Mezen, Onega, Primorskiy, Leshukonsk and Pinega municipal districts) and 13 municipalities of the Republic of Sakha (Yakutia).

[8] Engel coefficient. Calculated by the author.

[9] Engel coefficient. Calculated by the author.

- along roadways to settlements in the central and western regions of the oblast (the cities of Apatity, Kirovsk, Monchegorsk, Kovdor, etc.), as well as to the Lotta checkpoint and Salla checkpoint.

Fig. 1. Scheme of public roads in the Murmansk Oblast.

The situation in the eastern part of the Murmansk Oblast is completely different — due to the lack of highways, most settlements are connected with the regional center and the centers of municipal districts only by air transport.

Peculiarities of financing road activities in the Murmansk Oblast

In the Murmansk Oblast, the Road Fund (RF) was established in 2012 [10]. Over the eight years of its existence, more than 17.9 billion rubles were allocated to the road infrastructure of the region, the overwhelming part (74.4%) of which was directed to the maintenance and repair of roads (both regional and local) and only 3.9 % for construction and reconstruction. However, while in 2012 the share of funds allocated for the construction of new and reconstruction of existing

[10] Zakon Murmanskoy oblasti ot 17 sentyabrya 2011 g. № 1390-01 «O dorozhnom fonde Murmanskoy oblasti» [Law of the Murmansk region dated September 17, 2011 No. 1390-01 "On the Road Fund of the Murmansk Oblast"]. URL: https://base.garant.ru/16974587/ (accessed 20 January 2021).

roads in the region was 15.2%, by 2019 it decreased to 0.4%. Only in 2020, after the start of construction of a 5-kilometre section of a new four-lane road near Murmansk, the share of funds for this expenditure item increased to 6.1% (Table 2).

Table 2

Dynamics of expenditure of Murmansk Oblast Road Fund for construction (reconstruction) and maintenance and repair of roads [11]

	2012	2013	2014	2015	2016	2017	2018	2019	2020
Funds from the Road Fund used, mln rub	1477.1	1752.7	1864.1	1523.2	2215.3	2374.9	1970.2	3157.1	1646.6
of which aimed at:									
Construction (reconstruction) of roads, mln rub	224.3	9.7	61.9	2.1	188.1	77.4	27.4	12.9	100.0
share in the total amount of funds, %	*15.2*	*0.6*	*3.3*	*0.1*	*8.5*	*3.3*	*1.4*	*0.4*	*6.1*
Repair and maintenance of roads, mln rub	1249.9	1438.8	1644.7	1385.7	1938.3	2116.7	1661.6	2512.3	1244.5
share in the total amount of funds, %	*84.6*	*82.1*	*88.2*	*91.0*	*87.5*	*89.1*	*84.3*	*79.6*	*75.6*

Another noteworthy trend is the reduction in the funds for the maintenance and repair of highways in the region. This mainly affected local roads, as due to the redistribution of funding (in particular, in 2014, a new item appeared in the structure of spending — expenditures on road maintenance facilities) less funds were allocated for subsidies to municipal budgets (Table 3).

Table 3

Structure of Murmansk Oblast Road Fund expenditure, % [12]

	2012	2013	2014	2015	2016	2017	2018	2019	2020
Construction, maintenance and repair of regional roads	81.1	72.2	79.4	85.8	83.2	78.1	79.8	71.5	69.7
Subsidies to municipal budgets	18.7	23.0	15.8	9.6	12.8	16.3	5.9	18.2	16.4
Activities of road facilities	-	-	4.6	4.5	3.6	3.9	13.8	9.7	13.8
Other areas of spending	0.2	4.9	0.2	0.2	0.4	1.8	0.4	0.6	0.2

How the reduction in financing of road activities of the Murmansk Oblast municipalities has affected the quality of local roads is clearly illustrated by the dynamics of the share of roads that do not meet the regulatory requirements in the total length of roads in the region (Fig. 2). Thus, if in 2010 96.2% of local roads in the region met the standards (it is one of the highest indicators not only among the regions of the Russian Arctic, but also in the country as a whole), by 2018 their share decreased by 25.3, accounting for 70.9%.

[11] Compiled and calculated by the author according to the Ministry of Transport and Roads of the Murmansk Oblast.
[12] Compiled and calculated by the author according to the Ministry of Transport and Roads of the Murmansk Oblast.

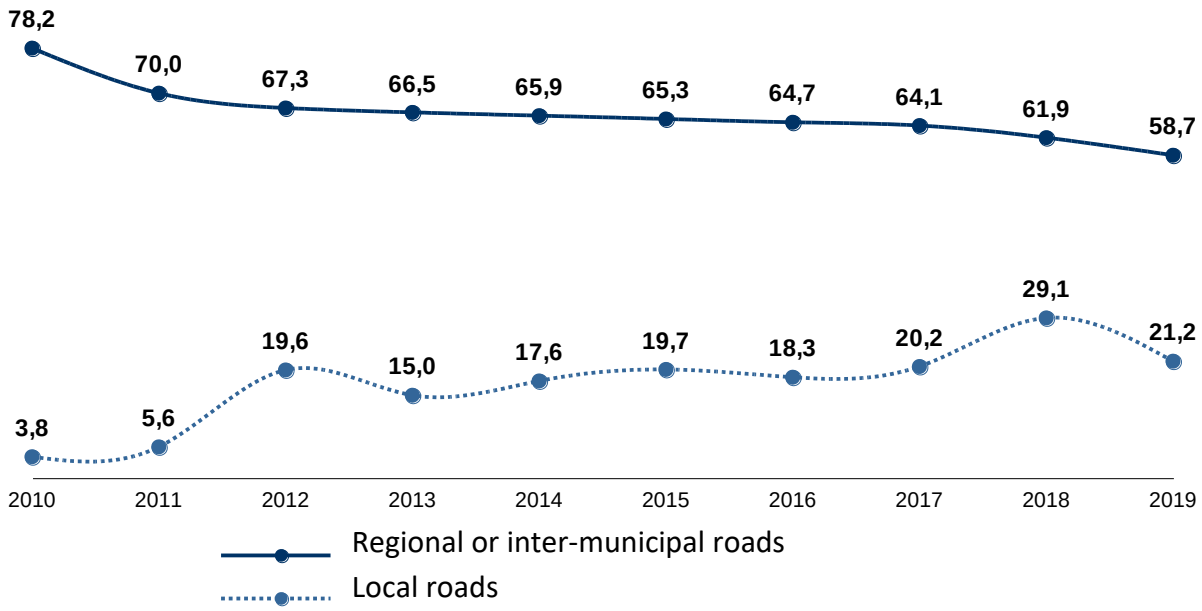

Fig. 2 The share of roads in the Murmansk Oblast that do not meet regulatory requirements, in the total length of highways.

The situation began to change only in 2019, when the national project “Safe and Quality Roads” [13] was launched in the region, one of the main tasks of which is to bring at least 50% of regional highways and 85% of the road network of urban agglomerations to a standard 2024. For these purposes, more than 6.6 billion rubles will be allocated to the budget of the Murmansk Oblast over the entire period of the project implementation. In particular, in 2019–2020, these funds have already been used to repair more than 20 sections of regional roads and 27 objects of the street and road network of Murmansk (part of the Murmansk agglomeration). In 2021, 5 sections of regional roads, more than 30 objects of the urban road network and 3 bridges will be repaired.

Conclusion

The analysis has shown that the current amount of funding for road activities in the Murmansk Oblast does not allow the region to fully implement the tasks of developing road infrastructure and improving the quality of roads (primarily, local ones) in the region. For the regions of the Russian Arctic, which includes the Murmansk Oblast, the problem of underfunding of road activities is exacerbated by the influence of the “Arctic specifics” (huge hard-to-reach areas, extreme climate, etc.), which limits the possibilities of building new roads and causes difficulties in maintaining the roads in a high quality condition. This implies that additional funding

[13] Razrabotan Ministerstvom transporta Rossii vo ispolnenie Ukaza Prezidenta RF ot 7 maya 2018 g. № 204 «O natsional'nykh tselyakh i strategicheskikh zadachakh razvitiya Rossiyskoy Federatsii na period do 2024 goda» [Developed by the Ministry of Transport of Russia in pursuance of the Decree of the President of the Russian Federation of May 7, 2018 No. 204 "On the National Goals and Strategic Objectives of the Development of the Russian Federation for the Period up to 2024"]. URL: https://rosavtodor.gov.ru/about/upravlenie-fda/nacionalnyj-proekt-bezopasnye-i-kachestvennye-avtomobilnye-dorogi (accessed 20 January 2021).

is needed to finance road activities in the Arctic regions, including public-private partnership mechanisms.

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Reindeer Tracking Technologies in the Russian Federation *

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Abstract. Currently, reindeer husbandry actively uses tracking technologies to identify animals. They allow solving the problems of breeding and zootechnical accounting, tracking the movement of animals between herds, and carrying out antiepizootic measures. The electronic databases with individual characteristics of reindeer formed in this process allow speeding up the breeding process, organising breeding work in reindeer breeding, improving the breed and regulating the herd. Keeping an electronic "registration" of calves to their mothers gives the possibility of system functioning of cross-breeding estimation of animals that will undoubtedly increase both productivity and economic efficiency of reindeer breeding as a whole. This article addresses an issue related to reindeer tracking technologies. Attention is paid to radio tracking and satellite tracking techniques. The use of modern methods of chipping animals is considered on the example of various territories of the Russian Federation: the Yamalo-Nenets Autonomous Okrug, the Republic of Sakha (Yakutia), the Trans-Baikal Krai, the Murmansk Oblast, the Krasnoyarsk Krai, the Republic of Karelia, the Arkhangelsk Oblast. The work carried out on deer chipping is considered for various time periods, during which monitoring, programs, projects and other large-scale studies of animal movement paths were carried out. The resulting data can then be processed using mathematical tools, after which conclusions can be drawn about the impact of the environment on reindeer migration routes.
Keywords: *reindeer, tracking technology, modern chipping method, satellite tracking.*

Introduction

The procedure for marking and counting in reindeer husbandry was developed for the purpose of preserving the ancestral habitat and traditional way of life of the indigenous minorities of the North. Currently used Global Positioning System (GPS) collars have significantly improved research into the behaviour of livestock during grazing. Scientists Derek W. Bailey (New Mexico State University, Animal and Range Sciences Department, Las Cruces, NM USA), Mark G. Trotter (Central Queensland University, School of Medical and Applied Sciences, Rockhampton, QLD Australia), Colt W. Knight (University of Maine, Cooperative Extension, Orono, ME USA), Milt G. Thomas (Colorado State University, Department of Animal Sciences, Fort Collins, CO USA) noted that methods developed to improve grazing livestock pathways can now be tracked efficiently and cost-

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effectively using GPS tracking. Ongoing research, according to scientists, has identified genetic markers that are linked to spatial movement patterns of cattle. Researchers argue that recent technological advances can make real-time or near-real-time pasture tracking possible and cost effective [1, p. 81].

The socio-economic effect of introducing GPS collars and adaptive forest management was also confirmed by researchers E. Valinger (Department of Forest Ecology and Management, Swedish University of Agricultural Sciences), S. Berg (European Forest Institute, Finland). T. Lind (Department of Forest Resource Management, Swedish University of Agricultural Sciences). The research was carried out in the Sami village of Nyarke in Boreal, Sweden. The authors noted that the use of GPS tracking allows the Sami to track the location and activity of the reindeer herd, which reduces the risk of accidents and incidents in the field and on the roads for both reindeer and people. Knowledge of the migration routes, as documented by the devices used, provides a better basis for rational management, as well as a basis for consultation with forest landowners in order to create better conditions for the development of reindeer husbandry [2, Valinger E., Berg S., Lind T., p. 941].

In Russia, reindeer husbandry has historically played a significant role for most of the indigenous peoples of the northern territories. In Circumpolar Russia, reindeer husbandry is a constitutional domain of indigenous peoples. V. Vladimirova (Institute for Russian and Eurasian Studies (IRES), Dept. Cultural Anthropology and Ethnology, Uppsala University) conducted an empirical study of the issues of selective breeding on the example of the Evenki reindeer herding enterprise in the village of Surinda, Evenki District, Krasnoyarsk Krai. The author considered the breeding process as a technology of power in Circumpolar Russia [3, p. 250].

Deer tracking technologies are currently widely used in the Russian Federation. Researcher V. Goncharov (Scientific-Research Institute of Agriculture and Ecology of the Arctic) studied the feasibility and effectiveness of implementation of electronic chipping RFID tags in reindeer breeding to identify animals on the example of the Krasnoyarsk Krai [4, p. 63]. The research of I.V. Seredkin is devoted to the introduction of radio telemetry methods for wildlife and satellite tracking programs in the Far East [5, p. 29].

Tracking technologies

The most commonly used deer tracking technologies are radio and satellite tracking.

Radio tracking is based primarily on the use of internal and external transmitters such as radio collars. A transmitter is used (attached or surgically implanted to animal) that sends a signal in the form of radio waves. The transmitter usually uses a frequency in the VHF range, the transmitted pulses are short. A radio direction finding (RDF) receiver gets the signal. The receiver has a directional antenna and a means of displaying the strength of the received signal. In order to track the signal, the scientist follows the animal (on an airplane or ATV) using a receiver.

Satellite tracking is based on a network or group of satellites, each receiving signals from a transmitter mounted on the animal. The combination of signals from all satellites allows not only to determine the location of the animal accurately, but also to track the path of the animal while it is moving. Animal transmitters can also provide data on the physiological characteristics (for example, temperature and habitat use). Satellite networks report territorial movements of animals. Tracking systems such as Argos and GPS are widely used to find the main habitats of moving animals.

Satellite tracking is also possible through the use of acoustic telemetry, which includes the implementation of electronic tags. In this case, the monitored animals are determined in three dimensions.

One of the modern methods of computer modeling of reindeer behaviour is chipping, which makes it possible to form electronic dossiers of animals, contributing to an increase in the efficiency of the operation of farms and reindeer husbandry in general.

This article provides an overview of the technologies used for tracking reindeer in various regions of the Russian Federation, aimed at studying the migration routes of reindeer, plotting data on a map of the investigated area, conducting biological and zoological analysis of the data obtained, analyzing the impact on the ecostructure of the studied territory.

Reindeer tracking in the Russian Federation
The Republic of Sakha (Yakutia)

In March 2010, an experimental Argos system radio beacon was tested on domestic reindeer in Yakutia. In August 2010, wild reindeer (15 individuals) were equipped with radio beacons with built-in transmitting antennas of the Argos system, which made it possible to monitor the movements of animals [6, Salman A.L., Rozhnov V.V., p. 46] (Fig. 1).

Fig. 1. Wild reindeer with an Argos collar [6, Salman A.L., Rozhnov V.V., p. 46].

Research on reindeer chipping continued, and in 2018, ALROSA Company, together with the *Institute for Biological Problems of Cryolithozone SB RAS*, monitored the movement of a herd of the Lena–Olenek population (Yakutia) of wild deer numbering about 90 thousand animals in the

area of Udachninskiy MPP [1]. The main purpose of the monitoring was to preserve the population of wild reindeer in the area of industrial diamond mining and to prevent the death of animals. Chipping of female deer was carried out using radio collars transmitting data on their location. The GLONASS satellite system used transmitted information about the deer's movement every 20 minutes. The installation of collars was painless for animals; the collar was automatically unfastened when the batteries ran out. As a result, a system was created to track the migration routes of wild reindeer in the area of the industrial enterprise, recommendations were developed to ensure the transition of reindeer on various sections of the road during the construction of the passage to the Verkhne-Munskoye field [2].

In 2018, LLC Information and Technical Center, having become a resident of the Yakutia Technopark, completed tests (conducted since 2012) of satellite collars for tracking a nomadic herd when detecting the hijacking of domestic reindeer by wild ones and minimising losses due to predator attacks. The satellite collar developers felt that it would be optimal to attach one collar for every 20 deer (for example, the herd leaders), in order to track and trace their movements on a geographical map. The developed satellite collars turned out to be well adapted to the conditions of the Arctic and are cheaper than foreign analogues [3].

Yamalo-Nenets Autonomous Okrug

In 2016, the Yamalo-Nenets Autonomous Okrug started using a modern method of chipping, which allows for cost-effective control of the deer population in the Priuralskaya tundra. An electronic clip on the ear of an animal allows to obtain information about the animal, its unique code (Fig. 2).

Fig. 2. The process of an electronic clip placing.

1 ALROSA provela chipirovanie dikikh severnykh oleney [ALROSA performed chipping of wild reindeer]. URL: https://ysia.ru/alrosa-provela-chipirovanie-dikih-severnyh-olenej/ (accessed 30 March 2021).

2 ALROSA podderzhit programmu po okhrane severnykh oleney [ALROSA will support the reindeer protection program]. URL: http://www.alrosa.ru/ (accessed 30 March 2021).

3 Proizvodstvo sputnikovykh osheynikov dlya oleney i loshadey planiruyut zapustit' v Yakutii [The production of satellite collars for deer and horses is planned to be launched in Yakutia]. URL: http://uhhan.ru/news/2019-03-02-16512 (accessed 30 March 2021).

A scanner, put to the animal's ear, reads the information from the chip within a few seconds and transmits the necessary data, for example, who owns the deer (which herd, including private reindeer herders). The collected information on the chipped animal gets into an electronic database, which makes it possible to carry out zoo-technical work, determine the number of herds and grazing routes. The clipping chips are also convenient as they allow to solve the issue of counting the animals. Special frames are also used to read out the information [4].

As of 2020, 22 thousand deer have been "digitized" in the Yamalo-Nenets Autonomous Okrug. When an animal passes through the frame of a deer corral, the electronic tag in its ear makes it possible to find out the animal's dossier: weight, age, sex, vaccination and reproductive data. According to the developers, the volume of portfolio data can be increased in the future, for example, by introducing an option for weight control. Almost every fourth deer in Yamal has ordinary tags (224 thousand animals). Digital tags are more functional and informative. In addition, microchipping will make it possible to improve the quality of breeding by creating a system for the evaluation of cross-breeding of horned animals. In particular, the quality of offspring can better determine the evaluation of bulls-producers, it will be possible to assign cows to specific bulls-producers. It should be noted that the deer herd available in Yamal is considered to be the largest in the world in terms of the number of species: more than 770 thousand animals (in 2017), almost 900 thousand animals (in 2020) [5] (Fig. 3).

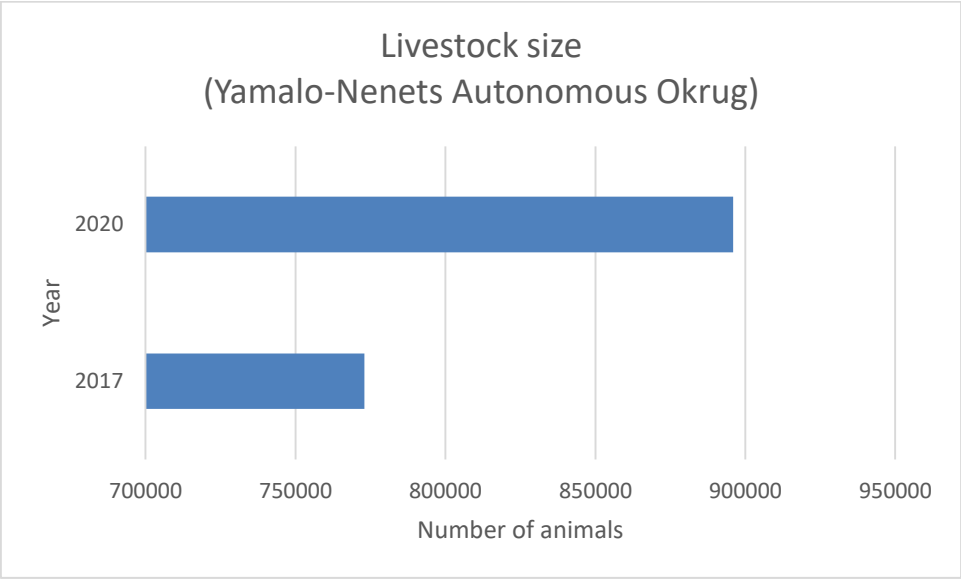

Fig. 3. Yamalo-Nenets Autonomous Okrug. Livestock size.

[4] Roga i kopyta pod kontrolem. Kodirovannyy chip — novoe ukrashenie dlya oleney Priural'skoy tundry [Horns and hooves under control. The coded chip is a new decoration for the reindeer of the Ural tundra]. URL: https://vesti-yamal.ru/ru/vjesti_jamal/roga_i_kopyita_pod_kontrolem_kodirovannyiy_chip_-_novoe_ukrashenie_dlya_oleney_priuralskoy_tundryi (accessed 28 March 2021).

[5] Na Yamale nachali vzhivlyat' mikrochipy [Microchips have been implanted in Yamal]. URL: https://rg.ru/2020/07/21/reg-urfo/na-iamale-oleniam-nachali-vzhivliat-mikrochipy.html (accessed 25 March 2021).

Republic of Karelia, Arkhangelsk Oblast (Vodlozerskiy National Park)

From 2017 to 2019, the Vodlozerskiy National Park and the "Beautiful Children in the Beautiful World" Charity Fund implemented the project "In the footsteps of a reindeer", aimed at preserving the symbol of the northern taiga — the forest reindeer — on the territory of Vodlozerskiy Park (Fig. 4).

Fig. 4. Project "In the footsteps of a reindeer".

Remote observation of animals by scientists of the Park made it possible to obtain information about the places of their concentration, the ways of deer's movement, the number and structure of herds, and seasonal peculiarities of animals' behaviour. The work was focused on prevention poaching (planning patrol protection routes) and death of deer from predators (prompt detection of wolves in the areas under consideration). All of the planned and conducted activities were aimed at preserving the forest reindeer isolated in the park, and analysing the number and structure of herds and their migration routes. Within the framework of this project, an expedition was carried out in a part of the park located in the Arkhangelsk Oblast. Scientists installed GPS collars on the deer using the author's method of V. Mamontov, the head of the scientific department of Vodlozerskiy park: trap loops were installed on the path of the reindeer movement at a height of 1.2 meters, so as not to harm the animal. After the project was over, the work on wild reindeer conservation is being successfully continued [6].

Zabaykalskiy Krai

In 2019, in the north of Zabaykalie (in the Kalarskiy District), the counting of reindeer began in Evenk reindeer herding farms with a livestock of about 3.5 thousand reindeer. Chipping has become a modern method of counting animals. After vaccination, a reindeer is pierced in the ear

6 Proekt «Po sledam severnogo olenya» [Project "In the footsteps of a reindeer"]. URL: http://vodlozero.ru/about/proekty/proekt-po-sledam-severnogo-olenya/ (accessed 02 April 2021).

with an electronic clip, containing information on the identification number, sex and age group of the animal, data on its owner. Electronic identification of domestic reindeer made it possible to maintain a database on the number and structure of the herd, which, in turn, helped to develop support measures together with LLC "Baikal Mining Company", including traditional nature management of Evenks within the subprogramme "Support for indigenous and minority peoples of the Far North", launched in Zabaikalskiy Krai in 2019. Within the framework of the program, the regional public organization "Association of Indigenous Minorities of the North" purchased equipment for the electronic identification of domestic reindeer: a set of ET 30 FDX electronic ear tags; universal applicators-irrigators for installation of all types of ear tags; a PR-520B manual reader (fig. 5). The chip is injected into the reindeer for life. It will report information about the animal throughout its life [7].

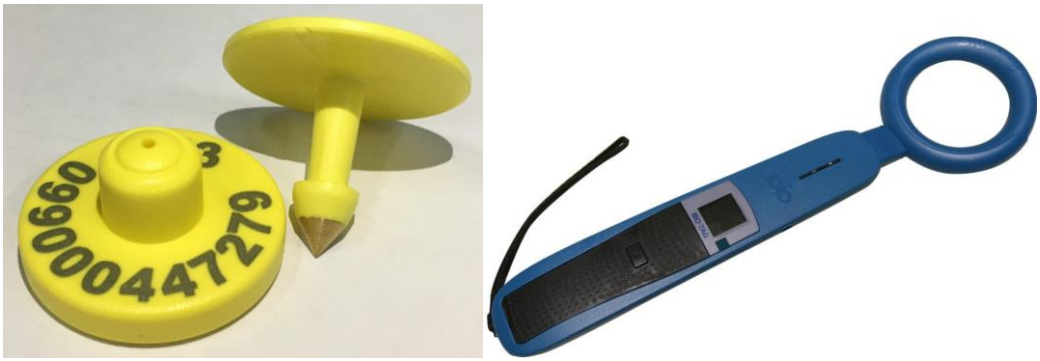

Fig. 5. The ET30 FDX-B electronic tag and the PR-520B electronic tag reader.

Information received from chipped animals can be stored and processed in automated systems. Regional center for information support of livestock breeding "Plinor" implements the information and analytical system "SELEX. Reindeer", which is a software product for storage and analysis of the data on animals, monitoring of the main production indicators of reindeer breeding (Fig. 6). At the same time, available database allows to conduct not only individual registration of animals (events in the life of a deer from birth to death are recorded: weighing, assessment of conformation, bonitering, assignment, arrival, insemination, calving, veterinary treatments, movements), but also group registration, which makes it possible to record data on the presence and movement of the livestock without identifying each animal. Annual, semi-annual and intermediate counts of the livestock are formed. It is possible to record departures, additions, calving, castration, chipping, movement, veterinary treatment of groups of animals.

[7] Association of Indigenous Peoples of the North, Siberia and the Far East of the Russian Federation. URL: http://raipon.info/info/news/3859/ (accessed 05 April 2021).

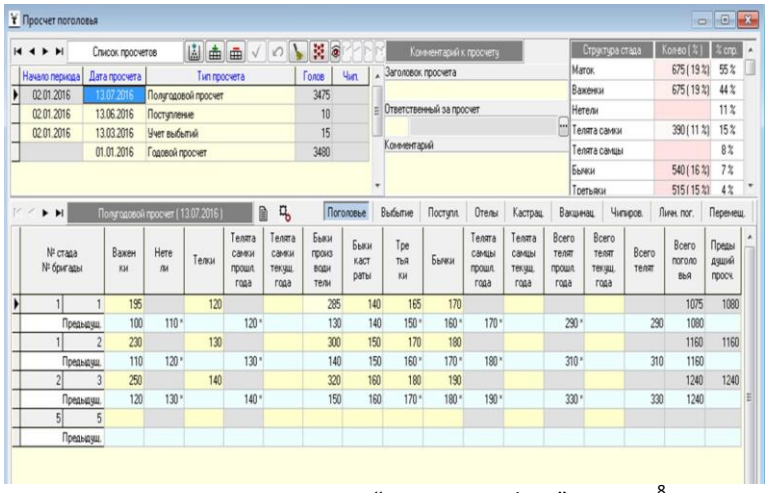

Fig. 6. Data processing in "SELEX. Reindeer" system [8].

Krasnoyarsk Krai

In 2015, Krasnoyarsk began to use unique satellite collars to track the movement of Evenk wild reindeer (produced by the Russian company ES-PAS). Some of the collars were equipped with radio beacons of the ARGOS satellite system, while others had built-in GPS receivers (Fig. 7). The data obtained made it possible to determine the location of the animal with an accuracy of 100 meters.

Fig. 7. Satellite collars for tracking the location of wild deer, developed by specialists of the Russian company ES-PAS.

A project to study wild reindeer, carried out by university scientists in cooperation with the East Siberian Oil and Gas Company, which is developing the Yurubcheno-Tokhomskoye field in the southern part of Evenkiya, has provided new data on animals' movement [9].

In 2019–2020, domestic reindeer in Krasnoyarsk Krai were chipped (electronically tagged), which made it possible to assess the veterinary welfare of herds. The total number of domestic reindeer in the Krasnoyarsk Krai was about 120 thousand in September 2020 [10].

[8] Information-analytical system "SELEKS.Deer". URL: https://plinor.spb.ru/index.php?l=0&p=531 (accessed 04 April 2021).

[9] Uchenye pokazali unikal'nye osheyniki dlya otslezhivaniya migratsii evenkiyskikh oleney [Scientists have shown unique collars for tracking the migration of Evenk deer]. URL: https://newslab.ru/news/641777 (accessed 20 March 2021).

[10] V Krasnoyarskom krae chipiruyut domashnikh severnykh oleney [Domestic reindeer are microchipped in the Krasnoyarsk Krai]. URL: https://regnum.ru/news/society/3056520.html (accessed 20 March 2021).

According to the Agency for Development of Northern Territories and Support of Indigenous Minorities of Krasnoyarsk Krai, from 2021, reindeer herders will receive support only for chipped reindeer [11].

In 2020, in order to preserve the population in the Krasnoyarsk Krai, wild reindeer were tagged with satellite collars. The collars had built-in GPS / GLONASS receivers. With the help of this satellite system, specialists will be able to constantly track the movement of reindeer, determine the places of their concentration and wintering. The collars were put on deer that live in the Evenk and Turukhansk regions, and on Taimyr territory [12].

It should be noted that since 2014, the authorities have not conducted population assessments or monitored the locations of the Taimyr wild reindeer population. At that time, the livestock population was found to be down to 417 thousand reindeer, which is 26% lower than in 2009 [13] (Fig. 8).

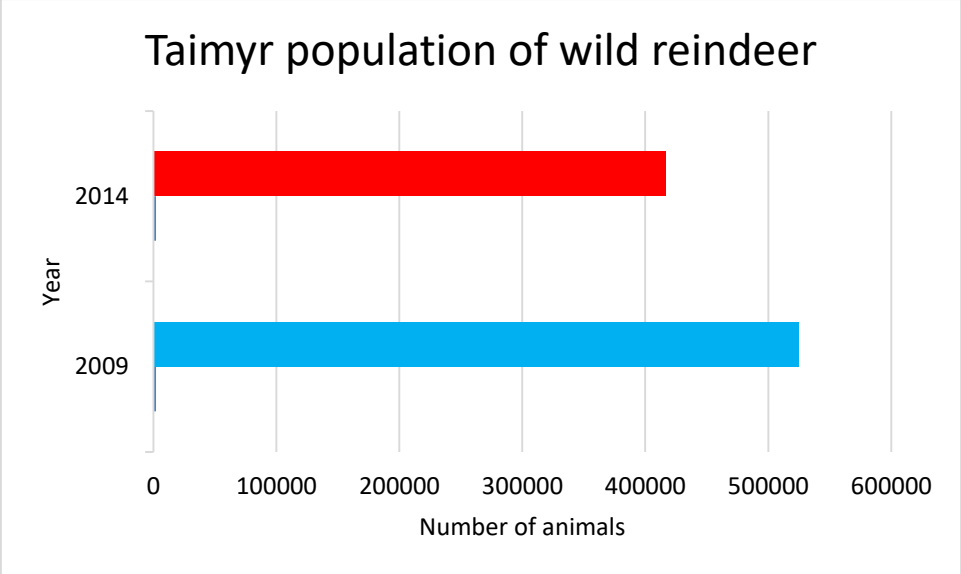

Fig. 8. Taimyr population of wild reindeer, 2009–2014.

In 2020, Rosneft Company began studying Arctic animals, including reindeer, to assess the sustainability of ecosystems. In the period up to 2023, within the framework of the program, eight expeditions will take place in the Laptev, Barents and Kara Seas. They will be attended by scientists from the A.N. Severtsov Institute of Ecology and Evolution, Arctic and Antarctic Research Institute and Siberian Federal University. This work is a continuation of the large-scale studies of polar bears, walruses and reindeer conducted in 2014–2018 [14].

[11] Vlasti Krasnoyarskogo kraya v 2020 godu provedut chipirovanie domashnikh oleney [The authorities of the Krasnoyarsk Krai will chip domestic deer in 2020]. URL: https://tass.ru/v-strane/7378231 (accessed 30 March 2021).
[12] GPS-osheyniki nadeli na dikikh severnykh oleney v Krasnoyarskom krae [GPS collars were put on wild reindeer in the Krasnoyarsk Krai]. URL: https://iz.ru/1032480/2020-07-07/gps-osheiniki-nadeli-na-dikikh-severnykh-olenei-v-krasnoiarskom-krae?utm_source=yxnews&utm_medium=desktop (accessed 29 March 2021).
[13] V Krasnoyarskom krae na severnykh oleney nadeli sputnikovye osheyniki [In the Krasnoyarsk Krai, satellite collars were put on reindeer]. URL: https://regnum.ru/news/society/3003807.html (accessed 29 March 2021).
[14] «Rosneft'» zapustila programmu izucheniya arkticheskikh zhivotnykh [Rosneft launched a program to study Arctic animals]. URL: https://iz.ru/1004129/2020-04-24/rosneft-zapustila-programmu-izucheniia-arkticheskikh-zhivotnykh (accessed 02 April 2021).

Murmansk Oblast

Since 2018, a new method of chipping has been used in the Murmansk Oblast: a reindeer is injected with a sensor on which information about the animal is recorded via a scanner: gender, nickname, number, color, age of vaccination, migration routes. In the future, the information is transferred to a single database for registration and accounting. Information about the animal is read out using a mini-computer. The chip used functions as long as the animal lives (on average, 15–20 years). Previously, the chips were injected with a syringe, or the animals were tagged. Over time, the sensor will provide information on the extent to which the age of the animal and its weight has increased. It is therefore a kind of electronic passport [15].

Conclusion

Thus, deer tracking technologies are widely used in the Russian Federation. At the same time, methods of capturing animals and technologies for installing chips are being improved. The result of chipping is the collection of information about the reindeer's behaviour. On the basis of the collected data, information and analytical systems are being developed for storing and analysing information on chipped animals. The data obtained can be processed by the methods of mathematical tools; the conclusions formed in this process make it possible to establish the influence of the environment on the reindeer migration routes and the spatial and temporal interactions between the animals.

The use of modern methods and technologies for tracing reindeer will undoubtedly lead to an increase in the economic efficiency of both individual reindeer herding farms and reindeer husbandry in general, which plays a significant role in the life support of the peoples of the North.

The development of this scientific topic at the international level is possible, for example, in the context of the COLARCTIC project “Breakthrough information technologies for BEAR”, which, in particular, solves the development of IT services in reindeer husbandry by partners from Russia, Sweden, Norway and Finland [16].

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Spatial Organisation of Gas Resources Development in the Yamal Oil and Gas Bearing Region *

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Abstract. The Yamal oil and gas province (OGP) is strategically important for the Russian gas industry. In the coming decade, gas production in Yamal is expected to grow to 180–200 billion cubic meters per year. The main goal of the article is to solve a scientific problem consisting in the study of the spatial organization of the development of gas resources, determination of the rational structure of reproduction of natural gas reserves in the Yamal oil-gas-bearing region in the context of the modernization of the Arctic gas industry complex. The article assessed the gas resources of Yamal, revealed trends in the economic development of natural gas fields, presented the characteristics of investment projects based on the fields being developed. An analysis was carried out that made it possible to differentiate the deposits by the degree of their prospects, and a strategy for expanding the hydrocarbon potential of Yamal was determined. It was revealed that the main areas of production in the Yamal oil-gas-bearing region are associated with the development of deposits with a high level of Cenomanian deposits. Such deposits are characterized by a higher increase in the capitalization and profitability of investment projects in real time compared to fields located in the northern and far eastern seas, including on the shelf of the Kara Sea. It was concluded that the strategy for the reproduction of hydrocarbon potential will be aimed at conducting prospecting and exploration in order to transfer forecast resources to industrial reserves of natural gas. The study applies a general scientific methodology providing for systemic and comprehensive approaches to justify the spatial organisation of gas resources development in the Yamal oil and gas bearing region. A significant body of factual material on the state of free gas and condensate reserves in Yamal has been analyzed. The results of the research were obtained with the use of comparative-analytical, statistical methods of economic analysis.
Keywords: *Arctic zone of Russia, Yamal oil-gas-bearing region, Arctic natural gas deposit, natural gas reserve, potential natural gas resource, reproduction of natural gas reserves, productivity of natural gas field.*

Introduction

Today Russia is one of the global leaders in natural gas production, second only to the United States, with more than 90% of production volume coming from the Russian Arctic sector. Scientific research in the field of spatial organization of regional economy in the Arctic during the economic development of energy resources is timely and relevant, since hydrocarbon resources development is one of the main drivers of economic development of the Arctic zone of Russia, as the prospects of discovering new deposits and hydrocarbon fields, including unique and large in reserves, are associated with the Arctic territories. Studies in the field of spatial organization of the economic development of hydrocarbon resources in the Western Arctic are used as a methodological approach in the works: [1, Kozmenko S., Saveliev A., Teslya A.], [2, Agarkov S.A., Saveliev A.N., Kozmenko S.Y., Ulchenko M.V., Shchegolkova A.A.], [3, Kozmenko S.Yu., Afanasiev R.A.].

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Technological processes for the development of hydrocarbon resources are the subject area of scientific research by N.P. Laverov, V.I. Bogoyavlensky [4], A.E. Kontorovich [5] and others.

Ensuring "sustainable reproduction of reserves and potential resources of Arctic natural gas, since it is this region that the main proven gas resources of Russia are localized in" [6, Shchegolkova A.A., Ulchenko M.V., p. 114], will allow maintaining the high competitive position of Russia in the global gas market [7, Kozmenko S.Yu., Saveliev A.N., Teslya A.B.]. Under these conditions, the main direction of economic development of the Arctic zone, in addition to the production of hydrocarbons itself, is geological exploration in order to ensure stable reproduction of reserves and potential hydrocarbon resources, including natural gas [6, Shchegolkova A.A., Ulchenko M.V.]. The most promising area for exploration and expansion of the raw hydrocarbon base is the northwestern part of the West Siberian oil and gas province (WSOGP) — the Yamal-Kara region, which includes the Yamal, Gydan and South Kara oil-and-gas bearing regions (OGR) [8, Kontorovich V.A., Kontorovich A.E.].

Spatial distribution of gas resources in the Arctic zone of Russia

According to various estimates, the volume of recoverable hydrocarbon reserves in the Arctic zone of Russia is about 245 billion tons of fuel equivalent. The Arctic zone includes the Naryan-Mar group of fields in the Timan-Pechora oil and gas province (OGP); deposits of the Barents-Kara OGP (Murmansk, Severo-Kildinskoe, Shtokman, Ledovoe, Ludlovskoe); WSOGP fields (two fields of the Ust-Yenisei OGR, Pur-Tazovsk OGR, Nadym-Pursk OGR, Yuzhno-Karskaya OGR, Gydan OGR, Yamal OGR). It should be noted that the major part of reserves (161.7 billion tons of fuel equivalent) belongs to the WSOGP, which is characterized by a high concentration of unique and large natural gas fields.

In recent years, substantial prospects for new hydrocarbon deposits and fields of WSOGP, including large ones, are associated with the Arctic territories, which include the Kara-Yamal region with the Yamal, Gydan and South Kara oil and gas regions (OGR). Commercial oil and gas deposits have already been identified there in a wide stratigraphic range — from the basement-sedimentary contact zone through the Cenomanian. However, as is well known, the main reserves of hydrocarbons (mainly gas and gas condensate) are discovered in the Aptian-Albian and Albian-Cenomanian productive complexes. This is explained primarily by their better knowledge of deep drilling [9, Skorobogatov V.A., Kabalin M.Yu.].

More than 70% of potential hydrocarbon resources are concentrated on the shelf of the Barents and Kara Seas, with the share of natural gas reaching 90%. However, the main problem of the economic development of the Arctic hydrocarbon resources is that most of the reserves are classified as hard-to-recover [1]. That is why the intensification of gas fields exploration directly on

[1] Global'nye tendentsii osvoeniya energeticheskikh resursov Rossiyskoy Arktiki. Chast' I. Tendentsii ekonomicheskogo razvitiya Rossiyskoy Arktiki [Global trends in the development of energy resources in the Russian Arctic. Part I. Trends

the shelf is constrained by the presence of significant volumes of not only explored, but also natural gas reserves under development on the Yamal Peninsula.

Gas potential assessment of the Yamal OGR

The Yamal oil and gas bearing region is unique in all parameters of gas and oil content, namely: the number of fields, discovered and explored reserves, the range of productivity, etc. To date, 31 fields with free gas reserves have been discovered on the Yamal Peninsula and adjacent waters, and 27 fields including 9 gas, 10 gas-condensate and 8 oil-and-gas fields onshore (without the Priyamalskiy shelf). The total reserves and resources of all the fields of the Yamal OGR, including the Priyamalskiy shelf, are the following: explored and preliminary estimated gas reserves (A + B + C1 + C2) — about 16 trillion m^3, prospective and forecast (C3 – D3) — about 22 trillion m^3; recoverable condensate reserves (A + B + C1) — "…over 226 million tons; oil reserves — 292 million tons" [10, Ananenkov A.G., p. 63].

Two powerful clusters of oil and gas accumulation have formed in Yamal — the Bovanenkovo and Tambey groups. The South Yamal group is represented by the Novoportovskoye and Rostovtsevskoye fields with predominant oil reserves (initial discovered oil reserves of about 1 billion tons, free gas — less than 1.3 trillion m^3). Natural gas reserves of the Tambeyskoye group, as well as the Kruzenshternovskoye and Kharasaveyskoye fields, have significantly increased. The Tambey-Malyginskiy group of deposits is less studied [9, Skorobogatov V.A., Kabalin M.Yu.]. The current value and structure of free gas and condensate reserves are presented in [9, Skorobogatov V.A., Kabalin M.Yu.] and are given in table 1.

Table 1

The state of free gas and condensate reserves in the Yamal OGR (onshore) as of 01.01.2017 (compiled according to the data [2], as well as [9, Skorobogatov V.A., Kabalin M.Yu.])

Field	Free gas, bcm			Condensate (recovered), mln tons			Degree of development	Subsoil user
	extraction /losses	$A+B_1+C_1$	B_2+C_2	extraction /losses	$A+B_1+C_1$	B_2+C_2		
Bovanenkovo group of fields								
OGC Bovanenkovskoye	211.3	4185.0	199.5	0.2	54.5	18.9	devel.	Department for Subsoil Use in the Urals Federal Okrug (Ural FO), OOO Gazprom dobycha Nadym
GC Kharasaveyskoye	1.3	1330.3	358.6	0.1	45.0	29.2	expl.	OOO Gazprom doby-

in the economic development of the Russian Arctic]. Ed. By Agarkov S.A., corr. member RAS Bogoyavlenskiy V.I., Dr. of Economics Kozmenko S.Yu., Dr. of Technical Sciences Masloboev V.A., Ph.D. Ulchenko M.V. Apatity, Kola Scientific Center of the Russian Academy of Sciences, 2019, 170 p.

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								cha Nadym, PJSC Gazprom
GC Kruzenshternskoe	-	617.3	293.1	-	0.7	1.9	expl.	PJSC Gazprom
G Yuzhno-Kruzenshternskoe	-	6.5	12.1	-	-	-	expl.	PJSC Gazprom
G Severo-Bovanenkovskoe	-	4.5	10.0	-	-	-	expl.	D/SU in the Ural FO
Vostochno-Bovanenkovskoe	-	1.7	3.0	-	-	-	expl.	D/SU in the Ural FO
Total	**212.6**	**6145.3**	**876.3**	**0.3**	**100.2**	**50.0**		
Tambeyskaya group of fields								
GC Yuzhno-Tambeyskoye	3.0	953.9	332.9	0.2	28.4	19.9	expl.	OAO Yamal LNG, OOO NOVATEK-Yurkharovneftegaz
GC Severo-Tambeyskoye	-	862.4	261.9	-	32.2	18.2	expl.	PJSC Gazprom
GC Tasiyskoe	-	503.6	62.1	-	26.4	3.8	expl.	PJSC Gazprom
GC Malyginskoe	0.1	439.5	305.6	-	18.9	30.2	expl.	D/SU in the Ural FO, PJSC Gazprom
OGC Zapadno-Tambeyskoe	-	124.4	86.3	-	2.9	6.1	expl.	PJSC Gazprom
G Syadorskoe	0.1	24.6	-	-	-	-	expl.	OOO NOVATEK-Yurkharovneftegaz
Total	**3.2**	**2908.4**	**1048.8**	**0.2**	**108.8**	**78.2**		
South Yamal group of fields (Novoportovsk oil and gas accumulation unit)								
OGC Arctic	0.01	276.2	39.3	-	2.7	1.2	expl.	D/SU in the Ural FO
OGC Novoportovskoe	0.9	267.9	33.4	0.1	16.8	1.6	devel.	OOO Gazpromneft-Yamal
OGC Nurminskoe	0.1	178.4	45.0	-	4.7	1.5	expl.	D/SU in the Ural FO
GC Malo-Yamalskoe	0.03	114.7	114.0	0.01	7.1	12.3	expl.	D/SU in the Ural FO, OOO Gazpromneft-Yamal *
G Verkhnetiuteyskoe	-	110.7	-	-	-	-	expl.	OOO NOVATEK-Yurkharovneftegaz
GC West-Seyakhinskoe	-	95.7	103.5	-	2.5	4.1	expl.	OOO NOVATEK-Yurkharovneftegaz
OGC Rostovtsevskoe	-	61.8	21.9	-	2.8	1.3	expl.	D/SU in the Ural FO
OGC Neitinskoe	-	60.3	37.1	-	0.5	0.0	expl.	D/SU in the Ural FO
OGC Sredneyamalskoe	-	40.3	25.0	-	2.1	1.7	expl.	D/SU in the Ural FO
G Kamennomysskoe (onshore)	0.5	34.6	-	-	-	-	devel.	D/SU in the Ural FO, CJSC Yamaltek, OOO Gazpromneft-Yamal
GK Khambateyskoye	-	15.7	18.7	-	1.2	1.4	expl.	OOO Gazpromneft-Yamal
G Ust-Yuribey	-	11.9	1.9	-	-	-	expl.	OOO Ust-Yuribey
Blizhnenovoportovskoe	-	4	-	-	-	-	expl.	OOO Gazpromneft-Yamal
GC Baydaratskoe	-	2.1	2.3	-	0.1	0.2	expl.	D/SU in the Ural FO
G Nerstinskoe	-	1.7	-	-	-	-	expl.	D/SU in the Ural FO
Total	**1.54**	**1276.0**	**442.1**	**0.11**	**40.5**	**25.3**		
TOTAL	**217.34**	**10329.7**	**2367.2**	**0.61**	**249.5**	**153.5**		
*Subsoil user OOO NOVATEK-Yarsaleneftegaz exchanged assets with OOO Gazpromneft-Yamal for a stake in 2 fields of Arcticgas — Yevo-Yakhinskoye OGCF and Severo-Chaselskoye GCF								

In the reserves structure of the Yamal OGR, gas dominates, confined to the Cenomanian and Lower Cretaceous horizons. Gas reserves, concentrated in the deposits of the Cenomanian-Aptian complex, lie at depths of 700–1700 meters. This is "... dry (energy) natural gas, characterized as methane with a very low (about 0.1%) content of methane homologues, suitable for energy production and transportation without preliminary processing" [6, Shchegolkova A.A., Ulchenko M.V., p. 116]. Valanginian ("combination") gas deposits in the Neocomian-Jurassic sediments at depths of 1700–3200 meters are located under the unique Cenomanian deposits, most of which are under development. Valanginian gas, consisting of methane, ethane, propane, butane and heavier fractions (gas condensate), requires processing with the release of heavy fractions, which increases the cost of production [3].

Characteristics of natural gas fields' development in Yamal OGR

Currently, the oil and gas condensate field Bovanenkovskoye is being developed, as well as the fields included in the Novoportovsk oil and gas accumulation unit (OGCF Novoportovskoye, GF Kamennomysskoye (onshore)).

The Bovanenkovskoye OGCF is part of the Bovanenkovsk industrial zone (IZ); commissioned: GP-1 in 2012, GP-2 in 2014, GP-3 in 2018. The projected production level of 115 billion m^3 per year (during the development of the Cenomanian-Aptian deposits) was reached in 2019. In the long term, due to the connection of the Neocomian-Jurassic deposits, it is planned to increase the design level of gas production up to 140 billion m^3 per year. In order to transfer gas from the Bovanenkovskoye OGCF to the Unified Gas Supply System (UGSS) of Russia, a gas transmission corridor to Ukhta was put into operation in 2012 and 2017.

The Novoportovskoye OGCF (under development since 2012) is a strategic project of Gazprom Neft and is the center of a powerful cluster of hydrocarbon production, primarily oil (the oil grade was named Novy Port). A feature of the Novoportovskoye OGCF is its high gas-oil ratio. The complicated geology of the Novoportovskoye OGCF, remoteness from the network infrastructure in order to increase the efficiency of the field development required the creation of autonomous generation using its own raw materials — natural and associated petroleum gas — a gas turbine power plant (GTPP). The Novoportovskoye OGCF is also implementing a gas reinjection project to maintain reservoir pressure (RPM) and production levels. For this purpose, a compressor station (CS) with an integrated gas treatment unit (IGTU) was built in 2017. In addition to ongoing projects on the basis of the Novoportovskoye OGCF, work is underway to create a unique infrastructure project aimed at efficient monetization of all types of hydrocarbons (Table 2). It is supposed that

[3] Global'nye tendentsii osvoeniya energeticheskikh resursov Rossiyskoy Arktiki. Chast' I. Tendentsii ekonomicheskogo razvitiya Rossiyskoy Arktiki [Global trends in the development of energy resources in the Russian Arctic. Part I. Trends in the economic development of the Russian Arctic]. Ed. by Agarkov S.A., corr. member RAS Bogoyavlenskiy V.I., Dr. of Economics Kozmenko S.Yu., Dr. of Technical Sciences Masloboev V.A., Ph.D. Ulchenko M.V. Apatity, Kola Scientific Center of the Russian Academy of Sciences, 2019, 170 p.

with each ton of recoverable liquid HC at Novoportovskoye OGCF, up to five thousand m^3 will be extracted simultaneously.

Only Cenomanian deposits are productive at the Kamennomysskoye GF (onshore); design and survey work (R&D) is underway at the field. Table 2 provides information on the fields under development in the Yamal OGR.

Table 2

Developed fields in the Yamal oil and gas region (onshore)

Field/area of interest	Distribution of free gas by deposit type (as of 01.01.2016)	Production level 2019	Implementation of field-based projects
OGC Bovanenkovskoye part of the Megaproject Yamal Gazprom is included in the Bovanenkovskaya IZ	$(A+B_1+C_1)+(B_2+C_2)$: 4185.0+199.5 bcm ¯ NG; 54.5+18.9 bcm — GC Alb-cenomanian — 32% Aptian — 52.1 % Valanginian (neocom) — 8.3% Jurassic — 7.6%	free gas — 115 bcm	MGP Bovanenko-Ukhta-Torzhok-1 MGP Bovanenko-Ukhta-Torzhok-2 PC — 115 bcm ↓ MGP Yamal-Europe
OGC Novoportovskoye part of the Megaproject Yamal Gazprom is included in the southern IZ, the leading raw material is oil (since 2014)	$(A+B_1+C_1)+(B_2+C_2)$: 267.9+33.4 bcm ¯ NG; 16.8+1.6 bcm — GC Alb-cenomanian–5.4 % Valanginian (neocom) — 62.2 Jurassic — 32.4%	oil — 7.7 million tons on the basis of the gas processing plant associated petroleum gas is compressed in the amount of – 8.59 bcm Utilization of APG — 95%, of which: - injection of APG into the reservoir for reservoir pressure maintenance — 89-93% - fuel for gas turbine power plants — 2-3%	Project (commissioned in 2022): 1.construction of CTAF — PC: - according to APG — 11.03 bcm, - natural gas — 5.07 bcm 2.construction of the GTS: GTS Novoportovskoe-Yamburg (115 km) PC — 20.5 bcm ↓ GTS Yamburg-Tula-1 GTS Yamburg-Tula-2
G Kamennomysskoye (onshore) part of the Megaproject Yamal Gazprom is included in the southern IZ	$A+B_1+C_1$: 34.6 bcm ¯ NG Alb-cenomanian–100%	n/d	- the development of TCP for the implementation of design and survey work is underway, - preparation of a technical scheme for the development of the PC1 reservoir (Cenomanian stage)
NG — natural gas; GC — gas condensate; APG — associated petroleum gas; PC — projected capacity; CTAF — Complex of technological and auxiliary facilities; TCP — technical and commercial proposal; GTS — gas transmission system; MGP — main gas pipeline			

Fields differentiation of Yamal OGR by their prospects

The development of hydrocarbon deposits in the Yamal OGR was repeatedly postponed due to the inaccessibility of the regions of the Arctic zone, the ecological component, expressed, first of all, by the weak susceptibility of the natural environment to man-made loads and a long period of self-recovery, the complete absence of industrial and social infrastructure [11, Bogoyavlencky V.]. Difficult climatic conditions — the spread of permafrost, heaving and saline soils,

thermal erosion and thermokarst processes, a large number of lakes and rivers with a complex hydrological regime — aggravate the problem of the region development.

Development of new hydrocarbon fields demands solving a complex science-intensive technical problem and, accordingly, requires significant investments. Making a decision on the development of new fields in conditions of significant uncertainty is, in fact, the largest strategic task that involves consideration of all (technical, organisational and investment) components. The successful project implementation is primarily associated with the uniqueness of each hydrocarbon field. Only giant and unique fields with more than 90% of the initial natural gas reserves are considered most cost-effective.

Analysis of the distribution of deposits, taking into account their mining and geological characteristics [12, Lyugai D.V., Soin D.A., Skorobogatko A.N.], assessments of natural and climatic conditions, ecological component and the presence or absence of industrial and social infrastructure allows to differentiate the fields of Yamal OGR (distributed subsoil fund) by their prospects, to highlight the supposed stages of hydrocarbon resources development project (Tables 3–6).

Table 3

Distributed subsoil fund, explored fields (1st stage of project implementation)

Field/area of interest	Distribution of free gas by deposit type (as of 01.01.2016)	Planned terms of commissioning / field-based project
1st stage of gas production		
GC Kharasaveyskoye part of the Yamal Gaprom Megaproject is included in the Bovanenkovskaya Reservoir	$(A+B_1+C_1)+(B_2+C_2)$: 1330.3+358.6 bcm ¯ NG; 45.0+29.2 bcm — GC Alb-cenomanian — 16.1 % Aptian — 53.1 % Valanginian (neocom) — 29.8 Jurassic — 1%	**Project (commissioned in 2023):** 1.construction of CGTU; BCS; clusters of production gas wells, transport and energy infrastructure 2.construction of the GTS: GTS Kharasavey-Bovanenko (100 km) PC – 20.5 bcm MGP Bovanenko-Ukhta-Torzhok-1 (2012) MGP Bovanenko-Ukhta-Torzhok-2 (2017) MGP Bovanenko-Ukhta-Torzhok-3 (2023) total PC – 160 bcm MGP Yamal-Europe MGP Nord Stream 1, 2
BCS — booster compressor station; CGTU — complex gas treatment unit		

Table 4

Distributed subsoil fund, explored fields (2nd stage of project implementation)

Field/area of interest	Distribution of free gas by deposit type (as of 01.01.2016)	Planned commissioning dates
G Verkhnetiuteyskoe Is the resource base of NOVATEK for the Obskiy LNG project	$(A+B_1+C_1)+(B_2+C_2)$: 110.7 bcm — NG Alb-cenomanian — 100%	Obskiy LNG project In 2019, the study of the main technical solutions was completed, the design and selection of the main equipment began. 1st line — PC 2.5 million tons (2024) 2nd line — PC 2.5 million tons (2025)
GC Zapadno-Seyakhinskoye Is the resource base of NOVATEK for the Obskiy LNG project	$(A+B_1+C_1)+(B_2+C_2)$: 95.7+103.5 bcm — NG; 2.5+4.1 bcm — GC Alb-cenomanian — 31.3% Aptian — 30.6 % Valanginian (neocom) — 38.1%	
OGC Tambeyskoe (North-Tambeyskoe, West-Tambeyskoe, Tasiyskoe) part of the Yamal Gasprom Megaproject is included in the Tambey Reservoir	$(A+B_1+C_1)+(B_2+C_2)$: 1490.4+410.3 bcm ¯ NG; 61.5+28.1 bcm — GC Alb-cenomanian — 30.8% Aptian — 41.5 % Valanginian (neocom) — 17.5% Jurassic — 10.2	Commissioning of the oil and gas condensate field — 2026
GC Kruzenshternskoe **G** Yuzhno-Kruzenshternskoe part of the Yamal Gasprom Megaproject is included in the Bovanenkovo Reservoir	$(A+B_1+C_1)+(B_2+C_2)$: 623.8+305.2 bcm ¯ NG; 0.7+1.9 bcm — GC Alb-cenomanian — 78.8% Aptian — 21.2 %	Commissioning of the gas condensate field — 2028
G Blizhnenovoportovskoe part of the Yamal cluster of Gazprom Neft	$A+B_1+C_1+C_2$: 4 bcm ¯ NG Paleozoic carbonate deposits — 100%	It is a pilot site for the extraction of minerals from Paleozoic deposits in the Yamalo-Nenets Autonomous Okrug. Development commissioning is planned after 2022.
GC Khambateyskoye part of the Megaproekt Yamal Gazprom is included in the South IZ	$(A+B_1+C_1)+(B_2+C_2)$: 15.7+18.7 bcm ¯ NG; 1.2+1.4 bcm — GC Valanginian (neocom) — 100%	Commissioning of gas condensate fields into commercial development — 2023 Commissioning of wells – 2024
GC Malo-Yamalskoe part of the Yamal Gazprom Megaproekt enters the Yuzhny IZ	$(A+B_1+C_1)+(B_2+C_2)$: 114.7+114.0 bcm ¯ NG; 7.1+12.3 bcm — GC Alb-cenomanian — 21.2 % Jurassic — 78.8%	Design and survey work on the development of the Malo-Yamalskoye gas condensate field is being carried out (planned date of design and survey work is 2021)

Table 5

Distributed subsoil fund, explored fields (3rd stage of project implementation)

Field/area of interest	Distribution of free gas by deposit type (as of 01.01.2016)	Planned timing of the project
GC Malyginskoe part of the Yamal Gasprom Megaproject is included in the Tambey Reservoir	$(A+B_1+C_1)+(B_2+C_2)$: 439.5+305.6 bcm ¯ NG; 18.9+30.2 bcm — GC Alb-cenomanian — 16% Aptian — 42 % Valanginian (neocom) — 16% Jurassic — 26%	Design and survey work is underway. The term for putting the gas condensate field into operation has not been determined
G Syadorskoe resource base NOVATEK included in the Tambeyskaya IZ	$(A+B_1+C_1)+(B_2+C_2)$: 24.6 bcm –NG Alb-cenomanian — 100%	Design and survey work is underway. The term for putting the gas condensate field into operation has not been determined

Table 6

Distributed subsoil fund, explored deposits (unpromising)

Field/area of interest	Distribution of free gas by deposit type (as of 01.01.2016)	Planned timing of the project
G Ust-Yuribey resource base of OOO "Ust-Yuribey"	$(A+B_1+C_1)+(B_2+C_2)$: 11.9+1.9 bcm –NG Valanginian (neocom) — 100%	The term for the development is not defined

Table 7 summarises the distribution of free gas by types of deposits in the Yamal onshore oil and gas fields.

Table 7

Distribution of free gas by types of deposits in the Yamal oil-and-gas region (onshore) of the distributed fund (%)

Jurassic-Cretaceous deposits				Paleozoic deposits
Alb-cenomanian	Aptian	Valanginian (neocom)	Jurassic	Carbon
Developed deposits				
30.7	48.4	11.7	9.2	-
1st stage of project implementation				
16.1	53.1	29.8	1	-
2nd stage of project implementation				
45.2	30.7	13.0	11.0	0.1
3rd stage of project implementation				
18.6	40.7	15.5	25.2	-
unpromising				
-	-	100.0	-	-
Total for all deposits of the distributed fund				
32.13	42.83	15.4	9.6	0.04

Certain fields of the Yamal OGR are classified as unallocated subsoil fund (USF), with the most significant of them being of federal significance for the purposes of energy security and of strategic importance for the Russian Federation's gas supply. According to the assessment of these fields (Table 8), the main free gas reserves are concentrated in the Aptian-Albsenomanian oil and gas complex.

Table 8

Distribution of free gas by types of deposits by fields of strategic importance for gas supply to the Russian Federation, referred to objects of federal importance (%)

Field	Distribution of free gas by deposit type (as of 01.01.2016)		
	Alb-cenomanian	Aptian	Valanginian (neocom)
OGC Arcticheskoe	68.75	18.75	12.5
OGC Nurminskoe	17.6	32.4	50.0
OGC Rostovtsevskoe	10.7	10.7	78.6
OGC Neitinskoe	31.25	50.0	18.75

Thus, according to the nature of the revealed productivity, the main dominant complex of the Yamal OGR in terms of free gas resources is the Albian-Cenomanian and Aptian, where the main gas reserves are concentrated [11, Bogoyavlencky V.]. It should be noted that the basis of the hydrocarbon potential of this OGCF is formed by fields that are confined to large tectonic elements, namely to all positive closed structures of the 2nd and 3rd orders: Nurminskiy mezoval — Bovanenkovskoye OGCF, Verkhnetiuteyskoye GF, Zapadno-Seyakhinskoe GCF, Severo-Bovanenkovskoe GF (USF), Vostochno-Bovanenkovskoe GF (USF); to the Yuzhno-Yamalskiy val —

Novoportovskoye OGCF, Malo-Yamalskoye GCF; Kharasaveyskiy dome-shaped mezoval — Kharasaveyskoye GCF, Malyginskiy val — Malyginskoye GCF; to the Yuzhno-Tambeyskiy dome-shaped mezoval — Yuzhno-Tambeyskoye GCF; to the Severno-Tambeyskiy mezoval — Zapadno-Tambeyskoye OGCF, Severo-Tambeyskoye GCF, Tasiyskoye GCF; to the Bovanenkovsko-Arctic large val — Neitinskoe OGC (USF), Arcticheskoe OGC (USF).

Structural low zones of the Yamal OGR are characterized by small and medium-sized fields with hydrocarbon deposits in the Cenomanian and Neocomian [5, Kontorovich A.E.]. Thus, "… structures on the eastern plunge of the Nurminskiy mezoval (Seyakhinskoye structural terrace) are associated with the following deposits: Verkhnetiuteyskoye GF, Zapadno-Seyakhinskoe GCF, Severno-Bovanenkovskoe GF (USF), Vostochno-Bovanenkovskoe GF (USF); to the north and east of the South Yamal val — Rostovtsevskoe OGCF (USF), Nurminskoe OGCF (USF), Sredneyamalskoe OGCF (USF), Khambateyskoye GCF, Kamennomysskoe (onshore) GF, etc." [12, Lugay D.V., Soin D.A., Skorobogatko A.N., p. 31]. It can be assumed that "... the nature of the gas content of the section of individual promising areas primarily depends on their tectonic confinement" [12, Lyugay D.V., Soin D.A., Skorobogatko A.N., p. 31].

Conclusion

The assessment of the Yamal oil and gas potential allows us to conclude that the degree of exploration of natural gas reserves (the ratio of developed and explored reserves to the total volume), according to the State Balance Sheet as of 01.01.2017 (Table 1), is quite high and amounts to 81.4 % (free gas), 61.9% (condensate). The share of production / loss of developed and explored reserves is at the level of statistical error and amounts to 2.1% (free gas), 0.2% (condensate).

In future, the strategy for the expansion and development of the hydrocarbon potential of the Yamal OGR will focus on prospecting and exploration to convert inferred resources into commercial natural gas reserves, including by expanding gas production areas, with leadership from the Cenomanian to the Albian and especially Aptian, where, in contrast to the Cenomanian and Jurassic, it is particularly promising. At the same time, the geological risks of developing the hydrocarbon potential are minimal, compared to the waters of the Northern and Far Eastern seas, including the shelf of the Kara Sea, which require colossal financial and technological costs. Geological exploration, organization of natural gas production, processing, and transportation in the hard-to-reach Arctic regions of the Yamal OGR will require substantial investment resources and will, in fact, become a transnational task, since Yamal gas will remain the guarantee of Russia's energy security for the decades to come and form the basis for gas supplies to several countries in the Asia-Pacific Region.

The deployment of large-scale investment projects in the gas industry of the Arctic zone of Russia is of fundamental geopolitical importance, as it is a tool for the economic development of

the regional space and the strengthening of the regional presence of Russia in the Arctic [4], as well as providing stability and economic security of the Arctic regions, creating a cumulative effect, which will not only increase Russian natural gas production and exports, but will also contribute to regional development processes in the Arctic, namely:

- increasing the cargo turnover of the NSR;
- increasing the transport and infrastructure potential of the region;
- construction of infrastructure facilities for the gas industry, including new terminals for transshipment of LNG in Kamchatka and in the Murmansk Oblast;
- gasification of the Arctic territories;
- development of national shipbuilding industry;
- expanding the scientific and technical base; creation of about 90 thousand new high-tech jobs;
- increasing in tax revenues to the federal and regional budgets, etc.

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European Union and Cooperation in the Arctic Council *

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Abstract. Since 2008, the European Union has unsuccessfully tried to obtain permanent observer status in the Arctic Council, the central cooperation forum in the Arctic. The analysis shows that the EU's failures in this area are connected both with its location mostly outside of the region and remoteness from the northern realities, as well as global geopolitical tensions. However, the EU has had de facto observer ad hoc status since 2013, allowing it to participate in almost all formats of interaction in the Arctic Council. Considering this fact, the permanent observer status has rather a symbolic meaning and is equivalent to joining a kind of "privileged Arctic club". An analysis of the EU's functioning in its relations with the Arctic Council and its members shows that the EU is ready to adapt and listen to the opinion of the Arctic countries in order to become a legitimate Arctic actor. The Arctic Council is of uneven importance for the different EU member states: Denmark, Finland and Sweden are full members, several countries are permanent observers, but most EU countries are not interested in the Arctic issues. Because of this multifaceted nature, the collective EU is more of an extra-regional player on the platform, but one with serious Arctic claims. The EU is actively working on a common Arctic policy. It is represented in the Arctic Council by the Ambassador-at-Large for Arctic Affairs, introduced in 2017, who acts in coordination with the European Commission and the member states concerned. The EU's overall approach is not unsuccessful: it has managed to engage more member states on the Arctic vector, and European expertise and input on sustainable development issues is already becoming an integral part of the AC's work and promises to evolve further.
Keywords: *Arctic, Arctic Council, European Union, Arctic cooperation, observer status.*

Introduction

The Arctic Council (abbreviated AC) was created in Ottawa, Canada 25 years ago, in 1996. The AC is the leading international cooperation forum, which is the central platform for regional interaction of eight member countries, six permanent participants represented by organizations of the Indigenous peoples of the Arctic and, as has become relevant in recent years, numerous observers. For the European Union, the Arctic is not an alien region: according to the EU Special Envoy for Arctic Matters, the EU already exists in the Arctic, since three member countries — Denmark, Finland and Sweden — are members of the Arctic Council, as well as two members of the European Economic Area — Iceland and Norway, not to mention some European countries and organisations having observer status. They all work at different levels of the AC, from the highest to the lowest, through ministerial meetings, negotiations at senior official level and projects in six thematic working groups and complementary expert groups, as well as in other related formats. Taking into account the importance of preserving the fragile Arctic ecosystem, the consequences of climate change and global warming, increasing anthropogenic pressure on the region and the

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desire for its sustainable development, these joint efforts play a key role in identifying common approaches, sharing experience, developing the Arctic comprehensively and supporting its population.

The European Union applied for observer status in the Arctic Council in 2009 after lengthy preparations. For a number of reasons, the representatives of the EU considered their arguments for obtaining this status undeniable, pointing to their long-term contribution to Arctic projects, climate change, green energy, new technologies, investments and geography. However, the application was rejected, and so far (as of July 22, 2021) the EU has not officially become a permanent observer. In practice, the EU started to "observe the work of the Council" in 2013, when the ministers of the Arctic Council, without making a final decision, considered the European application affirmatively. Having become a de facto ad hoc observer, the EU did not receive the official status, which, perhaps, was the original and main purpose of its application. This paper examines the EU's interests in participation in the Arctic Council, outlines the reasons for the European Union's "suspended" status in this body, explores the specifics of country positions and the overall approach to the issue in the integration alliance, analyses the achievements, challenges and prospects for the EU in the Council, and draws brief conclusions.

The EU's interest in participating in the Arctic Council

The Arctic Council is a unique forum for cooperation. On the one hand, it is exclusive, since making decisions at all levels is the prerogative of only eight Arctic countries with the involvement of six organisations of traditional Arctic residents — permanent participants of the forum: the Aleuts, the Athabaskans, the Gwich'ins, the Inuits, the Sami, the Indigenous peoples of the North, Siberia and the Far East of Russia. On the other hand, various organisations and non-regional countries are invited to observe the activities of the Council. They contribute accordingly through their participation in the AC at the working group level, they can propose projects through the states or permanent participants, and finance them commensurately. Observers may make written statements at ministerial sessions, may take the floor in subsidiary bodies if the chairperson considers it appropriate, but only after member-states and the Indigenous peoples. They can also submit the necessary documents and express their position on current issues. In addition to this, countries and organisations without any status, the so-called "ad hoc observers", whose participation is relevant to the agenda under discussion, are often invited to individual meetings within the AC.

According to the Declaration on the Establishment of the Arctic Council, observer status in the Arctic Council is open to non-Arctic states and all kinds of organisations that support the AC goals, recognise the sovereignty, sovereign rights and jurisdiction of the states in the Arctic, the

legal framework regarding the Arctic Ocean (AO), including the law of the sea, demonstrate financial capacity to contribute to the work, interest in the Arctic, etc. [1]

According to experts from The Arctic Institute, the European Union considers the status of a permanent observer of the AC as a tool that legitimises its participation in matters that concern the Arctic, and uses it as an important intergovernmental platform for discussing the problems of the region [2]. Although the EU received ad hoc observer status in 2013 (that is, having been invited to AC events, the EU has the same rights as any other observer, despite the absence of a final decision), the desire to become an official observer "is gaining more and more importance and relevance, since this status is seen as giving the EU the desired legitimacy as an Arctic actor, whose voice will have sufficient weight to be heard and have the ability to influence discussions about the future of this region"[1, Aliev N., p. 5].

If one evaluates the practical advantages of the desired status of a permanent observer, it does not entail anything more than regular invitations to AC meetings and contributions to the activities of working groups, which is an option also available to ad hoc observers [3]. It is therefore clear that for the EU the official status of observer has more of a symbolic value. Becoming a permanent observer is tantamount to joining a kind of "closed club" of legitimate players in the Arctic arena. This is especially important in the context of the growing number of parties expressing their interest in high-latitude processes. Legitimacy is comparable to access, influence, and opportunity for them. In this case, the Arctic Council is seen as a kind of formal gatekeeper of the region, which is facilitated by involvement of indigenous peoples in its work, refusal to discuss "hard security" issues and active participation of Russia. In addition, with the growing opposition of the Arctic and non-regional countries, the inclusion of "outsiders" allows the format to remain relevant against the background of the development of other international platforms. With this perception of the AC observers, the ambiguous approach to the European Union by some Arctic states becomes understandable.

Analysis of the EU's functioning on cooperation in the Arctic Council

When discussing the EU's approach to Arctic issues, it is necessary to take into account the general principles underlying it. First of all, it is important to state that the Arctic is included in the sphere of "soft policy" for the EU, that is, there is no clear doctrinal framework for a common European Arctic policy. There is no single treaty, strategy or action plan that defines the EU's goals and priorities in the Arctic. The region is also not defined in any of the main financial framework

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documents of the association. Therefore, the approach to the Arctic and the Arctic Council is an "umbrella", that is, the efforts of various departments of the European Commission in the relevant direction are coordinated by the EU Special Representative for the Arctic [4]. The "soft" approach of Europe to the Arctic Council is defined in one of the relatively relevant documents: in 2016, the document "EU Policy for the Arctic" was published (in 2020, the European Commission launched a consultation process to update this document) [5]. It singles out the Arctic Council as one of the main platforms for international cooperation in the region and emphasises the importance of EU participation at all levels. However, according to the same document, the Arctic Council is not the only polar ambition of the EU. For example, on October 3-4, 2019, a special European Union Arctic Forum, organised by the European Commission, the European External Action Service and the Swedish government, took place in the city of Umeå in the north of Sweden. The forum was attended by the heads of the foreign ministries of Italy, India, Finland, Latvia, Norway, Malta, as well as two European Commissioners. This example demonstrates that the EU is ready to take a proactive line in the Arctic, bypassing the Arctic Council, and the European member states of the AC are ready to participate and then promote their collective interests in the official Arctic forum.

Since receiving ad hoc observer status in the Arctic Council in 2013, the European Union has significantly strengthened and coordinated its Arctic policy, including by introducing institutional mechanisms in this direction. Thus, in 2017, the post of Ambassador-at-Large for Arctic Affairs (also: EU Special Representative for Arctic Affairs / Special Envoy for Arctic Matters) was created, which is largely similar in content and tasks to the functions of the Ambassador-at-Large for the Russian Foreign Ministry [6]. For the EU, it has been a turning point in raising its profile in the region and increasing its involvement in Arctic affairs. The tasks of the diplomat in this post are to promote the EU's activities in the Arctic both in the international arena and directly within the integration association itself, and to coordinate the Arctic policy of the Union [7]. Among other things, his duties include attending all meetings of the Arctic Council to which the EU is invited, actively participating in them and providing information support.

At the expert level, the EU's involvement is even more noticeable: speakers attend meetings of all the working groups in which the Arctic Council works. EU experts support AC projects

[4] Exclusive interview with Michael Mann, EU's Ambassador at large for the Arctic / Special envoy for Arctic matters. *The Groupe d'études géopolitiques*. 2021. URL: https://geopolitique.eu/en/2021/01/18/exclusive-interview-with-michael-mann-eus-ambassador-at-large-for-the-arctic-special-envoy-for-arctic-matters/ (accessed 04 May 2021).
[5] Aliyev N. Russia's Arctic Council Chairmanship in 2021-2023. *Friedrich Ebert Stiftung. Peace and Security*. 2021. URL: http://library.fes.de/pdf-files/bueros/moskau/17686.pdf (accessed 04 May 2021).
[6] Exclusive interview with Michael Mann, EU's Ambassador at large for the Arctic / Special envoy for Arctic matters. *The Groupe d'études géopolitiques*. 2021. URL: https://geopolitique.eu/en/2021/01/18/exclusive-interview-with-michael-mann-eus-ambassador-at-large-for-the-arctic-special-envoy-for-arctic-matters/ (accessed 04 May 2021).
[7] Ibid.

and programs, co-financing many of them, e.g. the Expert Group on Black Carbon and Methane [8]. Thus, having not received the official status of an observer in the AC, Europe is trying to go another way. Through a number of initiatives, the EU is involved in expert discussions and decision-making, primarily in the field of combating global warming, supporting peoples of the North, Arctic business and agriculture [2, Zagorskiy A.V.]. In addition, the EU has already developed many effective legislative measures to protect the environment, which are applied in the European Arctic not only by Denmark, Finland and Sweden, but also by Norway and Iceland, as members of the EEA. Other EU initiatives in the Arctic include a circular economy with reducing pollution, efficient waste management and ecosystem restoration [9]. In this way the EU already fulfils a key objective for all Arctic countries — to preserve Arctic nature under increasing pressure from human activity — and promotes these practices within the framework of the AC.

Special Aspects of the Arctic Interests of Different EU Member States

The member states of the European Union have varying degrees of interest in the Arctic Council activities. Formally, they can be divided into three groups: AC member countries, non-regional countries actively participating in Arctic cooperation, in particular, in the role of observers of the Arctic Council (or trying to become one), and countries that are not interested in the Arctic. The first group includes three states: Denmark, Finland and Sweden [2, Zagorskiy A.V., p. 189].

Denmark owes its participation in the AC only to Greenland, which after the 1985 referendum is not included in the European Union, being only a European overseas territory. Meanwhile Sweden and Finland are not included in the "Arctic Five", since they have no access to the Arctic Ocean and therefore have no part of their Arctic shelf. Two more European member states of the Arctic Council — Norway and Iceland — are not part of the European Union, but are part of the European Economic Area and participate in a number of pan-European projects, for example, The European Framework Programmes for Research and Innovation. Among all these countries, only Sweden and Finland, to a lesser extent — Denmark, can be called active supporters of EU involvement. The greater engagement of the EU allows them to receive appropriate funding for their Arctic initiatives and events, increase their weight in promoting projects in working groups, and attract serious expert support and technologies to the region.

As for the second group, many EU member states are already full-fledged observers in the Arctic Council, in contrast to the European Union itself: France, Germany, Italy, the Netherlands,

[8] Dudina G. Zolotoe pravilo Arkticheskogo soveta — ne privnosit' v ego rabotu politicheskie konflikty izvne [The golden rule of the Arctic Council is not to bring political conflicts into its work from the outside]. Kommensant. 11 Apr. 2019. URL: https://www.kommersant.ru/doc/3940235 (accessed 04 May 2021).

[9] Spetspredstavitel' ES po Arktike: Evrosoyuz nameren tesno rabotat' s Moskvoy vo vremya predsedatel'stva RF v Arkticheskom sovete [EU Special Representative for the Arctic: EU intends to work closely with Moscow during Russia's chairmanship of the Arctic Council]. Interfax. 19 Mar. 2021. URL: https://www.interfax.ru/interview/756798 (accessed 04 May 2021).

Poland and Spain [10]. Many of these countries have not only their own specialists and Arctic strategy, but also officials who deal exclusively with polar areas. Moreover, recently more and more EU member states are applying for observer status in the AC. In November 2020, Estonia officially submitted its application, positioning itself as "the northernmost non-Arctic state". In addition, since autumn of 2020, the Czech Republic has been preparing its application, filed in March 2021 [11]. Getting a seat at the table in the Arctic Council is now prestigious (although in reality, observers are not seated at one table, usually behind the backs of the member states and permanent participants). However, a number of experts point out that the country's participation in the AC is motivated not least by geopolitical interests. This is evidenced by recent reports regarding the Czech Republic's unfair motives, confirmed by American statements. It is argued that Western countries seek to ensure the prevalence of the Western position through the quantitative superiority of the AC observer countries loyal to them. This increases Russia's distrust of the EU.

One of the observers in the Arctic Council is the former member of the European Union — Great Britain. Its exit from the EU significantly weakened the position of the union in the region: it lost not only one of the observers, but also the main sponsor — 15% of the EU budget was formed from British investments, and a significant part of the Arctic projects were also supported precisely with the UK's money [12]. For example, in the period 2007–2013, the EU has allocated 1.98 billion euros for Arctic projects, in 2014–2020 — over a billion euros from various funds. Funds went to clean energy, indigenous peoples, educational programs, etc., and a significant share was allocated by the UK. This raises concerns about the potential independence of Greenland that is not part of the EU, which could further weaken its position, including in geographic terms: the EU will lose another observer and the Arctic territory, which has a continental shelf in the Arctic Ocean. This is also linked to the EU's focus on the latest elections on the island in the spring of 2021.

EU achievements, challenges and perspectives in the Arctic Council

In 2008, Brussels expressed its desire to become an observer in the Arctic Council [13]. According to the communiqué "The European Union and the Arctic Region" that was released that year, this status was important for the future involvement of the EU in regional processes. Unexpectedly, the 2009 application ran up against a Canadian veto. Representatives of the North American state said that "they do not feel they have any understanding of the spirit of the EU platform at the moment". It is believed that the veto of the Canadians followed the EU ban on the import of

[10] Mezhuev B. Evropeyskiy Soyuz rasshiryaet svoe prisutstvie v Arktike [The European Union is expanding its presence in the Arctic]. Proektnyy ofis razvitiya Arktiki [Project Office for the Development of the Arctic]. Oct 14 2019. URL: https://goarctic.ru/society/evropeyskiy-soyuz-rasshiryaet-svoye-prisutstvie-v-arktike/ (accessed 04 May 2021).
[11] Ibid.
[12] Brocza S., Brocza A. Less EU in the Arctic Region after 2020. Arctic Yearbook 2020. URL: https://arcticyearbook.com/arctic-yearbook/2018/2018-briefing-notes/298-less-eu-in-the-arctic-region-after-2020 (accessed 04 May 2021).
[13] European Commission (11 November 2008). The European Union and the Arctic Region. Retrieved 5 March 2010 from Communication from the Commission to the European Parliament and the Council.

seal fur products, mainly from Canada [3, Voronkov L.S., p. 421]. In 2011, the Canadians vetoed the European attempt again. It is curious that this conflict is more of a symbolic nature as the export of seal products, without playing a significant role in the trade relations between the sides, is the livelihood basis of the indigenous people of the Canadian North — the Inuit, who have been traditionally involved in this fishery for hundreds of years. In this regard, for Canadians, positioning themselves as an Arctic nation, the conflict personified the opposition of regional and non-Arctic actors [3]. In other words, by keeping the EU out of the Arctic Council, Canada made it clear who was "in the club" and who made the decisions [4, Sokolov V.I.]. Until a compromise was found in 2015, allowing the import of indigenous peoples' products, including Canadian ones, into the European Union, Canadians did not soften their position [4]. That is, it was necessary for the European Union to adapt and change the approach, and not for the Arctic countries.

Against the background of the approval of the applications of large non-regional states in 2013 (China, India, Japan, the Republic of Korea, Singapore, Italy) [5, Ivanov I.S.], the EU was given a partial "green light", and the Europeans were allowed to "observe the work of the council" until "a final decision" was made [14]. But it was never adopted, since after the events in Ukraine and the EU sanctions against Russia in 2014–2015, arguments against Brussels being a permanent observer in the Arctic Council have also emerged in Russia. According to experts from the Friedrich Ebert Foundation, the Russian side has previously expressed concern over Brussels' aspirations to join the organization, and has also played an important role in developing criteria for permanent observers of the AC, which delayed the decision on the European application [1]. In 2021, Norway expressed skepticism about the EU's application. This happened against the backdrop of a disagreement between the EU and the Kingdom of Norway over cod fishing quotas in the Fisheries Protection Zone around Svalbard archipelago. Thus, the EU found itself locked in an uncertain situation: the union cannot be fully called either outsider or an insider of the region [15].

At the same time, the EU has learned how to operate in this undefined status. According to the former EU Ambassador-at-Large for the Arctic, Marie-Anne Coninx, the EU is treated the same as other observers and is invited to all events [16]. At the same time, the diplomat criticized Russia's resistance to obtaining observer status by the European Union, saying that "it is not customary to bring political conflicts from outside into the work of the Arctic Council". According to her, if the reason for the Russian position is sanctions, then the "golden principle" of the AC is violated. In any case, from the side of the official Brussels and its representatives, there is always a confidence

[14] Govorova N. Arkticheskaya politika ES. Mezhdunarodnaya zhizn'. 2021 [Arctic policy of the EU. International life. 2021]. URL: https://interaffairs.ru/news/show/29350 (accessed 04 May 2021).
[15] Østhagen A. In or Out? The Symbolism of the EU's Arctic Council Bid. The Arctic Institute. 18 June 2013. URL: https://www.thearcticinstitute.org/symbolism-eu-arctic-council/ (accessed 04 May 2021).
[16] Dudina G. Zolotoe pravilo Arkticheskogo soveta — ne privnosit' v ego rabotu politicheskie konflikty izvne [The golden rule of the Arctic Council is not to bring political conflicts into its work from the outside]. Kommensant. 11 Apr. 2019. URL: https://www.kommersant.ru/doc/3940235 (accessed 04 May 2021).

that in the future the EU will definitely receive the status of a permanent observer in the Arctic Council.

Conclusion

In conclusion, it can be noted that the European Union, despite numerous attempts, has not become a full observer to the Arctic Council after 13 years. In practical terms, this is not a problem: being a de facto observer since 2013, the European Union is present at all AC meetings, and its rights and obligations, according to the statements of the Europeans themselves, do not differ from the rights and obligations of other observers. The pro-active EU policy in this direction, broad expert and financial support for the AC projects, the introduction of the position of the EU Special Envoy for Arctic Matters and broad information powers allow the integration association to play a significant role in the Arctic direction, including in the opinion of ordinary people.

Nevertheless, in the context of the significance of official observer status in the Arctic Council, the European Union is seriously losing. If there is a “closed club” of observers, it is obvious that the EU is not allowed “inside”, but rather kept “in the hallway”. Considering that a number of EU member states already have observer status and the list is expanding, the absence of such a status for the European Union speaks for itself. On the one hand, this is due to the conflict between the Arctic identity of the regional countries and the EU's lack of understanding of high latitude issues; on the other hand, it is also due to geopolitical tensions that originate far beyond the region. Thus, due to the lack of an official observer status, the EU has to “deserve” its place in the Council each time by actively proposing solutions and its own experience in areas such as combating climate change, protecting the environment, promoting sustainable development, etc. The EU is also looking for ways to work around Arctic issues, including developing its own internal working mechanism on the North and organising European Arctic events such as the recent summit in Umeå, which attracted lots of Arctic-interest from member states, most of them from outside the region.

The ambiguity of EU involvement in the Arctic Council is likely to continue into the future, with de facto involvement without formal status appearing to be a compromise solution difficult to replace in the short term. However, no one doubts that it will be found.

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Human Security in the Arctic: Threats through the Prism of the "Northern Mentality" *

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Abstract. The article is devoted to the analysis of threats to human security in the Russian Arctic, taking into account the peculiarities of the "northern mentality". The authors note that the concept of "human security" is relatively new for the Arctic zone of the Russian Federation (AZRF), as until recently security in the northern regions of Russia was defined mainly from the state-centric positions. The universalist approach is hardly applicable in practical policy: it is impossible to build a policy of "human security in general" and transfer it to the conditions of the Arctic zone of the Russian Federation. The concept of human security and corresponding policies must be adapted to the specific conditions of the Russian Arctic. Today, however, the AZRF faces a set of new threats to human security that require a response. The authors examine several groups of threats to human security that are relevant to the AZRF, the reasons for their emergence and the extent to which they affect the further development of the region. In conclusion, the authors conclude that the transition of the AZRF to sustainable development is only possible if the threats to human security discussed in the article are neutralised. The key directions of human security policy, which is based on the principle of enhancing the viability and self-development of the peoples permanently living in the Arctic, are highlighted.
Keywords: *Arctic zone of the Russian Federation, human security, security challenge, social-economic development.*

Introduction

The Arctic has always been seen as Terra Incognita, dangerous for mankind due to harsh conditions. For a long time, the peoples, inhabiting the northern territories, adapted to the harsh conditions of the Arctic and accumulated a unique experience of survival. Notably, the key to survival is the quality of human relationships and harmonious coexistence with the natural environment rather than confrontation between people and nature [1, Kozlov A.I., Kozlova M.A., Vershubskaya G.G., Shilov A.B., p. 6]. Ensuring the safety of a person was most directly embedded in the system of relationships within the family and the local community (clan, tribe).

The 20th century brought serious changes in life in the Arctic due to the industrial development of resources with the leading role of the state. Social relations, natural environment, and traditional way of life have undergone serious transformations. Climate change, which is partly anthropogenic in nature, makes its own adjustments. Under these circumstances, the concept of human security in a permanent living environment in the Arctic requires reinterpretation.

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Studying security through the prism of the "northern mentality" is relevant because it helps to specify the concept of human security. In UN documents, this concept has the broadest content, including political, cultural, economic, food, environmental, individual dimensions [1]. Meanwhile, such a universalist approach is hardly applicable in practical politics. It is impossible to build a policy of human security "in general" and transfer it to the conditions of the Arctic zone of the Russian Federation (AZRF). The concept of human security and the corresponding policy should be adapted to the specific conditions of the Russian Arctic.

In political sciences, human security is studied in two aspects: (1) how it is perceived by the subject of security and (2) what security threats are formed objectively under the influence of the external environment. This article attempts to consider both aspects of security and to identify the relationship between them in relation to people permanently living in northern conditions. The authors proceed from the conviction that it is necessary to identify the perceptions of security that have been shaped by centuries of practical experience and cannot disappear instantly under changing socio-economic conditions. New threats to security, reflected in human consciousness, pass through the prism of already established stereotypes. Considering that a person in the Far North has always had to survive in a rapidly changing situation, then the "traditional" experience of perceiving danger and methods of response are a good addition to the "modern" experience, mainly based on general scientific and technological achievements. Taking into account the relationship between objective and subjective aspects of security allows us to clarify the directions, forms and methods of ensuring human safety in specific conditions. Though a lot of papers on different aspects of human safety in the Arctic has been published [2, Konyshev V., Sergunin A.; 3, Finger M., Heininen L.; 4, Hoogensen G., Bazely D.; 5, Laurelle M.; 6, Salminen M., Hossain K.], the specificity of this problem in relation to the Russian Arctic remains insufficiently studied.

What are the features of threat perception in terms of the "northern mentality"? What is the attitude towards contemporary dangers to security among the peoples who have been living in the Arctic Zone of the Russian Federation (AZRF) for a long time? What is the objective content of threats to human security in the Russian Arctic in the context of industrial development of the region? To what extent can the traditional experience of indigenous people in ensuring human security be applied today to the development of state policy? This article is devoted to the search for answers to these questions.

[1] Human Development Report 1994. NY, Oxford University Press, 1994. URL: http://hdr.undp.org/sites/default/files/reports/255/hdr_1994_en_complete_nostats.pdf (accessed 31 August 2021).

Problem statement

The last decade has seen rapid development of the AZRF in many directions. Currently, the region produces 10% of the country's GDP [2], while the population in the Arctic zone is estimated at 1.6%–1.8% of the total population of the Russian Federation. There are objective factors in the AZRF that create increased risks to any human activity: harsh climatic conditions; negative consequences of climate change; insufficient development of life support infrastructure; transport and communication systems; remoteness from the industrialized centers of the country; low population density; lagging behind the quality of life indicators in the AZRF from the national values; low level of availability of high-quality social services and comfortable housing; increased risk of the emergence and development of occupational diseases; vulnerability of ecological systems.

The concept of "human security" is relatively new for the AZRF, since, until recently, security was defined mainly from state-centric positions. This is due, firstly, to the historically established model of management, when the leading role belonged to the federal authorities throughout the entire 20th century. Secondly, since 2008, the AZRF has received the status of a state resource base for the foreseeable future [3]. However, in practice, it became clear that both approaches do not fully correspond to modern realities. On the one hand, it became obvious that the state alone cannot adequately respond to new challenges and threats to security. Therefore, interaction with other actors is necessary: private business, public organizations, municipal authorities, the indigenous population. On the other hand, a narrowly understood "resource" approach can make the AZRF a peripheral territory of Russia with a high level of population outflow to other regions and, as a result, create new problems on the northern borders of the state.

Today, the official rhetoric has changed: the main task of the Arctic policy of the Russian Federation is the sustainable development of the region, which presupposes the harmonization of the economic, social and environmental aspects of the life. This is reflected in the updated strategic documents adopted in 2020: "Fundamentals of State Policy of the Russian Federation in the Arctic up to 2035" [4] and the Decree on the approval of the "Strategy for the Development of the

[2] Rosstat: zhiteli Arkticheskoy zony obespechivayut desyatuyu chast' VVP Rossii [Rosstat: residents of the Arctic zone provide a tenth of Russia's GDP]. URL: https://www.strana2020.ru/mediaoffice/rosstat-zhiteli-arkticheskoy-zony-obespechivayut-desyatuyu-chast-vvp-rossii/ (accessed 17 April 2021).

[3] Osnovy gosudarstvennoy politiki Rossiyskoy Federatsii v Arktike do 2020 goda i dal'neyshuyu perspektivu. Utverzhdeny Prezidentom Rossiyskoy Federatsii D.A. Medvedevym 18 sentyabrya 2008 goda. Ukaz № 1969 [Fundamentals of the state policy of the Russian Federation in the Arctic up to 2020 and further prospects. Approved by the President of the Russian Federation D.A. Medvedev on September 18, 2008. Decree No. 1969]. URL: https://rg.ru/2009/03/30/arktika-osnovy-dok.html (accessed 12 December 2021); O Strategii razvitiya Arkticheskoy zony Rossiyskoy Federatsii i obespecheniya natsional'noy bezopasnosti na period do 2020 goda. Utverzhdeny Prezidentom Rossiyskoy Federatsii D.A. Medvedevym 20 fevralya 2013 goda [On the Strategy for the Development of the Arctic Zone of the Russian Federation and Ensuring National Security for the Period up to 2020. Approved by the President of the Russian Federation D.A. Medvedev February 20, 2013]. URL: http://static.government.ru/media/files/2RpSA3sctElhAGn4RN9dHrtzk0A3wZm8.pdf (accessed 12 December 2021).

[4] Osnovy gosudarstvennoy politiki Rossiyskoy Federatsii v Arktike na period do 2035 goda. Utverzhdeny Prezidentom Rossiyskoy Federatsii V.V. Putinym 5 marta 2020. Ukaz № 164 [Fundamentals of the state policy of the Russian Feder-

Arctic Zone of the Russian Federation and Ensuring National Security for the Period up to 2035" [5]. An important innovation of the two documents is a clearly expressed priority — improving the safety and quality of life of people living in the Russian Arctic. Although the documents do not use the term "human security", in fact they refer to many aspects of this concept.

It should be taken into account that the AZRF is a heterogeneous region not only in terms of socio-economic development, but also in terms of ethnic composition of the population, cultural and linguistic traditions, economic structure, belonging to indigenous peoples, and the peculiarities of labour organisation ("shift workers" and "locals"). This diversity affects the perception and composition of threats to security and requires the development of appropriate approaches to the content of the concept of "human security" in the conditions of the Russian Arctic. However, the focus of the security policy should be directed, first of all, to those groups of the population that are oriented to permanent residence in the Far North. Only in this way, one can expect to achieve sustainable development of the region as a whole and create long-term human security conditions.

Mentality peculiarities of the indigenous peoples of the North and security perception

The "northern mentality" can be understood as a set of common features of worldview, which are objectively formed among the inhabitants of the Far North. In general terms, the population of the Russian Arctic can be divided into indigenous peoples (Komi, Yakuts, Russians), small indigenous peoples (17 groups of peoples with a population of less than 50 thousand people) and recent internal migrants associated with the modern economic development of the North [7, Kharlampieva N.K., p. 77–78]. Unlike the first two groups, representatives of the latter category, for obvious reasons, have a more modest historical experience of adaptation to the conditions of living in the North.

The tundra parts of the Arctic from Scandinavia to Chukotka were inhabited approximately 20–30 thousand years ago, due to constant relocation across vast spaces. The modern Finno-Ugric and Samoyed peoples were formed from the aboriginal tribes of hunters, fishermen and more southern nomadic herders who came from Asia. The nomads reached the Kola Peninsula, Yamal, Gydan, Taimyr and gradually assimilated [8, Mazharov A.V., Smorchkova V.I., p. 9–10]. Russian settlers came mainly to the European North in the 11th–12th centuries, but they have only partially

ation in the Arctic for the period up to 2035. Approved by the President of the Russian Federation V.V. Putin March 5, 2020. Decree No. 164]. URL: http://static.kremlin.ru/media/events/files/ru/f8ZpjhpAaQ0WB1zjywN04OgKiI1mAvaM.pdf (accessed 13 December 2021).

[5] Strategiya razvitiya Arkticheskoy zony Rossiyskoy Federatsii i obespecheniya natsional'noy bezopasnosti na period do 2035 goda. Utverzhdena Prezidentom Rossiyskoy Federatsii V.V. Putinym 26 oktyabrya 2020 [Strategy for Developing the Russian Arctic Zone and Ensuring National Security until 2035. Approved by the President of the Russian Federation V.V. Putin on October 26, 2020]. URL: http://www.scrf.gov.ru/security/economic/Arctic_stratery/ (accessed 10 March 2021).

preserved their traditional economic way of life and represent a rather specific Russian cultural group, referred to as Pomor.

For many northern peoples, nomadism was associated with prosperity, while sedentarism — with disaster [9, Golovnev A.V., p. 10]. Until now, many indigenous peoples living in the Arctic are distinguished by a special, nomadic culture (nomadism), which is characterized by complex systems of beliefs, knowledge, ethics and social relations, as well as high adaptability to changing conditions and mobility, which are implemented on huge spaces [10, Golovnev A.V., p. 164]. Nomadism is opposed to the local (sedentary) type of development, focused on the resources exploitation within fixed boundaries. Hence, one can understand why, the concept of security as peace is associated with constant movement in space — nomadism [10, Golovnev A.V., p. 165].

Due to the harsh conditions that put a person on the brink of survival, the northern mentality is distinguished by a constant readiness to confront undefined and multiple threats to security and active actions to overcome threats. For the peoples of the North, extreme situations are the norm rather than the exception. Unpredictable risks drive innovative solutions. In this sense, nomadic culture includes the skills of quick and flexible response in case of danger, without waiting for outside help and striving to get ahead of further changes in the situation [11, Golovnev A.V., p. 155]. At the level of Yakut and Evenki mythology, readiness for danger is cultivated through the popularity of “scary” plots in which a person encounters hostile otherworldly forces, often taking invisible forms [12, Kaduk A.V., p. 235]. Anthropologists attribute the function of society's adaptation to real threats to such a mythology, which is not only widespread, but is often perceived as a reality.

The state of security in the mentality of nomadic and sedentary indigenous peoples is closely related to the idea of harmonious coexistence with nature. The manifestation of the “northern mentality”, according to U.A. Vinokurova and Yu.V. Yakovets, is ecosophy as “the worldview of ecological harmony, or ecological balance, expressed in two standards — human self-realization and biospheric equality”. Nowadays, the ideas of ecosophy have a significant impact on the perception of nature and people-saving by indigenous peoples [13, Vinokurova U.A., Yakovets Yu.V., p. 36, 46]. It is noteworthy that the ideas of ecosophy are consonant with the modern concept of sustainable development.

Ecosophy is primarily about accumulated knowledge on survival in extreme conditions of the Arctic, which underlies strategies of coexistence with nature and the consolidation of norms of behaviour through the creation of cultural and religious symbols [13, Vinokurova U.A., Yakovets Yu.V., p. 40]. But interaction with the environment is based not just on deep knowledge, but also on animating nature and representation of oneself as an integral part of it. This relationship with nature is much richer than the “food chain” system or profit making, so characteristic of modern civilizations. For example, for the “northern mentality”, animal hunting is always limited to a rational need, and the principle of natural balance is behind it. The Khanty and Nenets living on the

banks of the Ob River endow beavers with human qualities, which does not prevent them from hunting valuable animals [14, Gramatchikova N.B., p. 118].

Socially, responding to sudden danger in the "northern mentality" is closely related to the idea of collectivism, which implies mutual assistance. Living conditions taught the northern peoples to rely mainly on their own strengths and initiative. But, on the other hand, in case of extreme danger, a person has no doubts that he can always rely on the help of neighbors and the support of relatives.

The above-described features of danger perception from the point of view of the "northern mentality" help to clarify the specifics of modern threats to human security, which are objective in nature, as well as ways of responding to them.

Threats to the traditional livelihoods of indigenous peoples in the AZRF

Threats to traditional lifestyles for indigenous peoples are crucial, as they are often amount to their existence. The problem of how to adapt the traditional way of life to modern conditions is far from being resolved. Do Arctic Indigenous Peoples even need modernisation? Can modernisation be partial, without the prospect of loss of identity? How can traditional and modern ways coexist in the conditions of the Russian Arctic? While discussions are underway on these issues, the state remains an urgent task of preserving the traditional way of life of indigenous peoples.

Traditional way of life for people living in the North has several dimensions, including the preservation of traditional types of production, crafts and labour relations; stable (reproducible) natural environment; features of family and social relations, cultural, linguistic and religious identity.

The economic basis of the traditional way of life for most of the indigenous peoples of the AZRF is reindeer husbandry. Reindeer husbandry is a peculiar form of human adaptation to extreme living conditions, and it is so perfect, diverse and comprehensive that scientists even talk about the "reindeer civilization" [15, Dolmatova S.A.]. However, the state of reindeer husbandry today is very ambiguous. The situation is most favorable in Yamal and the Kola Peninsula, and much worse in Chukotka. This is due both to the peculiarities of nomadic traditions (Nenets, Sami, Chukchi), and to the socio-economic situation.

Since Soviet times, reindeer husbandry has played an important role economically, both as part of the traditional way of life and as an industrial enterprise. Chukotka and Yamal were world leaders with a total reindeer population of 490 thousand, respectively. By now, in Yamal, the livestock has grown to 700 thousand, and in Chukotka it has dropped catastrophically — to 150 thousand. On the Kola Peninsula, there was a more moderate reduction, from 77 to 58 thousand heads. Experts associate the current degradation of reindeer husbandry in Chukotka with the nationalization of herds instead of preserving private livestock, as well as the introduction of all-round technology that destroys pastures, and the outflow of qualified personnel against the background of economic devastation, looting and soldering of reindeer herders [9, Golovnev A.V., p.

12–13]. Threats to security of the traditional way of life are to a greater extent associated with social factors of the 1990s–2000s. Their consequences had specific negative effects for reindeer husbandry. In particular, in Chukotka, with the decline of households, the number of wild reindeer has increased, which, falling into domestic herds, can break it up into groups and take it away from reindeer herders. On the other hand, reindeer grazing requires the skills of the herders, which are accumulated over decades, and therefore the loss of the most skilled personnel can be irreplaceable both for maintaining the reindeer herds and for the lives of many Chukchi families [9, Golovnev A.V., p. 14, 19–21, 37]. This problem is typical for many regions of the Russian North.

Due to the transfer of lands for industrial enterprises and pollution of the territory by emissions, the indigenous population is deprived of pasture lands and hunting grounds, traditional fishing grounds, areas for gathering wild plants. But the situation is not so simple, because, according to the estimates of the Institute of Ethnology and Anthropology of the Russian Academy of Sciences, only 25% of the aboriginal population currently leads a permanent nomadic way of life, while the rest are sedentary [6]. Part of the indigenous peoples traditionally leads a semi-nomadic life, besides reindeer herding they engage in other types of nature management: hunting, fishing, and animal trapping.

Another ambiguity arises from the long-standing policy of stimulating the transition of nomadic peoples to sedentary life. Part of these measures was the separation of children from the nomadic family and placing them in boarding schools (with the aim of their socialisation). Such a practice violates the age-old continuity, leads to “disconnection from traditional culture” and a sharp shortage of personnel in traditional industries. On the other hand, many young people who have left for cities do not adapt to modern living conditions [7]. Departure to the city is often accompanied by social adaptation problems, provoking alcoholism and drug addiction.

The introduction of federal laws regulating the use of natural resources was not effective enough to protect and preserve the traditional way of life. For the economic communities of indigenous peoples, due to the ambiguity of the legislation, restrictions remain on their commercial activities within the framework of the traditional way, as well as on the creation of territories of traditional nature management [16, Kryazhkov V.A., p. 55]. The issue, however, is not fully resolved simply by issuing permits to indigenous peoples. The preservation of elements of the traditional way of life is also important for other inhabitants of the North who live in similar conditions.

For example, fishing collective farms in Pomor villages, after the introduction of new fishing rules in 2007, are losing auctions for catching quotas to large farms, since they are less competi-

[6] Tishkov V.A. Korennye narody rossiyskoy Arktiki: istoriya, sovremennyy status, perspektivy [Indigenous peoples of the Russian Arctic: history, current status, prospects]. URL: http://www.russiancouncil.ru/analytics-and-comments/comments/korennye-narody-rossiyskoy-arktiki-istoriya-sovremennyy-stat/ (accessed 31 August 2021).

[7] Kirko V.I., Zakharova K.N. Khozyaystvennaya deyatel'nost' — etnosokhranyayushchiy obraz zhizni [Economic activity is an ethno-preserving way of life]. Arktika i Sever [Arctic and North], 2013, no. 12. URL: http://narfu.ru/upload/iblock/6f8/03.pdf (accessed 22 March 2021).

tive [17, Tulaeva S.A.]. Federal Law No. 475 on recreational fishing allows Pomors to fish only for their own needs, and not for sale [8]. The Pomors are not included in the indigenous small-numbered peoples of the North, but, like other permanent residents who live off the sea trade, they are entitled to benefits. Some experts generally consider the Pomors to be a cultural and ethnic group, equated to the indigenous peoples of the North, and then the question of the appropriate benefits for the use of natural resources and self-government arises directly [18, Lukin Yu.F.].

In terms of the preservation of cultural and linguistic identity, experts note a tendency towards the loss of native language among aboriginal ethnic groups, related to the long-standing assimilation policy pursued in Soviet times. However, since 1991, there has been a tendency to maintain a linguistic identity among the nomadic indigenous groups [9]. The state at the federal level supports the work of nomadic schools, and the languages of the northerners are taken under state protection [10]. In the AZRF, the languages of the Republic of Sakha (Yakutia) are considered to be the most legally protected, and the languages of the autonomous okrugs (NAO, KhMAO-Yugra, ChAO, YaNAO) are supported by separate regulatory acts [19, Tishkov V.A. et al., p. 220]. At the same time, in most regions, native languages are not included in the compulsory curricula, but are taught mainly in boarding schools. As a result, parents are faced with a choice between giving a good education to their child or teaching them their native language. In addition, native languages are sometimes perceived as less prestigious, since officials regard them as “the languages of the tundra and taiga” [19, Tishkov V.A. et al., p. 223].

The ratio of the ways of life of the indigenous and “newcomers” population of the Far North is usually considered as a conflict (especially in the second half of the 20th century), although in fact, as noted by the famous anthropologist A.V. Golovnev, there is also a lot of mutual enrichment with social practices in this interaction [10, Golovnev A.V., p. 165], which concern the conditions of human security. This should be taken into account, since the inconsistencies in the cultural code bring the potential for conflict, as well as false stereotypes about the alleged “backwardness” of the traditional way of life of the indigenous peoples.

As for the mutual influence of traditions and modern innovations in the Arctic, as far back as the 1930s, the USSR had a positive experience with reintroducing animal populations. Considering that the status of a protected area with a ban on hunting contradicted the traditional way of

[8] Federal'nyy zakon «O lyubitel'skom rybolovstve i o vnesenii izmeneniy v otdel'nye zakonodatel'nye akty Rossiyskoy Federatsii» ot 25.12.2018 N 475-FZ [Federal Law "On recreational fishing and on amendments to certain legislative acts of the Russian Federation" dated December 25, 2018 No. 475-FZ]. URL: http://www.consultant.ru/document/cons_doc_LAW_314261/ (accessed 31 August 2021).

[9] Tishkov V.A. Korennye narody rossiyskoy Arktiki: istoriya, sovremennyy status, perspektivy [Indigenous peoples of the Russian Arctic: history, current status, prospects]. URL: http://www.russiancouncil.ru/analytics-and-comments/comments/korennye-narody-rossiyskoy-arktiki-istoriya-sovremennyy-stat/ (accessed 31 August 2021).

[10] Mikhaylovskaya M. Kak sokhranit' yazyki korennykh narodov Severa [How to preserve the languages of the indigenous peoples of the North]. Parlamentskaya gazeta [Parliament newspaper]. URL: https://www.pnp.ru/social/kak-sokhranit-yazyki-korennykh-narodov-severa.html (accessed 31 August 2021).

life, state officials allowed hunting only for local fur trappers, who were also responsible for the restoration and maintenance of the population [14, Gramatchikova N.B., p. 124]. On the other hand, nowadays the nomads of the North have quickly mastered such convenient means as snowmobiles and GPS navigators, and they consider drones and small helicopters as promising means for searching and gathering reindeer herds, facilitating the work of herders. In Taimyr and Yamal, the reindeer meat processing plants are being set up to process the product without waste, from where it is marketed in Russia and exported to Germany, Sweden and Finland [11]. Nowadays, the nomadic peoples of the AZRF creatively combine tradition and innovation in maintaining a traditional way of life. Moreover, the experience of traditional life suggests the principles, consonant with the era of globalization, which are in demand in the development of the AZRF: mobility, flexibility, modularity, transformation of methods and types of activities [9, Golovnev A.V., p. 40]. The combination of traditional knowledge and new technologies is gradually becoming one of the characteristic features of the modern North development.

Threats to the environment

Environmental degradation in the Russian Arctic is mainly associated with anthropogenic impact. Active pollution of the Arctic began in the Soviet period due to the development of port cities and industry, the construction of military facilities, the dumping of submarines with nuclear reactors at the seabed, and the accumulation of other unprocessed waste. Currently, the Russian Arctic has the largest number of so-called environmental "hot spots" [12], which were identified within the framework of the UNEP/GEF Project "Russian Federation — Support to the National Action Plan for the Protection of the Arctic Marine Environment (NAP–Arctic)". In total, more than 100 "hot spots" were identified, 30 of them were prioritized [20, Lukin Yu.F., p. 16]. Surveys of the population from industrial centers of the Murmansk Oblast (conducted in 2008, 2015 and 2016) also show that among the threats to everyday life, the greatest concern is caused by the state of environment as a result of man-made accidents [21, Klyukina E.S., p. 99]. The protection of the unique Arctic natural environment is a policy priority for all Arctic countries, including Russia.

In 2010, V. Putin launched a "general clean-up" of the Arctic from pollution, which was started by the military, and then supported by volunteers from various public organizations. In 2019, V. Putin announced the results of the work done: "since 2012, more than 80 thousand tons

[11] YaNAO za 10 let v 10 raz uvelichil eksport oleniny v strany Evrosoyuza [Yamal-Nenets Autonomous Okrug has increased the export of venison to the EU countries by 10 times in 10 years]. URL: https://www.ros-net.ru/export-oleniny-s-yamala-v-strany-es-vyros-v-10-raz.html (accessed 31 August 2021).

[12] Proekt YuNEP/GEF Rossiyskaya Federatsiya – Podderzhka natsional'nogo plana deystviy po zashchite arkticheskoy morskoy sredy 2008 [UNEP/GEF Project Russian Federation - Support for the National Action Plan for the Protection of the Arctic Marine Environment 2008]. URL: https://docplayer.ru/45130554-Proekt-rossiyskaya-federaciya-podderzhka-nacionalnogo-plana-deystviy-po-zashchite-arkticheskoy-morskoy-sredy.html (accessed 22 March 2021).

of wastes have been removed and disposed of" [13]. Experts note that estimates of the amount of pollution are still very different: from 2 to 12 million tons of waste. Some of the facilities needing cleaning are difficult to access, and the cleaning itself requires high-tech technological solutions. As a result, it is difficult to estimate the scale of work, their cost and performers [14]. Apparently, this is why the Strategy for the Development of the Russian Arctic and Ensuring National Security for the Period up to 2035 contains only a general formulation about the need to continue work to eliminate the accumulated harm to the environment [15]. Institutional, financial, technological, and personnel mechanisms need to be improved.

In addition to the accumulated environmental damage, the modern construction of industrial enterprises, the development of transport systems and human life also have a negative impact on the natural environment of the Russian Arctic, which is particularly vulnerable. As a result, natural balance occurs very slowly, or even becomes completely impossible. Since the Arctic plays an important role in maintaining the biodiversity of the entire planet, the environmental problem in the AZRF has not only regional but also global significance.

The tendency towards environmental degradation in the Arctic is also related to the fact that the state's environmental policy lagged significantly behind the pace of economic development of the region. The problem of environmental conservation was further exacerbated by the general economic growth after the 1998 crisis. The government made serious mistakes, since the Ministry of the Environment was abolished in 1996, and the State Committee for Environmental Protection was liquidated in 2000. Only in 2008, environmental functions were added to the Ministry of Natural Resources and Environment [22, Turn to Nature, p. 89]. At the initial stage, the Russian Arctic was defined as the "resource base" of the country; therefore, the main attention was paid to the development of the resource potential of the region. Environmental issues, on the other hand, were not among the priorities until recently.

The situation in the Arctic is aggravated by the failure of the "garbage reform" in Russia (2019). According to the Accounts Chamber, no more than 7% of waste is still processed in Russia,

[13] Putin: Za sem' let iz Arktiki vyvezeno i utilizirovano svyshe 80 tys. tonn otkhodov [Vladimir Putin: Over 80,000 tons of waste have been removed and disposed of in the Arctic over seven years. April 09, 2019]. URL: https://er.ru/activity/news/putin-za-sem-let-iz-arktiki-vyvezeno-i-utilizirovano-svyshe-80-tys-othodov (accessed 31 August 2021).

[14] Trushin A. Arktika ispravit? [Will the Arctic be fixed?]. Ogonek, no. 50. URL: https://www.kommersant.ru/doc/4614622 (accessed 02 August 2021).

[15] Strategiya razvitiya Arkticheskoy zony Rossiyskoy Federatsii i obespecheniya natsional'noy bezopasnosti na period do 2035 goda. Utverzhdena Prezidentom Rossiyskoy Federatsii V.V. Putinym 26 oktyabrya 2020 [Strategy for Developing the Russian Arctic Zone and Ensuring National Security until 2035. Approved by the President of the Russian Federation V.V. Putin on October 26, 2020]. URL: http://www.scrf.gov.ru/security/economic/Arctic_stratery/ (accessed 10 March 2021).

and landfills and dumps do not meet sanitary requirements, poisoning the air, water and soil. If more than 90% of waste in Russia is sent to landfills, the European average is 50% [16].

Experts identify several important tasks to ensure the environmental safety of the Arctic in the context of intensive economic activity:

- Increasing the level of waste disposal. A huge number of landfills pollute soil and water resources. In the Russian Arctic, the most unfavorable situation is in the Krasnoyarsk Krai and the Republic of Sakha-Yakutia. The largest volumes of waste are produced by the mining enterprises PJSC Mining Company Polyus, MMC Norilsk Nickel, AK ALROSA, and OJSC Yakutugol.
- Prevention of further air pollution by industrial enterprises. The largest contributions are made by JSC Vorkuta Ugol, MMC Norilsk Nickel, JSC RUSAL Krasnoyarsk, CJSC Vankorneft, LLC Lukoil Komi, LLC Gazprom Transgaz Ukhta, LLC Gazprompererabotka. The AZRF exceeds the Russian average by 3 times in terms of emissions per gross regional product (GRP).
- Protection and restoration of aquatic ecosystems. The largest volumes of wastewater pollution come from the mining and processing and pulp and paper enterprises of the Arkhangelsk and Murmansk oblasts, the Republic of Karelia and the Krasnoyarsk Krai. Among them are OJSC Kondopoga, PPM OJSC Segezha, OJSC Ilim Group, JSC Apatit. Regions of oil and gas production give relatively less pollution. The dynamics of pollution changes downward and, on the whole, coincides with the all-Russian one.
- Conservation of the natural environment and biodiversity. The most important condition for solving this problem is the creation of a network of specially protected natural areas (SPNA). Such a network should neutralise anthropogenic impact on nature and contribute to its self-recovery. According to expert estimates, 17% of the AZRF territories should be allocated for protected areas. In general, there is positive dynamics in the Russian Arctic, but the lowest values of this indicator are observed in the Republic of Karelia and Chukotka.
- Development and implementation of environmentally friendly technologies. Most of these technologies include waste recycling, air and water purification. The low level of innovation in this area is associated with the general crisis state of the Russian economy, the slowdown of modernization of production, which are aggravated by the regime of international sanctions (the share of foreign equipment in the oil and gas industry is about 60%) [23, Smirennikova E.V., Ukhanova A.V., Voronina L.V., p. 59–78].

[16] Dembinskaya N. Vse v odnu kuchu: pochemu musornaya reforma okazalas' na svalke [All in one pile: why the garbage reform ended up in a landfill]. URL: https://ria.ru/20201012/musor-1579044617.html (accessed 02 August 2021).

- Elimination of the consequences of radiation contamination. The pollution is related to testing of Soviet nuclear weapons (1955–1990), the discharge of liquid and the sinking of solid radioactive waste from nuclear submarines and icebreakers. In addition, radioactive waste was being dumped in the Kara and Barents Seas by French and British radiochemical plants in the English Channel and the Irish Sea. Nuclear waste has also been accumulated on the Kola Peninsula, but work is underway to utilize and safely store it with international participation. In general, the radiation situation in the AZRF is within the natural radiation background and has a tendency to decrease since 2016 [24, Modern Problems of Hydrometeorology, p. 570–572].

In the Russian Arctic, the problem of maintaining the balance of the environment depends on the interaction of indigenous peoples leading a nomadic way of life in vast areas, and industrialists represented by private and state enterprises. But industrial enterprises have low motivation for investment in support of scientific research on environmental protection [25, Bobrovnitskiy I.P., Nagornev S.N., Khudov V.V., Yakovlev M.Yu., p. 7]. At the same time, further economic development of the AZRF inevitably raises the issue of the spatial limitation on the nomadic way of life and the reduction of pastures. This fundamental contradiction, expressed in competition for free territories, requires a balanced solution that would distribute “nobody's” pastures for responsible use, introduce reasonable regulation and restrictions on the activities of private and state reindeer herding farms [11, Golovnev A. V., p. 166–167].

There are also contradictions between indigenous peoples and state bodies, which are manifested, for example, in the management of forestry in the Russian Arctic. The boundaries of the pre-tundra forests, which make up 60% of the forest fund and perform climate-regulating and protective functions, have not been reliably determined. This leads to damage to valuable forests during sanitary felling and violations of the regime of use by poachers and tourists. In addition, in order not to lose the rents and nature use fees, the forestry units resist the conversion of forest land to agricultural land, in which indigenous communities are interested [26, Kharitonova G.N., p. 154–168]. Regional authorities, local governments and representatives of indigenous peoples do not have the ability to influence decisions on granting rights to use subsoil plots of federal significance, since the procedure provides only for an auction, where the winner is determined by the size of a one-time payment [27, Masloboev V.A., Makarov D.V., p. 89].

At the same time, government agencies do not sufficiently use the experience and knowledge of indigenous peoples about the environment. Several scientific projects, in which indigenous peoples assisted with monitoring, helped to discover important features of marine mammals previously unknown to science. A project with the participation of Chukotka residents identified the impact of climate warming on coastal and continental biocenoses. In a joint Russian-American project with the participation of residents of Alaska and Chukotka during 2006–2010,

dozens of scientists have documented the accumulated knowledge and observations of the Arctic peoples of the environment. This knowledge and observations helped to obtain a more complete scientific picture of the evolution of ecosystems, proving not only the possibility, but the necessity of such a partnership. The uniqueness of the data received from local residents is that they "monitor the state of the weather, ice, surrounding landscape and biota every day, at any time of the day, 365 days a year. They summarize their personal data with those that they heard from other hunters, received from the elders, or inherited from their ancestors" [28, Bogoslovskaya L.S., Krupnik I.I., p. 331]. Moreover, observation is carried out according to many indicators, which corresponds to the principle of a comprehensive study.

Threat of demographic potential decrease

At the beginning of 2020, according to various estimates, 2.5–2.6 million people lived in the Russian Arctic (1.6%–1.8% of the country's population) [29, Fauser V.V., Smirnov A.V., p. 4–5]. In recent years, there have been multidirectional trends in the population in the Russian Arctic. The overall decline in the permanent population in the Far North continues. For example, from 1989 to 2014, the AZRF population has almost halved. From 2012 to 2020, the population of the Russian Arctic decreased from 2 736.4 to 2 618.7 thousand people, or by 117.7 thousand. The population decreased in seven of nine Arctic regions of Russia, and it increased in two of them (Nenets and Yamalo-Nenets Autonomous Okrugs) [29, Fauser V.V., Smirnov A.V., p. 5]. The result of the general decline in the population was a shortage of highly qualified labour force in the region and concentration of the population in large cities, mainly in the west of the Russian Arctic.

The proportion of people of working age among the departing migrants is higher than the Russian average. The outflow of the population from the Russian Arctic is associated with several reasons of a different nature: economic decline in the 1990s, reduced demand for workers in the extractive industries, depletion of deposits, decline in living standards, departure of young people and those of retirement age, deterioration of infrastructure. Reorientation of state officials to a "rotational" method of natural resources development played an important role in the decline of the demographic potential of the AZRF. As a result, the permanent population in the "old" industrial centers (Norilsk) was left to fend for themselves [7, Kharlampieva N.K., p. 92, 96], resulting in a trend of population outflow to other regions of Russia.

The migration processes have a rather complex and contradictory nature. During the whole period of Arctic exploration and up to the 1990s, there was an inflow of population with active participation of the state, followed by its general outflow. Historically, the migration flow was formed on a dual basis: as voluntary (economic incentives from the state) and as compulsory. While in the first half of the 20th century, migration to the European part of the Far North prevailed, later migration to the Eastern part of the region also dominated. This was due to the priority development of the oil and gas industry. Most of those who currently come to live in the Arctic,

consider it a temporary place for saving money and further move to southern regions. In addition, a significant part of the labour force is made up of "shift workers": Yamalo-Nenets Okrug — 46%, Nenets Autonomous Okrug — 25%, Republic of Sakha — 20%. According to official data, in 2020, 208 thousand (15%) people work on a rotational basis in the Arctic zone of the Russian Federation [17]. "Shift workers" exacerbate the problem of unemployment for the local population, which increases social tension [7, Kharlampieva N.K., p. 88–90], causing discontent among local residents and local authorities.

Labour migrants on a "shift" and permanent basis are attracted to the Arctic from the central and southern regions of Russia, as well as from the post-Soviet republics: Ukraine, Kyrgyzstan, Armenia, Tajikistan, Uzbekistan. The northern territories have always attracted by high wages and social guarantees. While in 2020–2021, the average salary in Russia was 36.000 rubles, then in Murmansk it was 43.670 rubles, in Kamchatka — 50.600 rubles, in Yakutia — 53.460 rubles, in Chukotka — 56.100 rubles, in the Yamalo-Nenets Autonomous Okrug — 70.620 rubles, etc. [18]. An exception is the Arkhangelsk Oblast, where the situation looks quite different: a high unemployment rate, relatively low salaries (in 2014, the average salary barely exceeded 36 thousand rubles, and the unemployment rate was the highest: 7.3%) [7, Kharlampieva N.K., p. 93] contribute to the fact that the number of people leaving for other regions of the country (including because of job search) exceeds the entry by several times.

A negative feature of migration from the Arctic is the outflow of highly educated and qualified personnel, which poses a threat of "degradation of human capital" in the Russian Arctic [19]. According to experts, from 2021, several tens of thousands of specialists will be required annually, "one third of them are workers with higher education, and almost half — are mid-level specialists, including skilled workers and employees" [20]. At the same time, Arctic educational institutions are not able to solve the problem of a shortage of highly qualified personnel completely due to a decrease of students' admission to state-financed places and the closure of regional branches of universities. As a result, the Arctic universities reduced admission from 12 thousand to 5.4 thousand students for 10 years, and their branches — from 11.7 thousand to 1.5 thousand [21]. As a result,

[17] Opredelena kadrovaya potrebnost' v Arkticheskoy zone Rossiyskoy Federatsii do 2035 goda. 08.12.2020. Ministerstvo RF po razvitiyu Dal'nego Vostoka i Arktiki [The personnel requirement in the Arctic zone of the Russian Federation until 2035 has been determined. 12 August 2020. Ministry of the Russian Federation for the Development of the Far East and the Arctic]. URL: https://minvr.gov.ru/press-center/news/29471/ (accessed 13 May 2021).

[18] Statistika sravneniya srednikh zarplat Rossii po regionam [Statistics comparing average wages in Russia by region]. URL: https://visasam.ru/russia/rabotavrf/zarplaty-v-rossii.html (accessed 12 May 2021).

[19] Shaparov A.E. Migratsionnye protsessy v regionakh Arkticheskoy zony Rossiyskoy Federatsii [Migration processes in the regions of the Arctic zone of the Russian Federation]. Rossiya: tendentsii i perspektivy razvitiya [Russia: trends and development prospects]. URL: https://cyberleninka.ru/article/n/migratsionnye-protsessy-v-regionah-arkticheskoy-zony-rossiyskoy-federatsii (accessed 08 May 2021).

[20] V Arktike sozdadut bolee 180 tys. novykh rabochikh mest za 15 let [More than 180,000 new jobs will be created in the Arctic in 15 years]. URL: https://tass.ru/ekonomika/10203915 (accessed 08 May 2021).

[21] Opredelena kadrovaya potrebnost' v Arkticheskoy zone Rossiyskoy Federatsii do 2035 goda. 08.12.2020. Ministerstvo RF po razvitiyu Dal'nego Vostoka i Arktiki [The personnel requirement in the Arctic zone of the Russian Federation

about half of school graduates are forced to go to universities in other cities and do not return to their homeland. The shortage of personnel is compensated by "shift workers".

In the long term, specialists expect the stabilization of the AZRF population, though it is uneven. There is an increase in the population in Salekhard and Novy Urengoy, but in Vorkuta and Norilsk, there is a decrease associated with the end of resource development cycles (accompanied by a drop in the profitability of production) [30, Smirnov A.V., p. 270–290]. Among the indigenous peoples, a noticeable increase in population is noted in the Yamalo-Nenets Autonomous Okrug, which is associated with the success in the development of reindeer husbandry. The number of such peoples as the Nenets, Chukchi, Khanty and Even stabilized [22].

The positive dynamics include an increase in the birth rate and life expectancy for those born in most subjects of the AZRF, which is approaching the national average [31, Govorova N.V., p. 52–61]. At the same time, the northern aborigines are traditionally characterized by relatively late marriages, which naturally limited the fertile period of women. According to experts, "this custom can be regarded as social adaptation to the conditions of a nomadic lifestyle: a too young mother could not provide the child with adequate protection and care" [1, Kozlov A.I., Kozlova M.A., Vershubskaya G.G., Shilov A.B., p. 31]. For example, the so-called "declaration" of marriage at an early age, accompanied by the transfer of a girl to her husband's family, was very common, but at the same time, during the first few years, young people usually did not engage in sexual relations [29, Afanasyeva G.M.]. As a result, the total number of births among northern peoples was relatively low, as in other nomadic or semi-nomadic societies. The low birth rate of indigenous peoples is also due to the influence of biomedical factors: "the lifestyle of women in hunter-gatherer societies ... contributes to a decrease in fertility" [1, Kozlov A.I., Kozlova M.A., Vershubskaya G.G., Shilov A.B., p. 31–35].

Today, the actual life expectancy in AZRF is 53 years, which is significantly lower than the national average — 73.4 years [23]. The development of demographic potential of the Russian Arctic is mainly due to the economic attractiveness of large cities and investment projects. But a steady demographic growth also requires attention to the creation of necessary conditions in medium and small settlements of the Far North [30, Smirnov A.V., p. 286] with a permanent population, which remains an unresolved problem.

until 2035 has been determined. 12 August 2020. Ministry of the Russian Federation for the Development of the Far East and the Arctic]. URL: https://minvr.gov.ru/press-center/news/29471/ (accessed 08 May 2021).

[22] Tishkov V.A. Korennye narody rossiyskoy Arktiki: istoriya, sovremennyy status, perspektivy [Indigenous peoples of the Russian Arctic: history, current status, prospects]. URL: http://www.russiancouncil.ru/analytics-and-comments/comments/korennye-narody-rossiyskoy-arktiki-istoriya-sovremennyy-stat/ (accessed 31 August 2021).

[23] Manukyan E. Srednyaya prodolzhitel'nost' zhizni rossiyan dostigla istoricheskogo maksimuma [The average life expectancy of Russians has reached a historical maximum]. URL: https://rg.ru/2020/04/21/sredniaia-prodolzhitelnost-zhizni-rossiian-dostigla-istoricheskogo-maksimuma.html (accessed 17 April 2021).

Threats to public health

Extreme climatic conditions in most regions of the Russian Arctic put serious pressure on the human body and lead to serious diseases. Studies show that in the Arctic, cold leads to a drop in the efficiency of physical labour by 15–25% compared to the middle latitudes of Russia, a decrease in working capacity, an increase in sensitivity to industrial poisons due to an increase in lung ventilation. As a result, the risks of respiratory and circulatory diseases increase. Deficiency of ultraviolet radiation from the sun, prolonged polar night, and frequent geomagnetic disturbances have an adverse effect on the health of northerners. Persistent pollution of the Russian Arctic, associated with river flows in the northern direction and transboundary transfers, cause diseases of the cardiovascular, endocrine and immune systems, reduce the reproductive capabilities of the population [32, Nagornev S.N., Khudov V.V., Bobrovnitskiy I.P., p. 6–7].

Violation of the traditional way of life of the Arctic indigenous peoples has an additional negative impact on the health of the indigenous population of the northern territories. In this regard, the so-called “social diseases” require attention [13, Vinokurova U.A., Yakovets Yu.V., p. 55], such as tuberculosis, alcoholism, drug addiction, infectious diseases. Indigenous peoples have developed their own special ways of achieving a comfortable psychological state in extreme conditions, relieving stress and tension: various calendar holidays, certain rituals, shamanism. However, during the Soviet era, most of the traditional customs and rituals were severely deformed or eradicated. As a result, alcohol has become a stress reliever, replacing traditional “healthy” ones.

The emergence of a craving for alcohol among indigenous peoples is also associated with a change in diet: “refusal from the protein-lipid diet, traditional for northerners, can contribute to an increase in craving for alcohol. A decrease of fat in the diet leads to an increase in the concentration of corticosteroids and, accordingly, an increase in the level of anxiety, which a person often seeks to relieve in a tried and tested “alcohol” way”. A serious problem is female alcoholism among northerners, which is caused by the special gender attitudes of traditional Arctic cultures [1, Kozlov A.I., Kozlova M.A., Vershubskaya G.G., Shilov A.B., p. 69, 73], according to which alcohol consumption is not considered shameful for a woman, in contrast to European society.

As for the anthropogenic factor, international studies conducted under the AMAP (Arctic Monitoring and Assessment Program) showed that health damage to Arctic residents from contamination with persistent toxic substances occurs mainly through the food chain, through the accumulation of toxins in terrestrial animals, birds, predatory fish and especially marine mammals. As a result, the incidence increases and the immune functions decrease in the permanent residents of the Russian Arctic [35, Dudarev A.A., Odland Y.O., p. 3–14].

It is important to note that the incidence of the indigenous population is additionally associated with “genetically determined factors: lower levels of thyroid hormones, insulin, C-peptide, blood lipids ...” [13, Vinokurova U.A., Yakovets Yu.V., p. 55]. As noted above, changes in the type of nutrition in modern conditions (the transition from protein-lipid to the European carbohydrate

type of diet) provoke the development of immunodeficiency states, which is one of the causes of disability and an increase in mortality of the indigenous population.

In addition to objective problems, experts point to the weak efficiency of the healthcare system in the Russian Arctic. This concerns health protection of the working population, prevention of occupational diseases, infections and other mass diseases. The problem of access to medical care for indigenous peoples, especially those leading a nomadic way of life, is acute. This is explained not only by the lack of medical institutions and personnel, but also by the lack of knowledge about the characteristics of the spread and course of diseases in the Far North [33, Nagornev S.N., Khudov V.V., Bobrovnitskiy I.P., p. 18]. With all the advantages of modern medicine used by indigenous peoples, they are complemented by traditional methods of maintaining health, based on the use of local resources and nomadism. Traditional methods remain in demand not only because of the remoteness and limitations of modern medical care, but also because of their effectiveness in specific conditions.

Constant movement was considered to be the main factor in maintaining the health of people and deer among all nomads. At the same time, human health was thought to be inseparable from the health of reindeer, and even some plants with medicinal effect entered traditional medical practices as a result of observation of animal nutrition. The Chukchi, who did not know medical preparations, used fermented walrus meat, which preserves vitamins, as well as a number of plants and berries that enhance immunity for the prevention of health. In the 19th–20th centuries, they successfully practiced the long-term self-isolation (with complete self-sufficiency), which became popular in the Covid-19 period.

The Evenks of Northern Baikal are treated in ways similar to the practice of a modern paramedic. They focus on using medicines with a broad spectrum of action. The rich knowledge accumulated over generations about the properties of minerals (potassium alum for fusing bones), animals (fat of dogs, seals, bears for lung diseases) and plants (golden root, badan, yanda) allow Evenki to find medicines around them. It is especially important that they know how to get necessary medicines in various landscapes, store them in a concentrated form, combine with animals and mineral sources of medicines. It is also noteworthy that, turning to shamanistic rituals for healing, Evenks willingly go for help to modern medicine, if such an opportunity arises [36, Davydov V.N., Belyaeva-Sachuk V.A., Davydova E.A., p. 60–69].

Threats of climate change

The observed climate change in the Arctic is nonlinear, and its nature is not completely clear, given the correlation between human influence and natural cycles of cooling and warming. Global natural cycles are known to have occurred about every 400 thousand years, but scientists also note many smaller cycles during meteorological observations. According to some reports, in the period between 2020 and 2030, Arctic warming will slow down, and ice cover in the Barents

and Kara Seas will grow. But some experts still believe that the Arctic Ocean will be free of ice by 2050 [37, Voronkov L.S., p. 9–18]. The ambiguity of assessments becomes a pretext for various political speculations.

In any case, in recent decades, the Arctic has been warming 2–2.5 times faster than the global average. According to Roshydromet, for the period 1990–2019, the average annual temperature rise in the Arctic was 2.4 degrees, and in the Kara Sea — 4.7 degrees [24]. The melting of permafrost is accompanied by the release of carbon dioxide and methane into the atmosphere. In addition, methane is released from gas hydrates located on the sea shelf. These processes, according to the principle of feedback, accelerate climate warming [38, Zhilina I.Yu., p. 70], lead to reduction of the ice cover in the Arctic and melting of permafrost.

The influence of climate change manifests itself in a non-uniform way in the territorial dimension. The most noticeable negative consequences occur in the coastal zone and on the islands of the Arctic seas located in high latitudes. This is associated with a complex system of interconnections and mutual influence of the state of atmosphere, ice and the Arctic Ocean [39, Davydov A.N., Mikhailova G.V., p. 29–34].

Permafrost degradation leads to ground subsidence and destruction of industrial facilities, residential buildings, power lines, bridges and roads. On Yamal, the destruction of coastlines and the shallowing of river mouths due to water erosion of the banks were recorded. As a result, navigation in the mouths of the Ob and Irtysh rivers becomes difficult. Ice melting in the sea is accompanied by increased winds and the formation of high waves, leading to deterioration of navigation conditions and destruction of the sea coastline, ports, jetties and protective structures [40, Khvostova M.S., p. 9–15]. According to some reports, the shores of the Laptev Sea and the East-Siberian Sea are receding by about 0.8 m per year [25]. The growing wave activity can have the opposite effect on further ice melting.

Climate change is accompanied by an increase in the risks of natural disasters, the origin and dynamics of which are insufficiently studied. Scientists refer to such threats as “cryovolcanism”, when volcanoes spew water, ammonia and methane. Since 2014, 17 huge craters from gas explosions, which are formed under the permafrost layer, have been discovered on Yamal.

Another hazardous phenomenon is glacial lakes, formed by melting glaciers in depressions of the Earth's crust. As the ice melts, the rocks along the shores of the lake can suddenly collapse due to geophysical processes (rock relaxation). For example, the melting of the Moscow State University glacier in the Polar Urals threatens with the release of a huge mass of water into a narrow

[24] Doklad ob osobennostyakh klimata na territorii Rossiyskoy Federatsii za 2019 god [Report on climate features in the territory of the Russian Federation for 2019]. Moscow, 2020. 97 p. URL: http://cc.voeikovmgo.ru/images/dokumenty/2020/o-klimate-rf-2019.pdf (accessed 03 August 2021).

[25] Zheleznyak M. RF teryaet ezhegodno okolo 11 kv. km sushi iz-za tayaniya vechnoy merzloty [RF annually loses about 11 square km of land due to melting permafrost]. URL: https://www.arms-expo.ru/news/incidents-and-crime/mikhail-zheleznyak-rf-teryaet-ezhegodno-okolo-11-kv-km-sushi-iz-zatayaniya-vechnoy-merzloty/ (accessed 03 August 2021).

valley and subsequent destruction. Over the past 50 years, the area of glacial lakes on the planet has increased by half.

The process of acidification of the Arctic Ocean is associated with warming, when cold water is quickly saturated with carbon dioxide from the atmosphere and river runoff and becomes less alkaline. The acidification mechanism is not completely clear, but it is obvious that more acidic water not only dissolves the shells and skeletons of marine organisms, but also disrupts food chains, and ultimately will affect commercial fishing and marine fishing of indigenous peoples [40, Khvostova M.S., p. 12–15].

Further warming and the accompanying phenomena endanger the survival of indigenous peoples, since they significantly change the habitat and the traditional way of life. Along with the melting of ice, the living conditions for some biological species, including polar bears, seals, and walruses, are significantly worsening. The range of arctic fish species is shrinking, which are being replaced by species that are more southerly. Large land areas will be subject to waterlogging and flooding. Increases in annual river flows and their seasonal redistribution, with an increase in the power of spring floods are being observed. The change in the water regime, along with warming, is accompanied by bacterial pollution of streams and lakes, where the aboriginal peoples get drinking water. There is swamping of some territories and drying up of others, a reduction in the area of the tundra, abrupt changes in meteorological conditions. In periods of winter warming, with snow and rain, the tundra becomes covered in ice, and reindeer starve to death. The largest loss of livestock occurred in 2013 in Yamal, where 61 thousand heads out of 340 thousand deer died. In summer, nomads face the instability of the landscape and rivers due to thawing of permafrost [38, Zhilina I.Yu., p. 82].

Warming threatens biological emergencies. The melting of permafrost in 2016 resulted in an outbreak of anthrax in Yamal, leading to the mass death of more than 2.5 thousand deer and human diseases. The disease had not manifested itself for more than 70 years and came as a surprise. An attempt to find a solution to overcome the crisis showed that government policy lacks flexibility through feedback from the indigenous population. On the part of biologists and officials, the question of reducing the reindeer herds was raised in order to stop the disease and at the same time avoid the depletion of pastures. From the indigenous peoples' perspective, a greater number of reindeer is a measure of well-being. Management decisions of state officials should take into account the opinion of the leaders of reindeer husbandry, who ensured rapid growth in Yamal in conditions when the country experienced a decline in production in most industries [11, Golovnev A.V., p. 164–165]. Similar outbreaks have occurred in the past, leading to the formation of about 60 places where animals have died, and as the permafrost thaws, they can again become sources of disease. Moreover, reindeer breeders do not always know these places and unaccounted cattle burial grounds, and the veterinary service of Yamal is poorly funded [40, Khvostova M.S., p. 11–12]. There is a high probability that such a situation will be repeated in other regions of the

Russian Arctic, therefore in 2021 Russia launched a project (implemented by the North-Eastern Federal University in Yakutsk (NEFU) together with the State Research Center of Virology and Biotechnology "Vector") to study prehistoric viruses that have survived in the permafrost and that may emerge as a result of climate change

At the same time the nature management of the northern peoples has a high adaptive potential due to climate changes that have happened more than once in history (against the background of the Small Ice Age of the 14th–19th centuries, there were warming periods). The adaptability of the Sami communities of the Kola Peninsula was facilitated by a combination of lake and sea fishing, hunting for animals, gathering, and reindeer husbandry. The choice of the way of management corresponded to the season, to the peculiarities of the landscape and to the climatic changes. The adaptability of the Sami to external conditions was also facilitated by cultural flexibility, for example, in the 4th century, they were active in fur trade with the Roman provinces. In turn, this led to a decrease in the settled rate. The expansion of the fur trade was related to the relative cooling of Europe. Adaptability helped the Sami, like other peoples of the North, to maintain their identity for several thousand years [41, Murashko O.A., p. 63–70].

Conclusion

In order to solve the problem of human security in the Russian Arctic, it is necessary to develop a model of modernisation, which is based not on subsidised livelihood, but on increasing the viability and self-development of peoples permanently living here. The archaic features of mentality and way of life of the population of the Far North help to clarify not only the nature of threats, but also approaches to ensuring safe and sustainable life. An acceptable level of human security can be achieved through the creation of a set of inseparable measures: economic, social, cultural and environmental ones.

The policy to protect the traditional way of life of the inhabitants of the AZRF requires a comprehensive approach, which:

- takes into account not only the interests of indigenous peoples of the North, but also all the citizens of Russia living there, in order to avoid the effect of reverse discrimination. At the same time, it should be borne in mind that indigenous peoples are in the most vulnerable position;
- does not single out the issue of ethnicity as a basis for special rights, creating equal conditions for cultural and socio-economic development for all groups of the population, because historically, different peoples and religious confessions have always coexisted quite peacefully in the North;
- creates conditions for multistructurality and reasonable and flexible combination of traditional and modern economic and social practices. At the same time, it is necessary to take into account the low competitiveness of traditional types of farming, which is asso-

ciated with small production volumes, transport costs, and the lack of modern technologies for the complex processing of raw materials.

For effective neutralisation of threats to the Arctic environment, it is advisable to involve indigenous peoples not only to monitor the environment in the interests of science or natural resources control, but also to invite them to discuss and develop government decisions on sustainable environmental management.

Strengthening the demographic potential requires consolidating of population, focused on a long-term stay in the Arctic. This is facilitated by creation of attractive living conditions not only in large cities, but also in small settlements. The education system in Arctic universities should be restored and aimed at training personnel in demand in the Russian Arctic.

In order to maintain health, treat and prevent diseases, it is necessary to eliminate the shortage of medical institutions and medical personnel, and to develop telemedicine. At the same time, it is necessary to find ways of a reasonable combination of achievements of modern medicine and traditional methods of treatment, which is especially important for indigenous peoples leading a nomadic and semi-nomadic lifestyle.

The consequences of climate change for the indigenous population will be predominantly negative due to the fact that the habitat will change significantly, which will also cause the erosion of the traditional way of life. The nature, depth and stability of changes require scientific study. At the same time, experience shows that indigenous peoples have their own adaptation mechanisms that have shown their effectiveness in history, and their knowledge about the environment will allow them to find optimal solutions to neutralise emerging threats and use them in public policy.

The issue of human security today has acquired a special meaning for the Russian Arctic in the context of implementation of one of the most important tasks of the state policy in the Arctic — the sustainable development of the region. The successful development of AZRF presupposes the creation of basis for the country's socio-economic development, and this requires neutralisation of existing challenges and threats in the field of human security. The concept of human security seems to be quite applicable for documents regulating the state socio-economic, cultural and environmental policy in the Russian Arctic. It allows the formation of a single set of all the above-mentioned problems.

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Tourism and Recreation of the Russian Arctic Population: Opportunities and Limitations *

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Abstract. The Arctic regions, being on the one hand an important resource for socio-economic development of the state, and on the other hand, characterized by harsh natural and climatic conditions of work and life, require special attention to achieving quality of life of the local population. The sphere of tourism and recreation is considered as a tool for restoration of physical and emotional forces of a person. The purpose of the study is to identify the opportunities and limitations of tourism and recreation for the residents of the Arctic regions of the Russian Federation. The study is based on the calculation of indices for economic, socio-economic and infrastructural indicators that characterize the opportunities and limitations of tourism and recreation organization by the population of the Arctic regions of Russia in the regional context. The results revealed the presence of high financial opportunities in the organization of tourist trips and leisure activities. There is a significant level of activity aimed at promoting inbound domestic and international tourism. It is revealed that the residents of the Arctic regions have a relatively low level of spending on recreation in the territory of permanent residence. The problems identified in the course of research work on recreation of residents of the Arctic regions in the territory of permanent residence require a more systematic and comprehensive approach. The results obtained can be used in strategic and policy documents on the development of the Arctic regions of the Russian Federation.
Keywords: *Arctic region, population, tourism and recreation, priority spending index.*

Introduction

The Arctic territories are a significant resource for the socio-economic development of the Russian Federation, actualizing the problems of reproduction, attraction and retention of the population, especially young people. One of the tools for restoring the physical and emotional health of a person is the sphere of tourism and recreation. Residents of Russia's Arctic regions are supposedly the most vulnerable in terms of harsh natural and climatic conditions of living and life, so they need full recreation and rest more than others. In this regard, the answer to the question of access to recreation and tourism for the population of the Russian Arctic is of particular importance. The present study is devoted to this topical issue; its purpose is to identify the possibilities and limitations of tourism and recreation for residents of the Arctic regions of the Russian Federation.

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Literature review

Arctic territories are a significant resource for the socio-economic development of Russia. The Arctic zone is reflected in 15 state programs of the Russian Federation as a priority territory. The scientific community pays close attention to the problems of economic development of the Arctic, studies of the demographic potential [1, Fauzer V.V., p. 71], environmental aspects of territory development [2, Ogorodov S.A., p. 44]. In the study [1] V.V. Fauser indicates the reasons for the destruction of the demographic and labour potential of the northern territories of Russia, indicating simultaneously its high demand for its availability and efficiency for the Russian economy. Most researchers emphasize the special economic and climatic characteristics of the Arctic territories: discomfortable natural and climatic conditions for living, unfavorable ecological situation, which have a negative impact on the lifestyle and quality of life [3, Moroshkina M.V., Potasheva O.V., p. 375]. The remoteness of the Arctic regions from the country's economic centre is reflected in the industrial, tourist and migration attractiveness of the territories, the impact of periphery is reflected in most economic directions of development [4, Fauzer V.V., p. 12].

In recent years, the problems of Arctic tourism development, tourism in the Northern territories has become increasingly important in scientific research. Theoretical and methodological foundations of tourism development are presented in the works of foreign [5, Hall C.M., Saarinen J., p. 450; 6, Stewart E. J., Draper D., Johnston E., p. 393; 7, Stewart E.J.] and Russian [8, Lukin Yu.F., p. 214; 9, Lukin Yu.F., p. 102; 10, Kharlampieva N.K., p. 126] researchers. Modern studies of tourism development in the regions of the Arctic Zone of the Russian Federation are mainly aimed at assessing the recreational potential of the Arctic and attracting the flow of tourists [11, Yakovchuk A.A., p. 61; 9, Lukin Yu.F., p. 107]. Besides, the works present modern opportunities and challenges for the development of the tourist sphere of activity in these territories [12, Kuklina V., Kuklina M., p. 381; 11, Yakovchuk A.A., p. 59], the development of Arctic (polar) tourism [7, Stewart E.J. et al., p. 81; 12, Kuklina V., Kuklina M., p. 383; 13] and cruise tourism [14, Glushchenko E.V., p. 4; 15, Pashkevich A., Lamers M.]. Approaches of researchers to assess the level of tourism development consist in the formation of a system of indicators and features of tourism industry development activity at the regional level [16, Kumar M., Prashar S., Jana R.K., p. 29]. There are groundworks in assessing the level of development of the tourist infrastructure in the northern regions, determining the possibility of effective functioning of tourism business, the use of tourist and recreational potential of territories without damage to the environment [17, Stepanova S.V., p. 220].

It is necessary to note the contribution of Yu.F. Lukin, professor of Northern Arctic Federal University named after M.V. Lomonosov, in the development of ideas about the potential of Arctic tourism in Russia. The scientist has thoroughly worked out the issues of tourist and recreational potential in the regional context, proposed a tourist rating of the Russian Arctic, strategic opportunities for the development of tourism in the Russian Arctic and the North [8, Lukin Yu.F., p. 213;

9, Lukin Yu.F., p. 112]. It is worth noting the collective Russian-American work, revealing the problems of Russian Arctic tourism development in the European and Siberian zones [12, Kuklina V., Kuklina M. et al., p. 370]. Some works are focused on the study of various types of tourism in the regional context. As an example, it is necessary to mention the problems of ethnographic tourism [18, Loktev R.I., p. 109]. The importance of works devoted to the problems of ecological tourism in the aspect of conservation and reproduction of natural potential and nature protection is high [19, Drozdov V.V., Eismont V.Yu., p. 250; 20, Barre S., Mager P.; 21, Huijbens E., Lamers M.].

Studies of the situation of young people in the regions of the Arctic zone of Russia reveal a negative trend of its outflow (demographic crisis, inability to get the desired education, professional fulfillment, ensuring a higher standard of living), characteristic of the regions under consideration [22, Simakova A.V., p. 140; 23, Simakova A.V., Gurtov V.A.]. A.V. Simakova's research, revealing the problem of youth mobility in the Russian Arctic, identifies as key factors “the specifics of the Arctic regions (harsh climatic conditions, remoteness from the center, single-industry development)”, as well as the characteristics of youth “as the most mobile social group, ready to implement ambitious life tasks” [22, Simakova A.V.]. Thus, more than half of 11th grade graduates (up to 88.7%, Chukotka Autonomous Okrug) leave the region of residence for the purpose of vocational education due to the limited opportunity to receive it locally, choosing educational institutions of cities of federal significance or neighboring regions. The authors emphasize the importance of the training system “for the development of the economy of the Arctic zone of Russia, the implementation of large-scale investment projects, the functioning of territories of advanced development” [23, Simakova A.V., Gurtov V.A.]. The study of scientists of the Karelian Research Centre, aimed at measuring the recreational mobility of the population on the example of the Republic of Karelia, seems to be significant. The study results showed the high importance of organized recreation and tourism accessibility as a prerequisite for effective recreation of the population, contributing to “restoration of vitality spent in the process of labour and being a necessary condition for expanded reproductive forces of society” [24, Morozova T.V., Murina S.G., Belaya R.V., p. 62]. The positive impact of travel on labour productivity is confirmed by a collective study of Japanese scientists [25, Miyakawa E., Kawakubo A., Oguchi T., p. 431]. As one of the directions of preserving and accumulating human potential, improving the quality of public health, confirmed by the practical results of sanatorium-resort health improvement and rehabilitation, researchers point out the need to develop sanatorium-resort activities that require state support [26, Dyakonova M.V., Stepanova S.V., p. 89].

However, it should be noted that there are few scientific works on the study of the possibilities of creating recreational conditions for the residents of the Arctic regions, where living and life activities can be classified as harsh. Geographical remoteness from the economic activity of Russian markets, vulnerable ecosystems and difficult natural conditions for the residents of the Arctic regions of Russia should be compensated by the creation of opportunities for physical and

emotional recreation. The above-mentioned actualizes the problems of researching the possibilities of organizing leisure and recreation by the population of the Arctic zone of Russia, especially young people, in the territory of permanent residence. The present study is devoted to this topical issue; its purpose is to identify the possibilities and limitations of tourism and recreation for residents of the Arctic regions of the Russian Federation.

Research methodology

The study of tourist destination accessibility for the residents of Russia's Arctic regions involves an assessment of economic, socio-economic and infrastructural factors. As part of the study, indicators characterizing various significant socio-economic aspects of the possibility of recreation organization by the population and simultaneously available in the information and communication space in the context of all Russian regions (2019) were selected. The determination of the availability of organizing tourism and recreation events by the population of the Russian Arctic regions was made on the basis of comparisons in the following categories:

- regions fully related to the Russian Arctic (4: Murmansk Oblast, Nenets Autonomous Okrug, Yamalo-Nenets Autonomous Okrug, Chukotka Autonomous Okrug);
- regions partially related to the Arctic (5: Republic of Karelia, Republic of Komi, Arkhangelsk Oblast, Krasnoyarsk Krai, Republic of Yakutia,);
- other subjects of the Russian Federation (86).

The study is based on the calculation of indices for economic, socio-economic and infrastructural indicators characterizing the possibilities and limitations of organizing tourism and leisure activities by the population of the Arctic regions of Russia in the regional context [27, Moroshkina M.V., Potasheva O.V., Gienko G.V.].

Taking into account the economic factor that determines the possibilities of making a tourist trip and choosing a destination for the population of Russian regions, four main indicators were selected for the study:

- index of priority spending on recreation and cultural events;
- index of priority spending on hotel and catering facilities;
- index of the average per capita income of the region's population;
- international tourist departure rate.

Calculation of regional indices (quotient to average for the Russian Federation) allows eliminating different dimensionality of the chosen parameters, while simultaneously revealing the possibilities of comparing the subjects of the Russian Federation.

The economic component was considered on the basis of analysis and evaluation of indices of priority spending on recreation and leisure services by the population in the regional context. These two indices are based on data of the structure of household according to the results of a

sample survey of household budgets (%) and are calculated using the following formulas (formulas 1 and 2). The first one assesses the propensity to spend on recreation and cultural activities of the population in the regions.

Formula 1

$$I_{ОиКМ} = \frac{h_{i\ ОиКМ}}{\bar{h}\ ОиКМ}$$

where:

I ОиКМ — index of priority spending on recreation and cultural events

$h_{iОиКМ}$ — share of expenses on recreation services and cultural events in the total expenses of the population of the i-th region

$\bar{h}$ ОиКМ — the same indicator for the whole country

The second formula is the propensity of the local population to spend money for the services of hotels and catering enterprises (restaurants, cafes, bars).

Formula 2

$$I_{гост\ и\ питан} = \frac{h_{i\ гост\ и\ питан}}{\bar{h}\ гост\ и\ питан}$$

where:

I гост и питан — index of priority spending on hotel and catering facilities

$h_{i\ гост\ и\ питан}$ — share of spending on recreation services and cultural events in the total expenditures of the population of the i-th region

$\bar{h}$ гост и питан — the same indicator for the whole country

From the point of view of economic affordability, the calculation of the index of per capita income, which assesses the financial capabilities of residents of Russian regions, is significant (formula 3).

Formula 3

$$I_{aver} = \frac{I_i}{I}$$

where:

Ii — average per capita income of the region's population, rubles

I — the same indicator for the whole country

Special attention should be paid to the coefficient of international tourist departure, calculated as the ratio of the number of people who went on vacation abroad to the average annual population, which allows estimating tourist mobility of the population of Russian regions abroad per 1 thousand people.

The socio-economic component is analyzed on the basis of migration data. In order to assess the infrastructural component of the availability of tourism and recreation accessibility for the

population of the Russian Arctic regions on the territory of their permanent residence, it is sufficient and reasonable to select five indicators and calculate the median indices on their basis: the number of health resorts and places there, the number of museums and theaters of the Ministry of Culture of the Russian Federation , as well as the development of public catering infrastructure (restaurants, cafes, bars).

The median indices are calculated in the paper.

Research results

According to statistical data, 5.3 million people lived in the regions fully or partially belonging to the Arctic zone of the Russian Federation as of 01.01.2019. Migration processes (table 1) reveal a high level of interregional migration of the population of the Russian Arctic regions to other Russian constituent entities (negative balance equal to 9.6 thousand people). At the same time, the decrease in the number due to interregional migration in the regions completely related to the AZRF in 2019 was 0.7%, in the regions of partial entry into the Arctic zone the indicator is lower — 0.58%. This actualizes the problem of creating a comfortable living environment and the need for conditions to recover physical and emotional strength of local residents.

Table 1

Migration in the Russian Arctic regions, 2019 [1]

Arctic regions	non-CIS countries		CIS countries		interregional migration, RF	
	arrived	declined	arrived	declined	arrived	declined
regions fully related to the Russian Arctic						
Murmansk Oblast	105	112	4008	2778	31186	37272
Nenets Autonomous Okrug	3	3	282	128	991	1027
Yamalo-Nenets Autonomous Okrug	48	33	5776	3845	27192	30456
Chukotka Autonomous Okrug	913	149	0	0	3997	4207
regions partly related to the Russian Arctic						
Republic of Karelia	215	513	1209	987	7721	8353
Komi Republic	145	75	1974	1416	26423	34840
Arkhangelsk Oblast	122	244	1908	898	15587	19467
Krasnoyarsk Krai	16381	14042	14399	12272	103409	108526
Republic of Yakutia	3112	874	3000	835	39226	44404
TOTAL	21044	16045	32556	23159	255732	288552

The calculation of indices that determine the financial feasibility of tourist travel and the choice of destination for the population of Russian regions reveals the leading position of the Arctic territories (Table 2). High indicators of average per capita income are determined by high percentages of northern and regional coefficients, amounting to 60–140%. In addition to the high av-

[1] Compiled by the authors based on the source: FSSS data.

erage per capita income, it is necessary to indicate the increased duration of annual paid leave in comparison with other regions, ranging from 44 to 52 days.

Table 2

Comparative characteristics of Russian regions by indices of the economic factor for the implementation of tourism and recreation by the population, median [2]

№	Index	Russian Arctic regions	regions partly related to the Russian Arctic	other regions
1	priority spending index for recreation and cultural events	0.56	0.75	0.79
2	index of priority spending of funds for receiving services of hotel enterprises and catering facilities	0.2	0.8	0.66
3	index of per capita money income of the region's population	2.38	1.02	0.77
4	international tourist departure rate	31.35	62.1	42.89

Thus, the regions that are fully related to the Arctic zone are more than three times (median) ahead of the other Russian constituent entities. At the same time, the nine Arctic regions under study are significantly inferior to the rest of the state in terms of priority spending on recreation, cultural events, hotel and catering services. This may be due to insignificant opportunities and / or lack of facilities for leisure and recreation in places of permanent residence in comparison with hinterland regions of the country. At the same time, the regions of the Russian Arctic are characterized by a high per capita index of income, which provides greater opportunities, compared to the rest of the Russian Federation, to organize and implement recreational and recreational activities. The analysis of the tourist activity of the population of the regions fully related to the Arctic, in comparison with the rest of the country, in the context of recreation abroad, shows the lag of the former in both real and specific indicators. Thus, the outbound flow abroad in 2019 from the four Arctic regions of Russia on average (median) amounted to 18.8 thousand people, in nine Arctic regions — 35.3 thousand people and 55.3 thousand people for the rest of the subjects of the Russian Federation. Taking into account the high, compared with the average Russian indicators, levels of per capita income of the population of the Russian Arctic regions, the data may indicate the demand for domestic tourism. Thus, according to A.Yu. Aleksandrova, there is a “reorientation of consumer demand for domestic travel” in Russia due to the introduction of package tours [28, Aleksandrova A.Yu., p. 102].

Taking into account the high importance of organized recreation and accessibility of tourism as a prerequisite for effective recreation of the population, contributing to the restoration of vitality and being a necessary condition for expanded reproduction of population [24 Morozova T.V., Murina S.G., Belaya R.V., p. 63], serious concerns are caused by the average specific indicators of the development of the health and recreation sphere in the regions included in the Arctic zone of the Russian Federation (table 3). For example, Republic of Karelia is characterized by

[2] Compiled by the authors based on the source: FSSS data.

unique medicinal and natural resources (the first resort in Russia was founded there). There is also a steady nationwide trend of reducing the enterprises of the health resort sphere in the region (by 50% by 2016); mainly at the expense of health resorts and children's sanatoriums. At the same time, more than half of children there need health improvement, and about a third — sanatorium treatment [26, Dyakonova M.V., Stepanova S.V., p. 87].

Table 3

Comparative characteristics of the development of the tourist infrastructure of Russian regions in 2019, per 1000 people (median) [3]

№	Index	Russian Arctic regions	regions partly related to the Russian Arctic	other regions
1	number of spa facilities	0.0065	0.016	0.012
2	number of places in sanatoriums	0.26	1.538	30.91
3	number of museums of the Ministry of Culture of the Russian Federation	0.049	0.029	0.018
4	number of theaters of the Ministry of Culture of the Russian Federation	0	0.0065	0.004
5	number of restaurants, cafes, bars	0.85	0.7	0.634

The average indicators of the number of theaters of the Ministry of Culture of the Russian Federation (MCRF) look just as depressing, which highlights the problem of the complexity of organising and conducting cultural leisure activities. In total, there are nine theatres of the MCRF operating in the Arctic zone. At the same time, there are no theatres in the three regions, which are fully related to the Russian Arctic (the exception is the Murmansk Oblast, 2 units). In addition, only six culture and recreation parks of the MCRF operate on the entire territory of the Russian Arctic, while the autonomous okrugs do not have any of them. By comparison, there is an average of 3.4 such parks per average Russian region as of 2019.

In addition, previous studies of tourist infrastructure assessment based on the calculation of an integral indicator assessing the level of development of infrastructure for accommodation, catering, leisure and recreation (2012), indicate low values in relation to the average Russian indicator. For example, in the Murmansk Oblast, the infrastructure for accommodation is 0.64, for food — 0.58 and for leisure and recreation — 0.35; in the Chukotka Autonomous Okrug — 0.11, 0.03 and 0.26, respectively [16].

Exceeding the Russian average specific indicators of the number of museums of the Ministry of Culture and the number of catering facilities (restaurants, cafes, bars), on the one hand, reveal the recreation opportunities for the local population of the Arctic regions, on the other hand, indicate the activity of efforts to stimulate inbound domestic and international tourism. Thus, one tenth of all international airports in Russia are located in the Arctic regions (table 4).

[3] Compiled by the authors based on the source: FSSS data.

Table 4

List of (aerodromes) open for international aircraft flights (01.10.2020) and airports of federal significance in the Russian Arctic [4,5 6]

№	airport name	AZRF region	airport status
regions fully related to the Russian Arctic			
1	Murmansk named after Nicholas II	Murmansk Oblast	airport of the administrative center (capital) of a constituent entity of the Russian Federation, **international**
3	Arkhangelsk (Talagi) named after F.A. Abramov	Arkhangelsk Oblast	airport of the administrative center (capital) of a constituent entity of the Russian Federation, **international**
2	Varandey *	Nenets Autonomous Okrug	**international**
4	Naryan-Mar	Nenets Autonomous Okrug	airport of the administrative center (capital) of a constituent entity of the Russian Federation
5	Sabetta	Yamalo-Nenets Autonomous Okrug	**international**
6	Salekhard	Yamalo-Nenets Autonomous Okrug	airport of the administrative center (capital) of a constituent entity of the Russian Federation
7	Anadyr (Ugolnyy) named after Yu.S. Rytkheu **	Chukotka Autonomous Okrug	airport of the administrative center (capital) of a constituent entity of the Russian Federation, **international**
8	Providence Bay **	Chukotka Autonomous Okrug	**international**
regions partly related to the Russian Arctic			
9	Petrozavodsk **	Republic of Karelia	airport of the administrative center (capital) of a constituent entity of the Russian Federation, **international**
10	Syktyvkar named after P.A. Istomin	Komi Republic	airport of the administrative center (capital) of a constituent entity of the Russian Federation, **international**
11	Krasnoyarsk (Emelyanovo) named after D.A. Hvorostovskiy	Krasnoyarsk Krai	airport of the administrative center (capital) of a constituent entity of the Russian Federation, **international**
12	Yakutsk named after Platon Oyunskiy	The Republic of Sakha (Yakutia)	airport of the administrative center (capital) of a constituent entity of the Russian Federation, **international**

** — airports without duly opened checkpoints*

*** — airports where the checkpoint across the state border of the Russian Federation operates on an irregular basis*

[4] List of airports as of 01.10.2020. Official website of the Federal Air Transport Agency. URL: https://favt.gov.ru/ (accessed 11 May 2021).

[5] List of airports of federal importance. URL: https://favt.gov.ru/dejatelnost-ajeroporty-i-ajerodromy-perechen-aeroportov/ (accessed 11 May 2021).

[6] Compiled by the authors based on the source: the official website of the Federal Air Transport Agency. URL: https://favt.gov.ru/ (accessed 11 May 2021).

Conclusion

The Arctic regions, which, on the one hand, are a significant resource for socio-economic development of the state, and, on the other hand, are characterized by harsh natural and climatic conditions of work and life, require special attention to achieving the quality of life of the local population.

Speaking about the importance of the tourism and recreation sector as an indispensable condition for effective restoration of physical and emotional forces of a person, contributing to the expanded reproduction of society, it is necessary to note, that the possibilities of its organization and realization demand special attention. In this regard, the problem of recreation accessibility and organization by the population of the Arctic zone of Russia, especially young people, needs particular emphasis from the standpoint of opportunities and limitations in the territory of permanent residence.

The study has identified a number of opportunities and limitations of tourism and recreation for residents of the Russian Arctic regions. On the one hand, residents of these regions have greater opportunities in organizing tourist trips and leisure activities, which is determined by financial indicators and duration of vacations. In addition, the Arctic zone is characterized by high indices of the number of museums of the Russian Ministry of Culture and the number of catering enterprises (restaurants, cafes, bars), which may indicate the opportunities for leisure and recreation for the local population, as well as the active efforts to stimulate inbound domestic and international tourist flows. Moreover, one tenth of all international airports in Russia are located there. On the other hand, extremely low average indices of priority spending on rest indicate the limited opportunities for local leisure and recreation during short weekends, vacations and free time in the territory of permanent residence. The extremely low median values of the indices of local health resort activities, the low infrastructure provision with parks of culture and rest, as well as theaters of the Ministry of Culture of the Russian Federation, are also a cause for concern. The abovementioned actualizes the problem of organizing effective recreation for the residents of the Arctic regions on the territory of permanent residence, contributing to the restoration of vitality and being a prerequisite for expanded reproduction of the population.

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Socio-Demographic Processes in the Russian Arctic in Statistical Assessments and Population Surveys *

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Abstract. Specificity of modern social processes determines close attention of the global scientific community to socio-demographic processes in the Arctic. The article examines systemic and recent social and demographic processes in the Russian Arctic, determined both by the immanent specifics of the Arctic (generating active migration processes, the phenomenon of city-forming enterprises, etc.) and by the all-Russian social reforms (in particular, the pension reform). The methodological peculiarity of the article is to present socio-demographic processes through the analysis of quantitative indicators, as well as through the reflection in the consciousness of the Arctic population (highlighting workers of city-forming enterprises) of modern factors of influence that determine their attitude to residence and work in the Arctic. The analysis of the results of settlement processes in the Arctic regions has been carried out, indicating an unstable stabilization of the population situation in the Nenets, Chukotka and Yamalo-Nenets okrugs, provided by various factors; it revealed the preservation of the negative trend of population decline in the Murmansk Oblast. Statistical analysis and surveys have revealed socio-demographic problems caused by the pension reform, which can aggravate the problem of the outflow of working-age population from the Arctic territories. It was found out that the reaction of city-forming enterprise employees differs from the "all-Arctic" reaction of the population on the grounds confirming the stabilizing role of city-forming enterprises in socio-demographic processes in the Arctic.

Keywords: *Arctic, socio-demographic process, problem, statistical analysis, survey, migration mood, city-forming enterprise.*

Introduction

This work is within the framework of one of the most popular topics of world studies of the socio-economic space of the North and the Arctic, aimed at identifying the specifics of the course of socio-demographic processes [1, Zaikov K.S., Kondratov N.A., Kudryashova E.V., Lipina S.A.,

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Chistobaev A.I., pp. 7–20; 2, Serova N., Korchak E., Skufina T., p. 2–3; 3, Heininen L., pp. 196–200]. Such special attention of the scientific community is explained by a whole complex of reasons that can be broken down on the following grounds.

The first reason is that socio-demographic trends reflect both objective economic factors and management [4, Kudryashova E.V., Lipina S.A., Zaikov K.S., Bocharova L.K., p. 447; 5, Schmidt J., Aanesen M., Klokov K., Khrutschev S., Hausner V., pp. 253–262; 6, Fauser V.V., Smirnov A.V., p. 113; 7, Volkov A.]. The second one is the special conditions of functioning of the North and the Arctic society, generated by geographic, climatic features, the action of environmental factors [8, Korchak E.A., Serova N.A., Emelyanova E.E., Yakovchuk A.A.; 9, Samarina V., Skufina T., Samarin A., pp. 707–710; 10, Volkov A.D., Tishkov S.V., Karginova-Gubinova V.V., Shcherbak A.P., pp. 205–230; 11, Markkula I., Turunen M., Rasmus S., p. 694]. The third objective is an increase of the social meaning of the Arctic, which is understood in many ways, ranging from the increasing importance of the Arctic and (or) northern society (often viewed as a special phenomenon and a special social value of modern society, requiring increased efforts to preserve) to the rising economic importance of Arctic resources [12, Kryukov V.A., Kryukov Ya.V., p. 27–30; 13, Gagiev N.N., Goncharenko L.P., Sybachin S.A., Shestakova A.A., p. 115–120; 14, Fauser V.V., Smirnov A.V., pp. 5–8; 15, Volkov A., Tishkov S .; 16, Bjerregaard P., Dahl-Petersen I., Larsen C., pp. 152–153; 17, Kryukov V.A., Kryukov Ya.V., Kuznetsov S.V., pp. 153–185; 18, Challenges and threats to national security ..., pp. 10–34; 19, Markin V.V., Silin A.N., pp. 76–80].

The most complicated interaction of these grounds generates a tangle of contradictions, so intricate and complex that scientists, unraveling it, do not repeat the results of previous studies, but find new knowledge characterizing the manifestation of specific socio-demographic processes, marking new factors and conditions of future development of the North and the Arctic. Therefore, in recent years, more and more books have appeared both in Russia and abroad, in which numerous, multidimensional, and even contradictory views on the specifics of socio-demographic processes manifestation in the northern territories of Russia and the world are presented.

Among these publications, the authors would especially like to note the large-scale collective monograph, which unites under the scientific editorship of Academician B.N. Porfiriev the multigenerational views of scientific teams of the Russian Academy of Sciences, traditionally engaged in the problems of the North development and its Arctic component — “Socio-Economic Problems of the Russian Arctic in the Research of the Institutes of the Russian Academy of Sciences: History, Modernity, Prospects“ [20]. The authors also note the review articles that appeared in the journal “Arctic and North” thanks to a selfless initiative of the RFBR to strengthen the positions of the best scientific Russian journals in the global information space through the publication of review articles on the most relevant and fundamentally significant topics. In these works, special attention is paid to the socio-demographic component of the development of the North and the

Arctic [21, Skufina T.P., Mitroshina M.N., pp. 89–90, 93–106; 22, Skufyina T.P., Korchak E.A., Baranov S.V., pp. 48–50, 52, 57–62, 65–70].

In this paper, the authors will continue the discussion of current and future development problems of the Arctic, proposing to consider both systemic and recent socio-demographic processes determined by the internal characteristics of the Arctic (for example, mono-dependence of the economy, active migration processes, the phenomenon of city-forming enterprises, etc.) and all-Russian social reforms (in particular, the pension reform). The significance of the pension reform factor is explained not only by the change in the size of the able-bodied population, but also by the very complex and ambiguous nature of its impact on the migration attitude of the Arctic population, which requires a detailed study [23, Baranov S.V., Skufina T.P., Gushchina I.A., pp. 162–170; 24, Toropushina E.E., pp. 619–624]. It should be noted that the study does not consider the impact of the COVID-19 pandemic on social and demographic processes. This is due to insufficient accumulation of statistical material; the inconsistency of the existing assessments of the current and forecast dynamics, set in the official, constantly updated, prognoses and plans for the socio-economic development of the regions of the Arctic zone of the Russian Federation (AZRF); changes of industrial plans of city-forming enterprises working in the Arctic, not reflected in their strategic priorities of development. The need for certainty of forecasts and plans of the state and the corporate sector is determined by the fact that the pandemic conditions have increased the role of budgetary policy and the influence of corporations on socio-demographic processes, especially in the Arctic [22, Skufyina T.P., Korchak E.A., Baranov S.V., pp. 53–66; 25, Shokhin A.N., Akindinova N.V., Astrov V.Yu., Gurvich E.T., Zamulin O.A., Klepach A.N., Mau V.A., Orlova N.V., pp. 8–15, 22–27]. Therefore, it is difficult to make a benign quantitative analysis of the impact of the COVID-19 pandemic factor on socio-demographic processes in the Arctic, as not only assumptions on a qualitative level are required, but also the accumulation of statistical material and getting the way out of the state of economic uncertainty.

Objectives and methodological features

The aim of the article is to reveal the systemic and recent socio-demographic processes in the Russian Arctic, determined by the specifics of the Arctic (active migration processes, the phenomenon of city-forming enterprises, etc.) and by all-Russian social reforms (in particular, the pension reform). The paper includes the solution of the following tasks: 1) consider the dynamics of the population; 2) examine the main characteristics of population settlement of the Arctic regions; 3) study a new factor of influence — pension reform — on the socio-demographic processes in the Arctic.

The object of research is the regions fully included in the AZRF (Murmansk Oblast, Chukotka, Nenets, Yamalo-Nenets Autonomous Okrugs (AO)).

The specifics of the tasks determined the use of an interdisciplinary approach, including a set of methods of economic analysis and sociological research methods. This methodological feature emphasizes the relevance of the research. Thus, the words of famous sociologists and demographers V.V. Markin and A.N. Silin are still relevant: “Unfortunately, in general, it can be stated that the scientific support of the upcoming development of the Arctic, both sociological and interdisciplinary, is given absolutely insufficient attention” [19, Markin V.V., Silin A.N., p. 77].

The results of settlement processes in the Arctic were studied using traditional direct and indirect methods. The direct method made it possible to identify the dynamics of the population size of the regions fully included in the AZRF, based on the analysis of changes in the corresponding indicators over time. Indirect methods made it possible to study the characteristics of the composition of the population in a certain territory at a certain time. The authors were primarily interested in the proportion of urban residents and population density. The study took into account the following indicators characterizing the resettlement of the AZRF regions: area (S) — the area of a constituent entity of the Russian Federation as of 2021 (km^2); population size (P) — calculated as the average annual resident population of a constituent entity of the Russian Federation; the study involved data for the period from 1929 to 2019 with a step of ten years, as well as annual indicators for the period from 2010 to 2021 (thousand people); population density (PD) — calculated as the ratio of the population size (P) to the area of the constituent entity of the Russian Federation (S) as of 2021 (people/km^2); proportion of city population (PCP) — calculated as the ratio of the number of resident urban population to the total resident population of the constituent entity of the Russian Federation as of 2020 (%); number of cities — the number of settlements with city status as of 2021.

The analysis of the dynamics of the working-age population (together with the forecast dynamics) included economic and statistical methods and the results of population surveys.

In order to demonstrate the shift in the size of the working-age population in Russia, the results of an analysis of the three-way forecast of the working-age population size in the Russian Federation, taking into account the factor of increasing the retirement age, are presented. The forecast is based on extrapolation of the data of the three-way forecast of Rosstat on the size of the working-age population (built by Rosstat without taking into account the change in the retirement age) [1], adjusted by the authors, taking into account the phased scheme of the gradual increase in the retirement age [2]. This prediction made it possible to reveal the effect of the influence (shift) of an increase in the retirement age on the size of the working-age population of the Rus-

[1] Predpolozhitel'naya chislennost' naseleniya Rossiyskoy Federatsii [Estimated population of the Russian Federation]. URL: http://www.gks.ru/free_doc/new_site/population/demo/progn3a.xls (accessed 09 September 2021).

[2] Federal'nyy zakon "O vnesenii izmeneniy v otdel'nye zakonodatel'nye akty Rossiyskoy Federatsii po voprosam naznacheniya i vyplaty pensiy" ot 03.10.2018 N 350-F [Federal Law "On Amendments to Certain Legislative Acts of the Russian Federation on the Appointment and Payment of Pensions" dated 03.10.2018 N 350-F]. URL: http://www.consultant.ru/document/cons_doc_LAW_308156/ (accessed 09 September 2021).

sian Federation until 2036. To demonstrate the situation in the Arctic region, using the example of the Murmansk Oblast, the results of the forecast of the number of working-age population until 2036 were given, compiled by the authors according to the base scenario by a similar methodological scheme [23, Baranov S.V., Skufina T.P., Gushchina I.A., p. 165–166].

However, it is generally accepted that the size of the able-bodied population in the northern territories of Russia is determined mainly by migration processes [6, Fauser V.V., Smirnov A.V., p. 114–116]. In order to assess the prospects for the development of the migration situation in 2019–2021, the authors conducted three series of surveys, which allowed finding out the opinions and migration preferences of the Arctic residents, including those related to the pension reform. Conducting such surveys is possible only with the support of grant research. All three series of surveys were carried out with the support of the Russian Foundation for Basic Research, grant no. 19-010-00022. The first series of surveys was carried out in 2019 in cities and districts of the Murmansk Oblast according to a representative sample (survey of 1291 respondents, differentiated by sex, age, place of residence) [23, Baranov S.V., Skufina T.P., Gushchina I.A., pp. 168–170]. The second series of surveys on a representative sample was conducted in 2020–2021 in all regions, the territories of which are completely located in the Arctic zone (a survey of 1 403 people was carried out in the Murmansk Oblast, Yamalo-Nenets, Nenets, Chukotka Autonomous okrugs). It should be noted that that the results of the second survey are massive (some of them are still being processed), a separate publication is required. In this study, the results of the survey for all regions of the Russian Arctic are used only to confirm (refute) the main conclusions based on the results of the survey in the Murmansk Oblast. The third series of surveys focused only on employees of city-forming enterprises. This is due to the generally accepted fact that the development of regional systems of the North and the Arctic is characterized by an increased role of corporate structures in socio-demographic processes, especially significant in times of crisis [22, Skufyina T.P., Korchak E.A., Baranov S.V., p. 52, 54, 56–57; Markin V.V., Silin A.N., pp. 80–81; 17, Kryukov V.A., Kryukov Ya.V., p. 140–153]. This gave reason to expect specific attitudes from the workers of city-forming enterprises regarding the desire to live and work in the Arctic, which requires independent study. In order to clarify this specificity, a survey of employees of the city-forming enterprise was conducted in 2019–2020 (JSC “Apatit”, Kirovsk, Murmansk Oblast), taking into account the characteristics (gender, age, working conditions (safe, difficult and dangerous, falling under pension lists No. 1 and No. 2), categories personnel (managers, workers, engineers)). We collected 70 questionnaires containing assessments of the attitude of employees of a city-forming enterprise to the pension reform in general, assessments of the impact of pension reform on the attractiveness of work at a city-forming enterprise in the Arctic, workers' expectations regarding future prospects for life and work in the Arctic, including issues of multigenerational consolidation.

Population dynamics in the Arctic regions

Natural, climatic and geographical features make the Arctic the least favoured place to live. However, the strategic objectives of the redevelopment of the Russian Arctic determine the need to attract and consolidate a permanent population in these territories. Therefore, the dynamics of the population in the Arctic regions has traditionally been regarded as one of the main indicators of the effectiveness of measures of achieving the strategic objectives for the Arctic development [1, Zaikov K.S., Kondratov N.A. et al., p. 15, 21–22; 4, Kudryashova E.V., Lipina S.A. et al., pp. 449–452; 18, pp. 5–25, 39–40].

Figure 1 illustrates the population changes in the Arctic regions. In the first third of the 20th century, the population number was small in all regions (in 1929: 24 thousand people in the Murmansk Oblast; 15 thousand people in the Nenets AO; 14 thousand people in the Chukotka AO and 32 thousand people in the Yamalo-Nenets AO), but it was characterized by a steady growth tendency up to the end of the 1980s. Population growth rates varied. Thus, the Murmansk Oblast, initially characterized not only by natural resources, but also by a relatively developed transport, industrial, social infrastructure in comparison with other Arctic regions, was developing most actively, creating and expanding territorial and industrial complexes and cities, naturally generating mass voluntary migration from various regions of Russia. Special measures of state support and significant “northern” benefits contributed to the consolidation of the population [6, Fauzer V.V., Smirnov A.V., pp. 114–118; 21, Skufina T.P., Mitroshina M.N., pp. 98–100]. As a result, since 1929, the population has increased 23.7 times over the first thirty years, and 47.8 times over sixty years. The maximum number of residents of the Murmansk Oblast was recorded in 1990 and amounted to 1 191 thousand people.

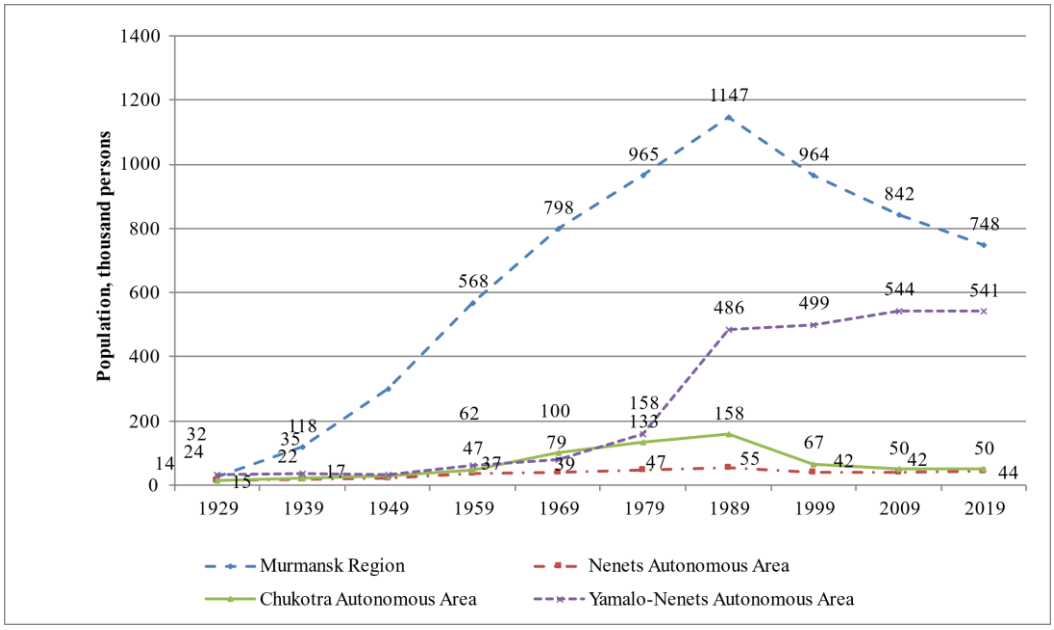

Fig. 1. Population dynamics in the Arctic regions for the period from 1929 to 2019 [3].

[3] Source: compiled by the authors based on data from the Federal State Statistics Service.

The Yamalo-Nenets Okrug, which received autonomous status in 1977, began to grow in population much later than the Murmansk Oblast — in the 1980s. The factors of population growth are typical for the northern territories —development of industry and measures of state support for the population, first of all, for young specialists and their families who come to permanent residence. Since 1929, the population has doubled in the first thirty years, and has increased by 7.8 times over the next thirty years. The maximum number of residents was recorded in 2009 and amounted to 544 thousand people.

In the Chukotka Autonomous Okrug, from 1929 to 1959 and from 1959 to 1989, the population increased at an equal rate: 3.4 times. The maximum number of residents was recorded in 1990 and amounted to 162 thousand people.

In the Nenets Autonomous Okrug, the population grew slowly. Nevertheless, the growth rate was 2.5 between 1929 and 1959, and 1.3 between 1959 and 1989. The maximum number of residents was recorded in 1989 and amounted to 55 thousand people. It should be noted that, as in other regions of the Far North, special measures of state support concerned the indigenous local population and were aimed at preserving its size, improving its health, education, protection of culture and national traditions.

The comprehensive state program to attract and consolidate the population in the Arctic was interrupted after the collapse of the Soviet Union. With the exception of the Yamalo-Nenets Autonomous Okrug, since the 1990s, the population of the Arctic regions began to decline. The Murmansk Oblast lost residents the most: 34.8% over thirty years (from 1989 to 2019). In a market economy, the state does not guarantee high salaries in the off-budget sector of the economy. Many enterprises of the Murmansk Oblast closed down, unable to withstand competition with foreign and Russian companies with lower costs. The high expenses of northern enterprises are related not only to climatic and geographical features, but also to the additional costs of providing northern benefits. Increasing unemployment problems, reduced economic attractiveness of life in the North, and a small and undiversified labour market have led to the mass relocation of northerners to other regions of Russia that are more comfortable to live in. The population decline in the Chukotka and Nenets Autonomous Okrugs (68.4% and 20.0%, respectively, for the period from 1989 to 2019) has the same reasons and is primarily caused by the outflow of the non-indigenous population.

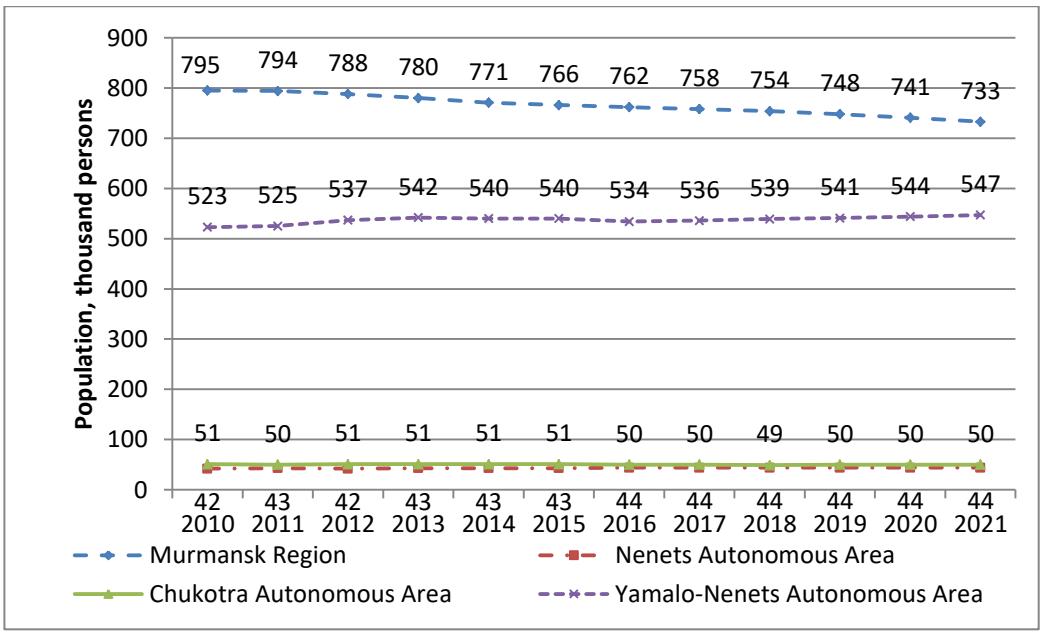

Fig. 2. Population dynamics in the Arctic regions for the period from 2010 to 2021 [4].

There is a certain stabilisation of the situation compared to the previous twenty-year period. Over the period from 2010 to 2021, the population of the Nenets and Chukotka Autonomous okrugs, with slight fluctuations, stabilized at the level of 44 thousand people and 50 thousand people, respectively; in Yamal-Nenets Autonomous Okrug it increased by 24 thousand people or 4.6%. All the Arctic regions, with the exception of Murmansk Oblast, have been experiencing steady natural increase in recent years: the birth rate exceeds the death rate, which also stabilizes the population. The migration balance of the Nenets and Chukotka Autonomous okrugs is positive: there is an insignificant but stable influx of permanent population. Despite high incomes (the average salary in the region as of May 2021 is 143 479 rubles — the highest in Russia), the migration balance of the Yamalo-Nenets Autonomous Okrug is negative. The population of the region is increasing due to natural growth. The Murmansk Oblast has slowed down the rate of population decline, but continues to lose population at a higher rate compared to other regions of the Arctic: 62 thousand people during the period from 2010 to 2021, which is 7.8% of the losses of the total population of the region.

Indicators of population settlement in the Arctic regions of the Russian Federation

From the perspective of settlement, the regions of the Russian Arctic are heterogeneous (Fig. 3). Thus, the Murmansk Oblast, despite the constant decline in population, has a population density of 5.06 people/km^2, which means that it can still be considered inhabited even in comparison with other territories of the country (in the Russian Federation, the population density is 8.57 km^2). The Murmansk Oblast has always been urbanised — the share of the urban population was much higher than the rural one. There are 16 cities in the region, the peak of development of which occurred dur-

[4] Source: compiled by the authors based on data from the Federal State Statistics Service.

ing the Soviet Union era and was accompanied by industrial growth, the formation of a transport network, industrial and social infrastructure. Murmansk, the capital of the region, has 283 thousand permanent residents as of 2021. This is the center of culture, education, enlightenment in the Arctic. The high geopolitical importance of the Murmansk Oblast predetermined the development of the military-industrial complex on its territory, which led to the emergence of closed administrative-territorial entities, five of which are currently functioning.

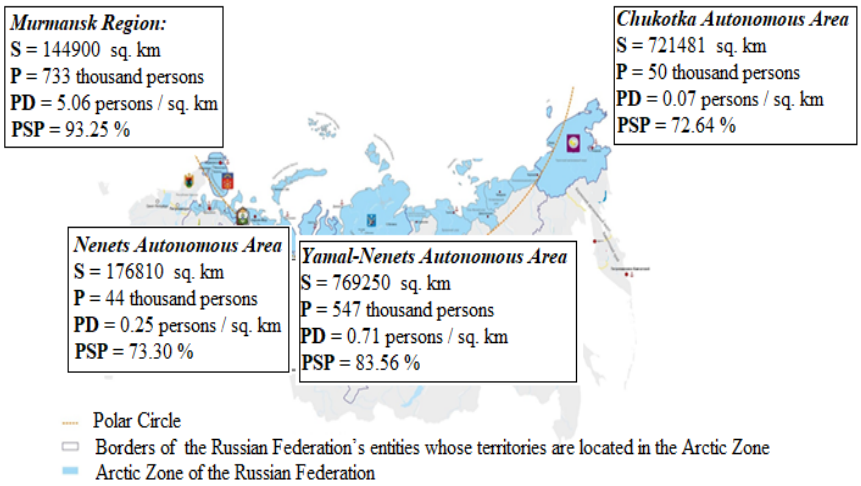

Fig. 3. The main characteristics of population settlement in the Arctic regions of Russia [5].

The rest of the Arctic regions demonstrate a fundamentally different pattern of settlement. Most of their territories remain uninhabited: the population density is less than 1 person per km^2. The Chukotka Autonomous Okrug is the least populated: with a territory of 721.5 thousand km^2, the population density is only 0.07 people per km^2. There are three urban settlements in Chukotka, the largest of which is the city of Anadyr, the capital of the region, with a population of 15240 as of 2021. The population density of the Nenets Autonomous Okrug with an area of 176.8 thousand km^2 is 0.25 people per km^2. The number of permanent residents is 44389 people, which makes the region the most sparsely populated in Russia. The population of the only urban settlement in the region, the city of Naryan-Mar, as of 2021 is 25536 people. Being an independent subject of the Russian Federation, the region, according to the Charter of the Arkhangelsk Oblast, is part of it. The population density of the Yamalo-Nenets Autonomous Okrug, with an area of 769.2 thousand km^2, is higher and amounts to 0.71 people per km^2. There are eight cities in the region. It is noteworthy that the capital of the region, the city of Salekhard (51 186 permanent residents as of 2021), is more than twice as large as the industrial cities of Noyabrsk (108 386 people) and Novy Urengoy (118 115 people) in terms of population. Being an independent subject of the Russian Federation, the region is simultaneously part of the Tyumen Oblast.

The Russian Federation, like the rest of the world, is experiencing stable urbanisation processes, leading to an increasing share of the urban population. Thus, as of 2018, the share of ur-

[5] Source: compiled by the authors based on data from the Federal State Statistics Service.

ban residents in Russia was 74.43%, and as of 2020 — already 74.66%. Notably, in the Murmansk Oblast, the most industrialised and urbanised of the Arctic regions, the proportion of urban population is extremely high: 92.33% in 2018 and 93.25% in 2020. However, even here, the trend of the proportion of urban dwellers remains upward: an increase of 0.92% over the two years. In the Nenets Autonomous Okrug in 2018, city residents accounted for 72.84% and 73.30% in 2020 (an increase over two years was 0.46%); in the Chukotka Autonomous Okrug — 70.51% and 72.64%, respectively (an increase of 2.13%); in the Yamalo-Nenets Autonomous Okrug — 83.83% and 83.56% (0.27% decrease over two years). Thus, in the less urbanised Arctic regions (compared to the Murmansk Oblast), the proportion of the urban population is significantly lower than the average for Russia. At the same time, growth trends in the share of urban residents among the population are observed in all the regions of the Russian Arctic, with the exception of the Yamalo-Nenets Autonomous Okrug.

Pension reform of 2018 — a new factor influencing socio-demographic processes in the Arctic

It is generally recognized that the dynamics of the working-age population in the northern territories is determined mainly by migration processes, which are based on the state policy of industrialization (during the Soviet period), the activity of resource corporations (at present) [14, Fauzer V.V., Smirnov A.V., pp. 6–15; 18, Challenges and Threats to National Security…, pp. 10–26]. However, in 2018, the influence of a new factor manifested itself — the pension reform of 2018 led to a shift in the working-age population in every region of Russia by increasing the retirement age.

The increase in the working-age population constituted the main economic justification for the pension reform. It should be noted that our previous works allow us to agree with the opinion of a number of leading economists on the need for a pension reform of 2018 in terms of increasing the retirement age [26, Kudrin A., Gurvich E., pp. 55–76]. Thus, the economic and mathematical model developed by the authors on real data establishes a positive relationship between the size of the able-bodied population, investments in fixed assets and GDP production [27, Skufina T.P., Baranov S.V., pp. 81–84]. In fact, the dynamics of the working-age population in Russia before the pension reform of 2018 was characterized by a steady downward trend, which is maintained in the three-way forecast for the long-term development of the Russian Federation, drawn up by Rosstat for the conditions of the “old” retirement age [6]. The authors’ forecast, which takes into account the shift in the working-age population caused by the implementation of a gradual transition to a new retirement age, indicates that this negative trend has reversed in all three forecast options [23, Baranov S.V., Skufina T.P., Gushchina I.A., p. 166].

[6] Data from the Federal State Statistics Service: estimated population of the Russian Federation. URL: http://www.gks.ru/free_doc/new_site/population/demo/progn3a.xls (accessed 09 September 2021).

The prediction for the Murmansk Oblast made it possible to identify a feature that distinguishes the forecast dynamics in the region from the all-Russian — there was no break in the trend of reducing the working-age population due to an increase in the retirement age, but the rate of loss of the working-age population slowed down (Fig. 4). Thus, the rate of loss of the working-age population in the Murmansk Oblast since 1997 averaged 0.7%. With a gradual increase in the retirement age, the rate of decline in the working-age population is projected to decrease to 0.14% per year. By 2036, if the current retirement age is maintained, the decline would have been 14% compared to 2018, when the decision to increase the retirement age was made. By 2036, under the new conditions of the retirement age, the number of able-bodied population of the Murmansk Oblast would decrease by only 4.4%.

The projected working-age population in Murmansk Oblast (fig. 4) reflects only one factor change — retirement age, which mechanically increased the working-age population. However, the lack of preparedness of the population for the pension reform, noted by many researchers, has led to the fact that the reform turned out to be a factor that could potentially increase the migration mood of the population of the Arctic regions. A survey conducted in 2019 among the population of cities and districts of the Murmansk Oblast revealed that the positive effect of slowing down the rate of decline in the working-age population is offset by a marked increase in the migration sentiments of residents against the background of a very negative perception of the pension reform. Thus, surveys have shown that more than 25% of the population of Murmansk Oblast have changed their plans of living, while another 7.5% are definitely going to leave and have looked for another place of work. It is obvious that not only the pension reform influenced the decision to leave the territory of the Arctic; however, the respondents linked their desire precisely with pension changes. This is most likely due to the strongly negative attitude towards pension reform, which was expressed by more than 64% of respondents.

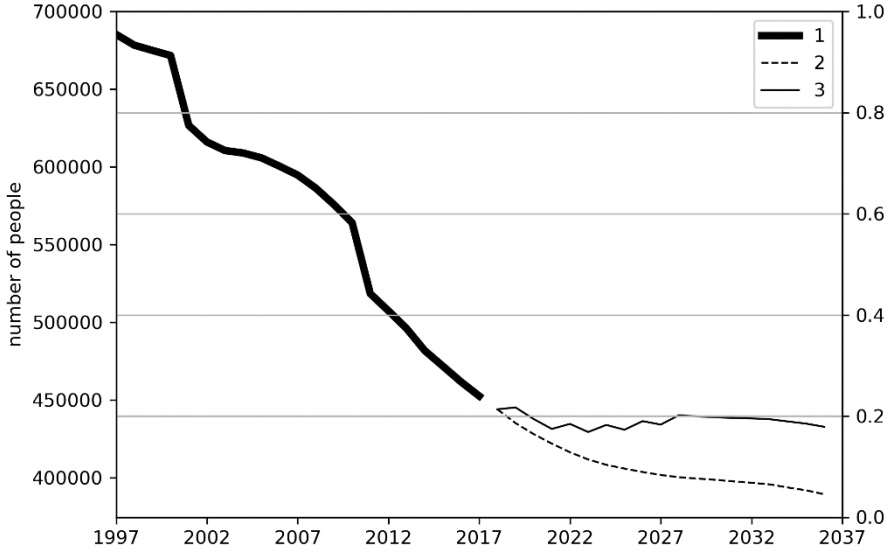

Fig. 4. Actual and forecast values of the indicator "working-age population" of the Murmansk Oblast, people; left axis — the working-age population; right axis — indicator values relative to the level of 1997; 1 — actual number; 2 — forecast values of Rosstat, made under the conditions of the previous retirement age; 3 — forecast, considering the increase in the retirement age [23, Baranov S.V., Skufina T.P., Gushchina I.A., p. 165] [7].

The greatest risks to the sustainability of demographic processes are associated with the age structure of respondents intending to leave. Thus, among those who are going to migrate, more than 15% are young people under 30 years old, 9.5% are middle-aged residents (30–49 years) and only 4.5% are 50–64 years old; there are no plans for departure among respondents over 65 years old [23, Baranov S.V., Skufina T.P., Gushchina I.A., pp. 168–170]. Preliminary results of a survey, conducted in all regions of the Arctic in 2020–2021, confirm the persistence of a sharply negative attitude towards pension reform and a high level of migration sentiment, which Arctic residents already associate not only with pension changes, but also with impact of the COVID-19 pandemic.

An in-depth study of the results of surveys in 2019 in the Murmansk Oblast from the perspective of place of work and age of respondents, as well as the high social security of employees of city-forming enterprises in the Arctic, suggested that migration sentiments of employees of city-forming enterprises were specific and their attitude to the pension reform of 2018 was more loyal. However, there was not enough data to confirm the hypothesis of the results of the conducted surveys. Therefore, in 2019–2020, a survey of employees of the city-forming enterprise JSC "Apatit" was conducted.

More than 70% of respondents gave a negative assessment of the pension reform's most challenging component, increasing the retirement age (Fig. 5). Moreover, the most categorical in

[7] Source: Federal State Statistics Service data and authors' calculations.

these assessments were male respondents, and as far as age is concerned, they were the respondents between 41 and 50 years old.

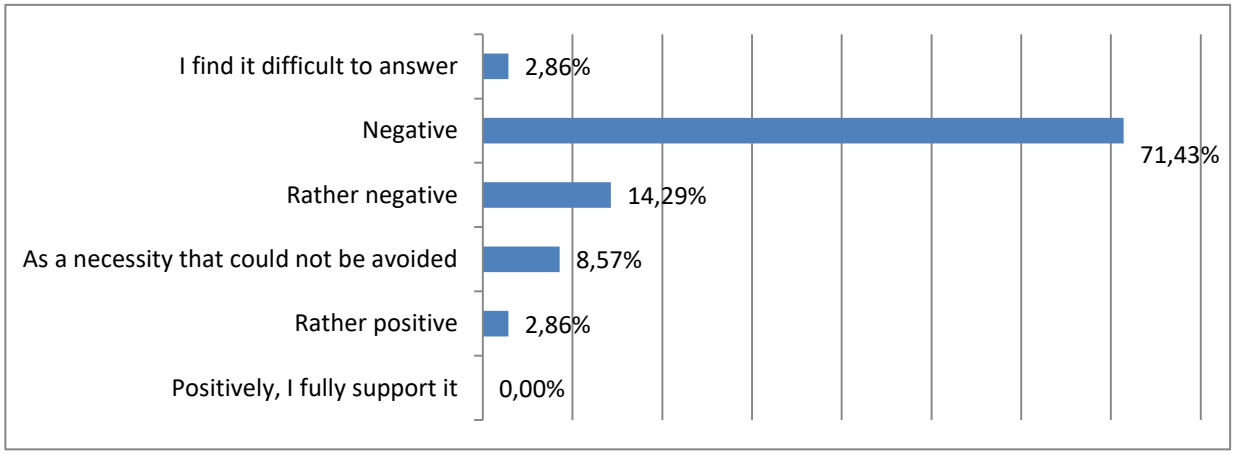

Fig. 5. Respondents' attitude to the increase of the retirement age [8].

The pension changes were unequivocally negatively assessed by employees referred to the category of workers and those who work in difficult and dangerous conditions (100% of respondents). Among workers employed in permissible (safe) working conditions, 60% have a negative attitude, 20% — rather negative, 12% — as a necessity, which cannot be avoided, and 4% are divided between "rather positive" attitude and those who find it difficult to answer (Fig. 6).

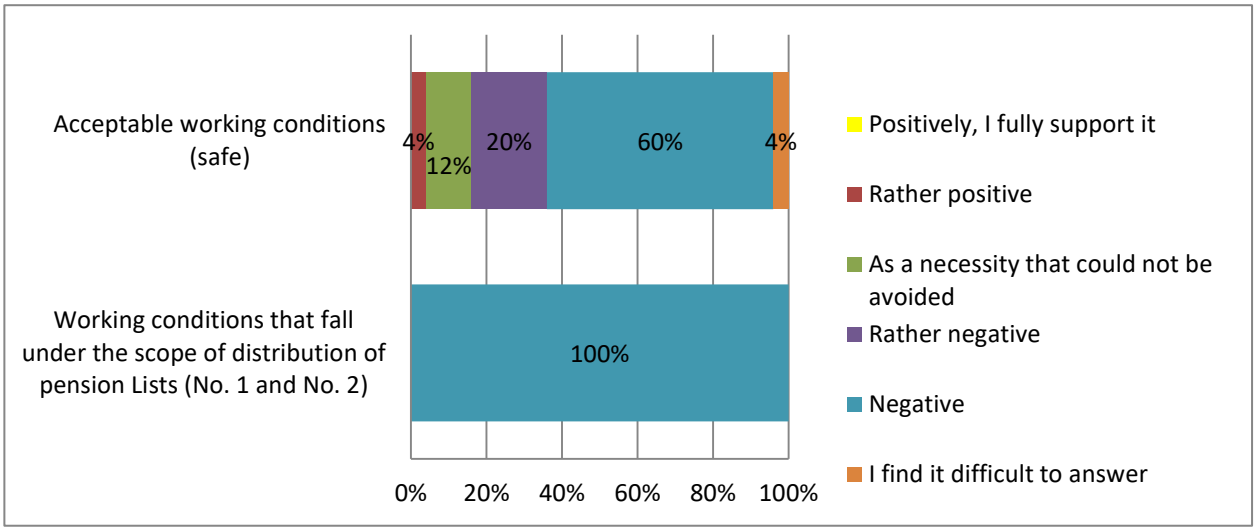

Fig. 6. Respondents' attitude to pension reform in the context of working conditions [9].

The most rational and loyal attitude to the pension changes was demonstrated by respondents in managerial and engineering positions (Fig. 7). Moreover, the managers' answers were distributed only in two categories — "negatively" (71%) and "as a necessity that cannot be avoided" (29%). Among engineering and technical workers, only 53% of respondents reacted neg-

[8] Source: Authors' surveys.
[9] Source: Authors' surveys.

atively, 29% — rather negatively, 6% assessed pension changes positively, or as a necessity that cannot be avoided, or found it difficult to answer. 100% of workers reacted negatively. This assessment is generally consistent with the results of our 2019 surveys for the Murmansk Oblast and the 2020–2021 surveys for all AZRF regions.

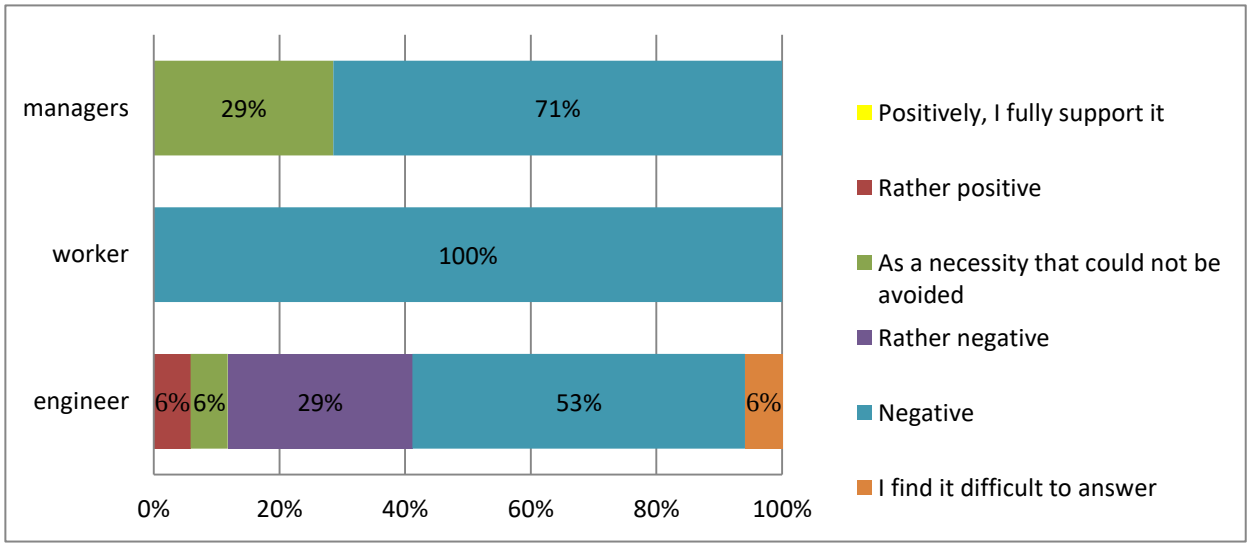

Fig. 7. Respondents' attitude to the pension reform by job category [10].

Despite the predominantly negative assessment of the pension reform and its consequences, the respondents' answers show that it did not have a significant impact on the desire of workers to change jobs and activities (Fig. 8). Thus, when analysing data by age, job, working conditions, it was found that the respondents who were in their 20–30 years old and worked in permissible (safe) working conditions, answered that the pension reform had changed their attitude to their current job largely. The desire to leave the Arctic territory, which workers associate with an increase in the retirement age, manifested itself in 14% of the employees of the city-forming enterprise; another 9% of those surveyed answered that this "probably influenced" their desire to leave. These answers generally correlate with the results of surveys in the Murmansk Oblast and all regions of the Russian Arctic. However, the employees of the city-forming enterprise are less oriented towards leaving in comparison with the situation in the regions of the Russian Arctic.

[10] Source: Authors' surveys.

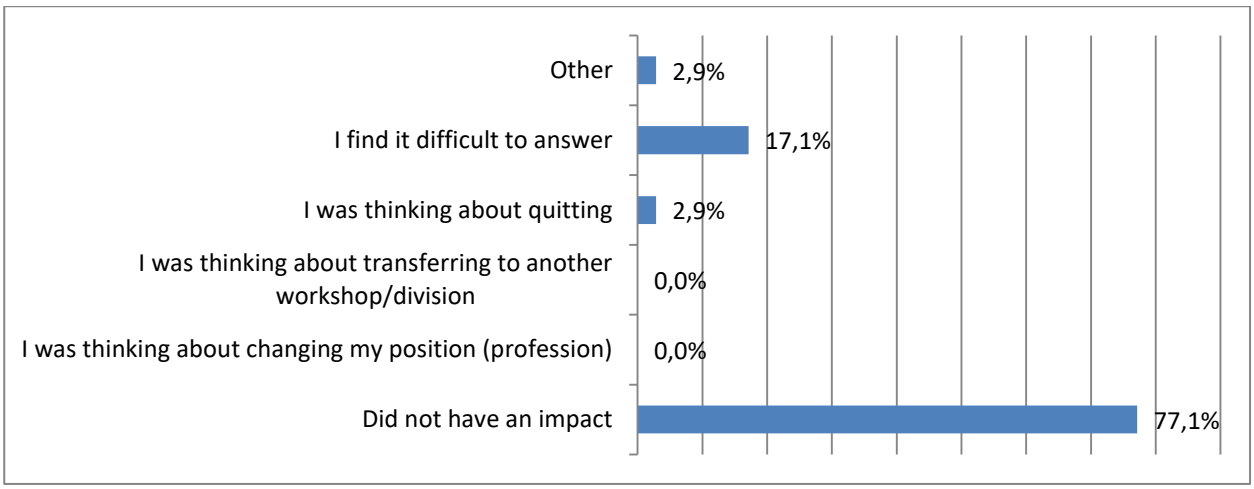

Fig. 8. Impact of the pension reform of 2018 on the respondents' attitudes towards their job and working conditions [11].

Among the employees of the city-forming enterprise, the desire to leave was expressed to a greater extent by male respondents belonging to the category of workers, aged 31 to 50 years, working in acceptable (safe) working conditions. In terms of moving from the northern territories, this category of workers is the least "tied" to northern benefits and may live and work in more favorable natural and climatic conditions.

Despite the prevalence of respondents' answers in favor of further residence in the Arctic, their view of the Arctic as a promising place to work and settle down for generations is pessimistic. Thus, more than 30% of respondents would not recommend moving to the Arctic to their inner circle, not living in the northern regions, for life and work. More than 45% would not like their children to live and work in the Arctic territories. Such representations are mostly characteristic of employees, predominantly belonging to the category of workers, with the highest proportion working in difficult and dangerous conditions.

At the same time, there is a contradiction in the respondents' opinions: along with a pessimistic view of the Arctic as a promising place to live, there is a loyal attitude to their workplace, the city-forming enterprise of JSC "Apatit", as a future employer for their families. Thus, almost 50% of respondents do not rule out the possibility of considering JSC "Apatit" as a future employer for their children.

Thus, the employees of the city-forming enterprise as a whole show a negative attitude towards the pension changes in 2018, which corresponds to the attitude of other residents of the Arctic regions. Specificity is manifested in less pronounced migratory attitudes.

Conclusion

The Russian Arctic is an area of special interest for Russia in terms of economy and national security, requiring sustainable and balanced development. The importance of this territory and

[11] Source: Authors' surveys.

objective problems of ensuring economic, social and demographic development naturally give rise to a great number and thematic variety of scientific studies, among which a considerable part is devoted to social and demographic development of the Russian Arctic. This research continued the study of systemic, new socio-demographic processes and problems of the Russian Arctic. Without repeating the processes and conclusions presented in the respective sections, it is necessary to emphasize the main points.

An examination of population dynamics in the regions of the Russian Arctic made it possible to confirm the decisive importance of an integrated approach of public administration to attract and consolidate the population in the regions of the Arctic during the Soviet period. So, despite the differences in the time frame and the rate of population growth, all the Arctic regions were characterized by rapid population growth until 1991. In the post-Soviet 20-year period, the population of the Arctic regions began to decline rapidly, with the exception of the Yamalo-Nenets Autonomous Okrug. Behavior of the main demographic indicators for the period 2010–2021 made it possible to state the relative stabilization of the situation (compared to the previous twenty-year post-Soviet period) in all Arctic regions, with the exception of the Murmansk Oblast.

Consideration of the indicators of population resettlement in the Arctic regions of the Russian Federation made it possible to find out that the Murmansk Oblast also has characteristic differences from other Arctic regions. The Murmansk Oblast, despite the highest rate of population decline, is relatively well populated in comparison not only with the Arctic regions, but also with the general national situation. The region is characterized by the highest level of urbanization compared to other regions of the Arctic, which is explained by the high level of industrial development and the military-strategic potential of the region. In other, less urbanized regions of the Arctic, the share of the urban population is lower than the average Russian indicators; the growth rate of urban residents lags behind the situation in the Murmansk Oblast.

The dynamics of the working-age population is considered in the context of the impact of the pension reform in 2018 and the migration sentiments of the population. It is proved that the pension reform of 2018 is a new factor influencing socio-demographic processes in the Arctic regions. On the example of the Murmansk Oblast, it is shown that an increase in the retirement age has led to a reduction in the rate of loss of the working-age population in the region. Comparison with the results of an assessment of the shift in the working-age population in the Russian Federation indicated that this differs from the general national situation, when a gradual increase in the retirement age reversed a steady decline in the working-age population to the opposite, ensuring sustainable growth indicator. The paper presents the results of the population survey in cities and districts of the Murmansk Oblast in 2019, which substantiate the increased migration sentiment of residents, which they associate with the pension changes, against the background of extremely negative perception of the pension reform. Preliminary results of the 2020–2021 surveys conducted in all regions of the Arctic indicate the persistence of a sharply negative attitude towards pen-

sion reform and a high level of migration sentiment, which residents of the Arctic already associate not only with pension changes, but also with the impact of the COVID-19 pandemic. The high level of income and corporate social security of employees of the city-forming enterprises of the Arctic made it possible to expect them to have a more loyal attitude to pension changes and less pronounced migratory moods. Therefore, a specialized survey of the employees of the city-forming enterprise was conducted. The results of a survey of the city-forming enterprise confirmed the generally negative attitude towards pension changes, which is especially pronounced among employees in the category of workers and those working in difficult and dangerous conditions. Migration moods among the workers of the city-forming enterprise are less pronounced than among the rest of the inhabitants of the Arctic. However, they do not consider the Arctic as a promising place for work and multi-generational consolidation. At the same time, a contradiction was found: a pessimistic view of the Arctic as a promising place to live is combined with a loyal attitude towards one's place of work — a city-forming enterprise — as a future employer for one's family. This contradiction in the opinions of workers confirms the high degree of interconnection between the future socio-economic development of the Arctic (including demographic, social and labour market processes) and its city-forming enterprises, the corporate policy of which is and will be of decisive importance for the development of AZRF regions — the territories of their presence.

In conclusion, it should be noted that the study has provided a comprehensive picture of the nature of the impact of external and internal factors on socio-demographic processes in the Arctic. The identified features of socio-demographic processes not only contribute to understanding the cause-and-effect relationships between changes in internal and external factors of influence, including corporate and social policies, but also reaffirm the need to take into account the special Arctic specifics when conducting social reforms, in particular — pension reform. Practice shows that the expected significance of this need does not mean automatic consideration in the implementation of social reforms, for instance, pension reform. Under such conditions, one can hardly expect positive dynamics from socio-demographic processes in the Arctic.

Current socio-demographic processes are associated with much greater social and economic shifts caused by the COVID-19 pandemic, which cannot be reliably tracked yet. However, the experience of previous crises allows us to reasonably assume that the current crisis will further strengthen the systemic problems of the socio-economic space of the Arctic, including demographic losses, as well as the depth of negative manifestations of managerial decisions that underestimate the specifics of the socio-economic processes in the Arctic.

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Labor Market Features in the Russian North: Employment, Wages and the Role of Northern Allowances [*]

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Abstract. This article focuses on the labor market in the Russian northern regions. The labor market in the Russian North was formed due to the state policy of the no longer existing state, aimed at the active attraction of migrants from other territories for the industrial development of the country. This policy of attracting migrant labor in the state was implemented mainly through the creation of the institution of wages, which provided additional northern payments to the salary, designed to compensate for the discomfort of living and working conditions in the North. This led to an increase in employment in the North. The research goal is to study the formation and development of the wage institution, as well as to determine the impact of wages on employment in modern conditions. The article presents the history of formation of the institution of wages in the Russian North. The dynamics of labour market indicators is given, the change in the ratio of wages in the North is presented, based on official statistical data over the past 15 years. The results of the study show that the northern territories have problems of the labor market that have arisen in recent decades: high levels of unemployment, reduced employment, and wages, once being a significant factor, had a positive impact on employment, but today contribute to the decline in the economic attractiveness of life in the North.
Keywords: *employment, wage, institutional approach, northern region.*

Introduction

The development of Russia's regions is accompanied by a low quality of institutions (political, financial, social, etc.). First of all, territorial development is determined by factors of the "first nature" (Krugman P.) — resource endowment and geographic location (resource-producing regions, especially new oil regions) [1, Zubarevich N.M., p. 167]. Despite these factors, a lot has been done to understand the trends of territories development: the problems of uneven regional development in Russia in the context of peripherization phenomena have been studied [2, Kazantseva E.G., pp. 2–10], the features of regional policy in solving the issues of improving the quality of economic development of territories were revealed [3, Kuznetsova O.V., pp. 11–16], the processes of state regulation of the socio-economic development of Russian regions were investigated [4, Bezdenezhnykh T.I., pp. 542–549].

The relevance of the chosen topic is determined by the peculiarities of the labour market in the Northern regions of Russia [1]. The model of the Russian labour market, established during the

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[1] Here and further in the paper, 13 regions belong to the northern regions of Russia: the Republics of Karelia, Komi, Tyva and Sakha (Yakutia), the oblasts of Arkhangelsk, Murmansk, Magadan and Sakhalin, the Autonomous Okrugs of

1990s, does not correspond to the traditional one, which should and is able to adapt to external shocks due to changes in the level of employment (and, consequently, the level of unemployment) at a relatively inflexible price for labour — wages. The domestic labour market responded to the negative impact of external shocks with a rapid drop in wages on the condition of a slow decline in employment and lagging behind the rate of decline in production, while the labour market is able to maintain an equilibrium state [8, Varshavskaya E.Ya.]. Thus, the labour market adaptation to shocks is primarily due to wage flexibility. The labour market in the North of Russia, a strategically important macro-region with difficult natural and climatic conditions, has its own specifics. For example, the employment rate was higher: in 2019, it was 63.9% in the North, compared with 59.4% in Russia. The history of development of the North of Russia was associated with the industrial development of the Soviet economy, therefore, the state policy was carried out as part of the settlement and securing the population in the sparsely populated North. Due to the migration factor, the population of the northern regions grew steadily until the 1990s, but later, the population started leaving the North [5, Samarina V.P. et al.], as a result, the population decreased from 9135.0 thousand people in 1996 to 7820.01 thousand people in 2019, while the number of people employed in the economy declined by 7.3% over the period 1996–2019 [6, Mostakhova T.S.].

The northern territories are "relatively developed resource-producing regions with a high proportion of single-industry cities and towns", therefore, unemployment in the North has increased values [7, Zubarevich N.M., p. 48]. In 2019, the unemployment rate in Russia as a whole was 4.6%, and the average for the northern regions was 5.6%. Unemployment in the regions of the European North is higher by 2.0–3.0%, while it is lower in the regions of the Asian North, thanks to the Khanty-Mansi (Yugra) and Yamalo-Nenets okrugs [2]. The tension in the northern labour markets in 2019 amounted to 3.45 people of the unemployed population per one vacancy, while the Russian average is 2.1.

The socio-economic situation in the northern regions of Russia is characterized by a deterioration in the financial condition of enterprises, which contributes not only to the growth of unemployment, but also to the decline in the quality of social infrastructure, reduction of resource capabilities of local communities and regions as a whole and leads to lower living standards [9, Korchak E.A.], as well as limited financial and human resources [10, Korchak E.A.]. Therefore, the role of an effective wage institution is enormous. Further, this paper attempts to analyze the northern labour market from the position of its flexibility, focusing on how employment and wages have changed over the past 12–15 years.

Khanty-Mansi (Yugra), Yamalo-Nenets, Nenets and Chukotka, as well as the Kamchatka Krai. The territories of these regions belong to the Far North and equivalent territories.

[2] The unemployment rate for 2019 in the Republic of Karelia is 7.4%, Komi is 6.8%, Tyva (12.3%) and Sakha (6.9%), in the Arkhangelsk Oblast (6.3%), Murmansk (5.4%), Magadan (4.6%) and Sakhalin (5.2%), in the okrugs of Khanty-Mansiysk (2.5%), Yamalo-Nenets (1.9%), Chukotka (3.8%) and Kamchatka Krai (3.8%).

Labour market flexibility

Interest in the problem of labour market flexibility has been renewed due to the continued imbalance in the markets for factors of production, including the labour market, which is fraught with underpricing of labour and overpricing of final products [11, Pissarides S.A.; 12, Solow R.M.; 13, Trevithick J.A.]. This situation in Russia is exacerbated by inefficient institutions, although economic practice shows that the costs incurred by economic entities to maintain a normal institutional environment and infrastructure do not correspond to those received in return, that is, the institutional rent transferred by economic agents in the form of taxes goes against the quantity and quality of services provided by the state. Such imbalances in institutional goods in the market adversely affect the overall economic equilibrium, further distorting the equilibrium prices for economic resources [14, Vishnevskaya N.T.].

Russian economists argue that the economic situation in the 1930s, which was studied by Keynes [15, Keynes J.M.], and the current situation in the Russian economy have many similar problems [16, Dzarasov S.S., pp. 18–22]. For example, the economic crisis of 2008–2009, according to the authors, is associated with an insufficient level of demand, the stimulation of which, combined with an increase in government spending, would eventually lead to a way out of it. Such policies allow solving the problems of unbalanced supply and demand for labour, inflexibility of the labour market, institutional failures (caused by institutional uncertainty, mismatch in the functioning of formal and informal norms, deficit or surplus of certain professions, etc.) [17, Manevich V.E., pp. 17–77]. The development of economic thought in solving institutional problems in both the economic and sociopolitical spheres has led to the fact that since the 1960s, the labour market has been studied from the perspective of institutional theory (T. Veblen, J. Dunlop, J. Commons, J. Galbraith, W. Mitchell). Institutionalist research deepens understanding of the influence of social and political institutions on labour markets. The institutional theory studies the behaviour of individuals (workers), which is irrational, so achieving an equilibrium state in the economic system is impossible. One way or another, when solving some economic issues, others will always emerge, connected with two postulates of institutional economic theory — limited human rationality and its inclination to opportunistic behaviour. But the solution of employment problems requires reforms in which it is necessary to take into account the behavioural aspects of a person as a worker [18, Veblen T.].

The existing rules of behaviour in the modern labour market are prescribed by a set of institutional restrictions [19, Commons J.R.], which determine the institutional properties of territorial labour market system functioning. Thus, the labour markets in the northern regions of the country, in comparison with other regions of Russia, have such institutional features associated primarily with a stricter regulation of wages, which leads to higher employer costs when hiring and firing employees, as well as increases the cost of workers due to additional charges to wages (northern and regional allowances).

The history of the wage institution in the North

The institution of wages began in the Soviet period, and until the end of the 1990s, wages were centrally regulated in the USSR. During the 70 years of Soviet government, the institution of wages in the northern regions has undergone changes. Workers and employees in the Far North and similar areas received labour benefits which tended to grow, fostering wage growth and providing greater social security, compensation, etc. As a result, the northern regions became attractive, people from other parts of the country started coming to the North for "easy money", this increased the number of labour resources in the North. After the USSR collapse and the transition to market economic conditions, the northern and regional allowances were preserved. Thus, in 1991, the Decree of the Council of Ministers of the RSFSR "On Some Measures on Socio-Economic Development of the Northern Regions" [3] was adopted: the regions were given the opportunity to solve the issue of coefficients when calculating wages.

Within the framework of the Decree of the Supreme Council of the Russian Federation of February 19, 1993 No. 4521-1 On the procedure for enacting the law of the Russian Federation "On State Guarantees and Compensations for People Working and Living in the Far North and Equated Localities" (Law on the North), the district coefficient and the percentage bonus to wages were determined. In paragraph 3 of this decree, state guarantees and compensations "apply to the regions of the North, in which the regional coefficient and the percentage increase in salary are charged, but not attributed to the regions of the Far North and areas equated to them". Controversy arose as to which areas are referred to the North. It became clear that in the new market conditions, the accumulated contradictions in the development of the institution of wages need to be resolved. In 2002, the Labour Code of the Russian Federation was adopted, which did not lead to a decrease in the rigidity of Russian legislation on employment protection: the dismissal of workers is also associated with high financial and administrative costs. The Labour Code comprised a separate chapter on the regulation of the labour of people working in the Far North and in areas equated to it, and also provided for certain parts of the Labour Code: Article 59 (allows to execute a fixed-term employment contract to join organizations in the Far North and equated areas if it involves relocation to a new place of work), Article 116 (provides additional annual paid vacations, including for employees working in the regions of the Far North and areas equated to them) and Article 287 (indicates guarantees and compensations to people combining work with education, as well as persons working in the Far North and equated areas, provided to employees only at their primary work location). Since 2004, Chapter 50 of the Labour Code was amended, providing for the right of local authorities and employers of extra-budgetary sphere, taking into account the

[3] O nekotorykh merakh po sotsial'no-ekonomicheskomu razvitiyu rayonov Severa. Postanovlenie Soveta Ministrov RSFSR ot 04.02.1991 №76 (v red. Postanovleniya Pravitel'stva RF ot 29.10.92 № 838) ["On some measures for the socio-economic development of the regions of the North". Decree of the Council of Ministers of the RSFSR of 04.02.1991 No. 76 (as amended by Decree of the Government of the Russian Federation of 10.29.92 No. 838)]. ConsultantPlus. URL: http: //www.consultant.ru/document/cons_doc_LAW_6725 (accessed 18 April 2020).

comments of trade union organizations, to establish additional guarantees and compensations independently. This made it possible to establish higher amounts of guarantees and compensation payments, the size of the district coefficient for institutions financed from regional and municipal budgets. Commercial enterprises introduced such payments through collective agreements, local regulations, labour contracts. It is worth noting that the experience of industrialized countries shows that among workers covered by collective agreements, wage inequality is more pronounced [20, Antonczyk D., DeLeire T., Fitzenberger B.]. It would seem that public sector employees are more protected by labour legislation, but domestic studies [4] indicate that, since the size of tariff rates (salaries), as well as incentive and compensation payments, are set based on the financial capabilities of the budgets of regions, municipalities and the employer. As a result, there is a strong differentiation of salaries both in the sectoral, and in the professional and qualification aspect.

The wage policy pursued by the Soviet state to attract the labour force for the industrial model of the economy can be called successful. Nevertheless, the radical change in the country's economy in the 1990s, accompanied by the decline of the industrial development model, did not lead to the abolition of the “northern compensation” to wages.

Institutional structure of the northern labour market

In the framework of the theory of compensating differences, the increase in the wage rate in the North should ensure high employment, despite unfavorable living conditions. Some researchers [22, Gimpelson V. et al., p. 138] point to a relatively “good situation” in the labour market of the northern regions, linking success with high employment rates. The dynamics of statistical data in fig. 1 indicates that, compared to the average Russian values, the level of employment in the Russian North is higher.

Fig. 1. The dynamics of employment and unemployment rates, % [5].

[4] Korchak E.A. Gosudarstvennaya politika v sfere urovnya zhizni v regionakh Severa i Arktiki RF [State policy in the field of living standards in the regions of the North and the Arctic of the Russian Federation]. ECO, 2017, no. 10, pp. 110–123.

[5] Source: Rosstat, author's calculations.

When comparing the northern regions in terms of employment, it can be noted that over the past 15 years, most of them have a positive trend (Fig. 2).

Fig. 2. The dynamics of the employment rate in the Northern regions of Russia, % [6].

The favorable employment trend is a consequence of the country's continued growth in the employment rate in 2000–2016. The Republic of Tyva had a significant increase in employment among the northern regions (an increase of 7.6, despite the lowest level of employment; it did not rise above 52.0% for 15 years), followed by Chukotka Autonomous Okrug (an increase of 7.2) and the Sakhalin Oblast (by 7.0). The highest employment rate in 2002–2018 was in Chukotka and Yamalo-Nenets Autonomous okrugs, while the lowest employment rates were observed in the Republics of Tyva and Karelia.

The demographic factor plays a significant role in the growth of employment in the North. Regions with a young age structure of the population are usually characterized by a large percentage of employed people aged 15–72. Accordingly, in most northern territories, the level of employment of the population is above the national average. The only traditional exception is Tyva, where young age structure is characterized by a low share of working-age population: below the national average (Table 1).

[6] Source: Rosstat.

Table 1

The dynamics of share of working-age population in the northern regions of Russia, % [7]

	Working-age population in total population			Employed population of working age in total population		
	2010	2015	2019	2010	2015	2019
Russia	61.5	57.4	56.3	47.3	48	49.3
European North						
Republic of Karelia	61.1	56.1	54.8	52.4	46.2	43.6
Komi Republic	64.5	59.0	57.3	53.9	49.8	49.0
Arkhangelsk Oblast	61.3	56.1	55.1	50.7	50.3	45.1
Nenets Autonomous Okrug	62.9	58.6	56.0	56.0	55.0	62.0
Murmansk Oblast	65.3	60.6	59.6	59.2	52.4	49.1
Asian North						
Khanty-Mansi AO –Yugra	68.8	63.2	61.0	55.7	56.3	64.7
Yamalo-Nenets AO	70.1	66.2	64.3	59.4	70.6	77.9
Tyva Republic	59.5	55.1	54.8	34.4	32.4	31.2
The Republic of Sakha (Yakutia)	63.9	59.5	58.6	47.0	50.4	52.1
Kamchatka Krai	65.4	61.9	61.0	59.0	58.3	53.5
Magadan Oblast	66.3	61.1	60.1	60.9	59.9	65.7
Sakhalin Oblast	63.5	58.6	57.5	54.1	58.6	57.2
Chukotka AO	67.1	64.0	63.1	68.6	64.0	67.0

This difference is a consequence of the spread of temporary employment (including employment for several years), shift work, and migration of pensioners to regions with a favourable climate. The share of the working-age population and employed people in the working-age population in the northern regions is higher than the average for the Russian Federation.

The decline in employment in recent years is associated with a large-scale migration outflow, leading to a significant loss of both the total population and the working-age contingents. In the context of increasing birth rates and life expectancy in the 2000s, in the northern regions, there was a decrease not only in absolute numbers, but also in the share of the working-age population. Therefore, the problem of qualitative characteristics of labour resources will continue to aggravate here in the near future.

Figure 3 shows that during the crisis years (2008, 2014, 2018), labour market regulation was supported by flexible wages. Since the northern economy had a relatively smoothed trend during 2005–2019, only the 2008 crisis had a negative impact on the dynamics, it can be noted

[7] Source: calculated according to Rosstat.

that the northern economy was able to adapt to external economic shocks. Employment grew slowly over the period 2005–2016, but since 2016, it started to decline, and the trends continue to the present. It should be noted that employment in the North did not suffer much during the 2008 and 2014 crises, there was a decrease in wages, i.e. due to that institutional mechanism, when under strict legislation, employers in times of crisis "sanitize" their economic situation not by dismissing employees (limit the high costs of dismissal — severance pay, etc.), but by reducing wages.

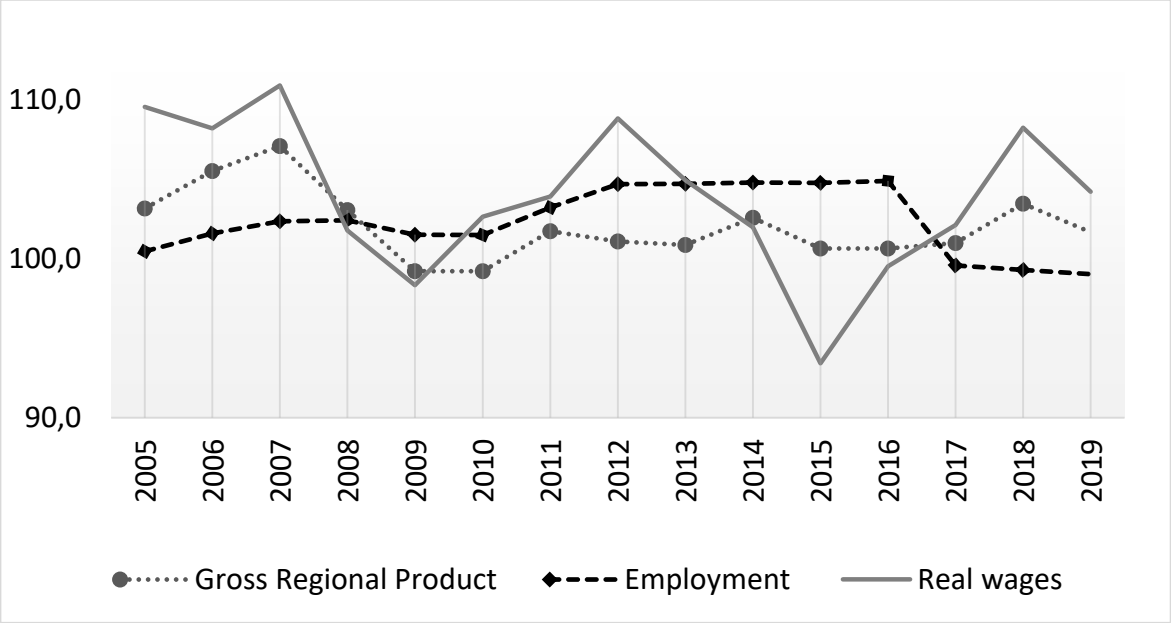

Fig. 3. The dynamics of the basic parameters of the labour market in the northern regions of Russia, % [8].

This affected labour productivity in the northern regions: for 12 years, the growth rate of labour productivity was lower than the growth rate of real wages; the dynamics of the two indicators in the North grew, but much more slowly than in the Russian Federation. By 2018, the rates of wages and labour productivity were almost equal (Fig. 4).

[8] Source: Rosstat, author's calculations.

Fig. 4. The dynamics of wages and labour productivity in the Russian North (compared to 2005) [9].

The data presented confirm that until 2018, the Russian North is characterized by outstripping real wage rates compared to labour productivity. Now the situation has changed, the growth rates of wages and labour productivity have leveled off. This is a consequence of a prolonged migration outflow of labour resources [23, Giltman M.A., et al.], which led to a shortage of qualified personnel [21, Korchak E.A. et al., p. 25]. Since the demand for qualified personnel is quite high, this leads to the fact that wages are growing, but labour productivity is falling. In turn, the decline in human capital hinders the improvement of social institutions (arising as a result of people's interaction in the process of social production), which becomes a serious obstacle to the growth of the northern economy.

Thus, the institutional structure of the labour market in the Russian North is also determined by high employment and unemployment. Some studies note that regions with higher unemployment rates tend to have higher wage inequality [24, Toksanbaeva M.S., p. 185], [25, Pilyasov A. N., p. 52], which can be explained by the behavior of job seekers, who evaluate at a low level the possibility of finding work with decent wages and agree to any low-paid work. In the northern regions of Russia, the dynamics of nominal wages (i.e. income due to the employee) over the last 15 years (Fig. 5) showed an increasing trend.

[9] Source: calculated by the author according to Rosstat.

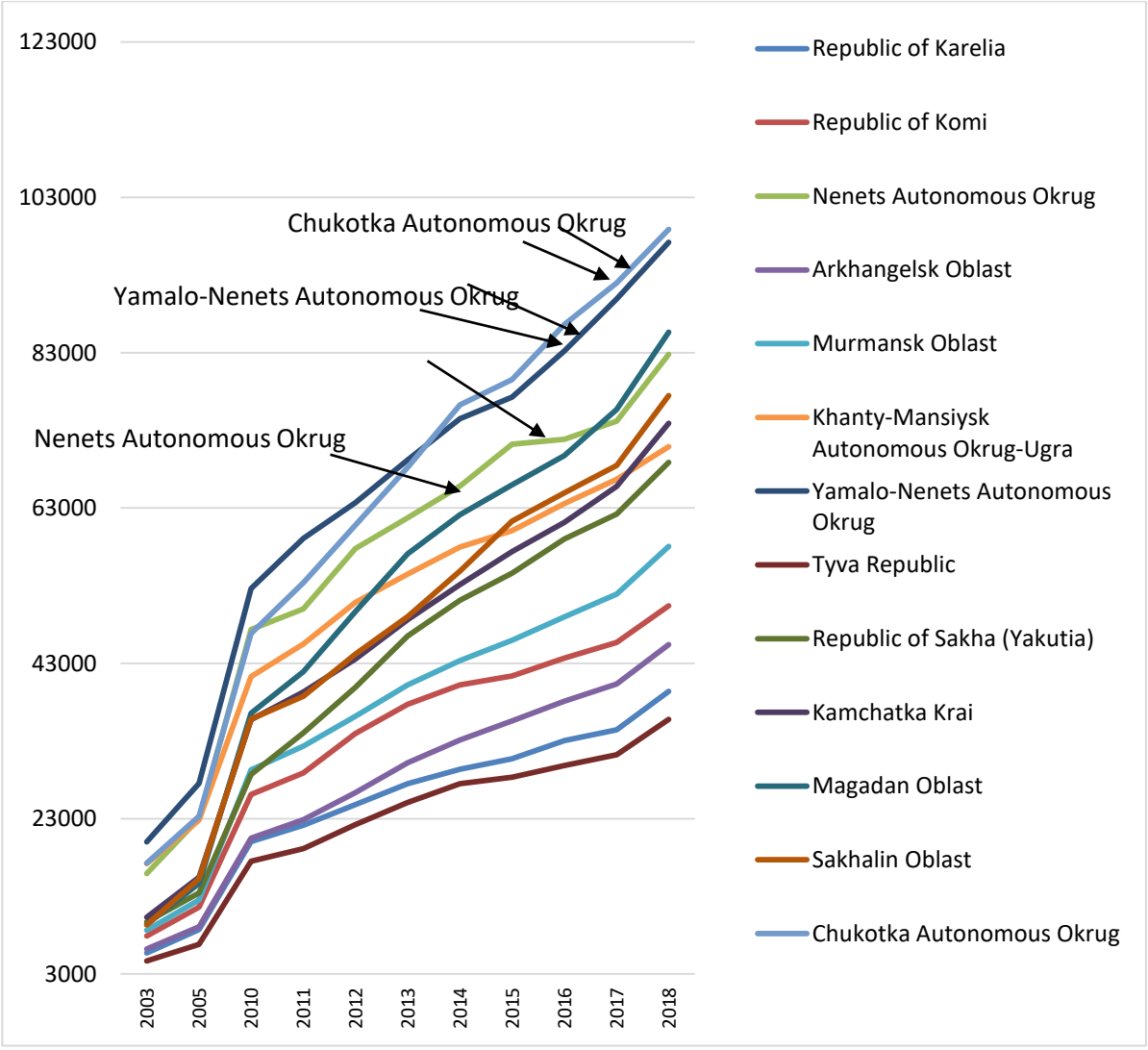

Fig. 5. The dynamics of nominal wages for 2003–2018 [10]

Among northern regions, the autonomous okrugs with a dominant extractive industry in the economy — Chukotka (mainly non-ferrous and precious metals production), Yamalo-Nenets and Nenets Autonomous okrugs (over 90.0% of industrial production is in the oil and gas sector) — lead in nominal wages. Wages are lower in the Tyva Republic and in the regions of the European North, whose territories belong to the old-developed territories: the Republic of Karelia, Arkhangelsk Oblast, Komi Republic and Murmansk Oblast. Nominal wages are often considered as "balancing" the demand and supply of labour, since it determines not only the levels of employment and unemployment, but also incentives to work and its quality [26, Belyavskiy M.O. et al.]. If nominal wages grow at an increasing rate in the Northern regions, there can (and should) be an increase in employment, reduction in the number of unemployed with a constant number of people employed, increase in employment with decreasing unemployment, reduction in the vacancy rate relative to the employment growth rate, which is greater than or equal to one. In fact, employ-

[10] Source: Rosstat.

ment growth was observed in Russia's northern regions until 2016, but the employment rate has been declining since 2017. Here, according to official data from Rosstat, the relatively constant number of employed decreased by 4.4% between 2010 and 2019, while the number of unemployed decreased by 37.0% over the same years. The growth rate of vacancies relative to the growth rate of employment is not decreasing: the growth in the number of vacancies by 9.0% was accompanied by an increase in employment by 5.0% in 2005, by 2019, the growth rate in the number of vacancies was 13.0% against 1.0% of the pace employment growth [11].

The regions of the Russian North lead in terms of wages compared to other regions of the Russian Federation, with the exception of the republics of Karelia and Tyva (Fig. 6).

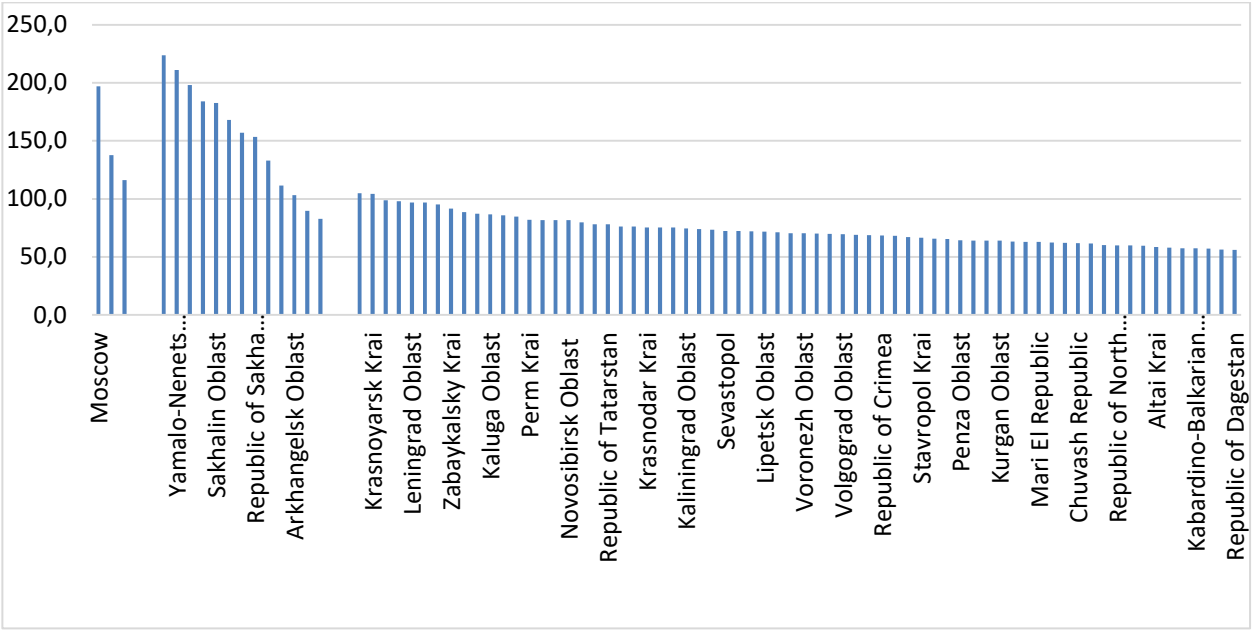

Fig. 6. The dynamics of the average nominal wages in the region (AW) in % of the average in the Russian Federation in 2019

In terms of wages, the city of Moscow (where this level is twice the average for Russia) is ahead of the autonomous okrugs of the Asian North — Chukotka and Yamalo-Nenets. However, the ratio of salaries in the northern regions and the average for the regions of Russia has decreased over the past 15 years (Fig. 7).

[11] Calculated by the author according to official data of Rosstat.

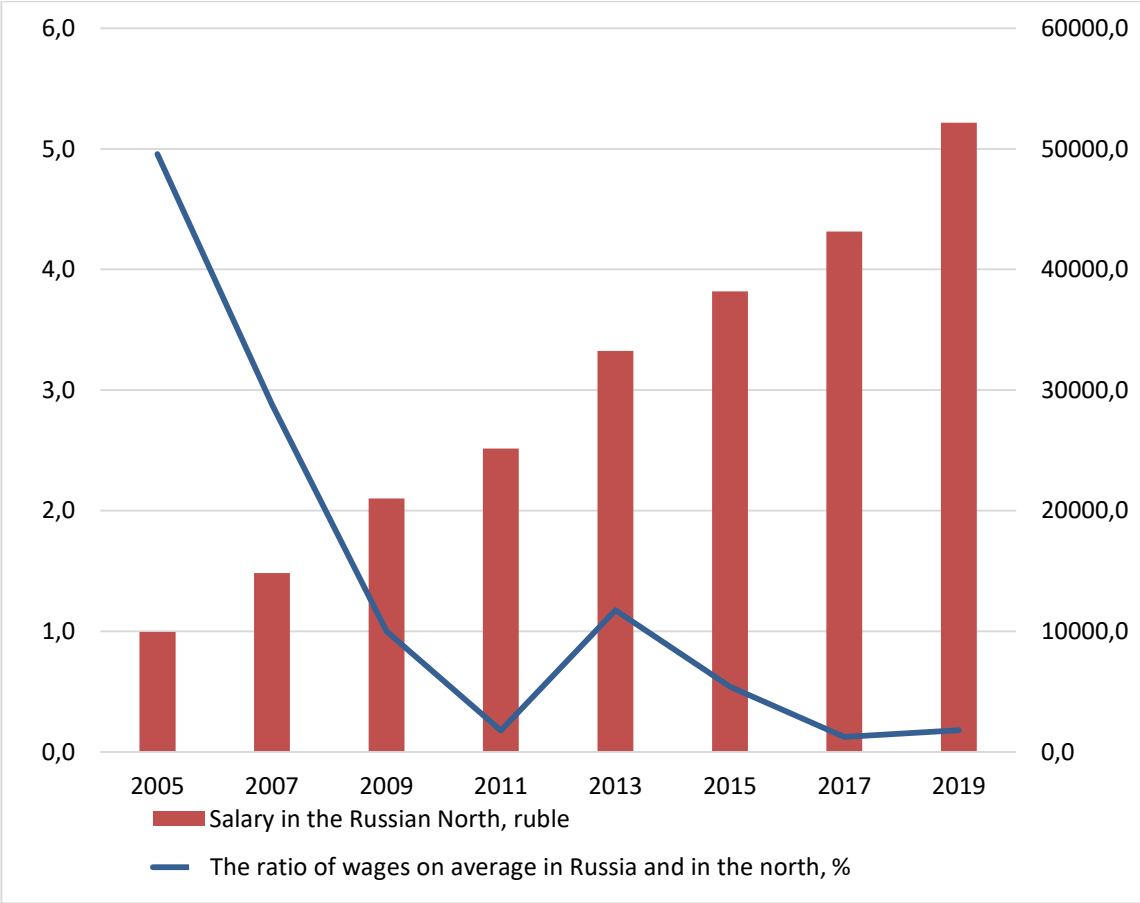

Fig. 7. The ratio of wages in the North and the average for the regions of Russia for 2005–2018 [12].

While in 2004 wages in the North were higher by 5%, then by 2019 the ratio decreased to 0.2%, which was primarily due to the abolition of restrictions on the amount of earnings on which northern compensation is accrued (regional coefficient and percentage surcharges).

Conclusion

Thus, the problems of employment in the Russian North for the period under review 2004–2019 have worsened. The solution to these problems lies, among other things, in the organization of the institution of wages. The results of the study showed that wages are no longer an incentive factor in the growth of labour productivity. In fact, the market mechanism has destroyed the institution of wages. The North has ceased to be attractive for qualified personnel. Under such circumstances, the northern labour market will have to decide soon how to develop further in modern conditions. On the one hand, considering the fact of declining influence of the climatic factor (namely, new energy-saving technologies and their rapid development by people are currently the main competitive advantage of national economies; there are tendencies to reduce “climate costs”, and their share of GDP is decreasing), this is a “cardinal” way to change the existing situa-

[12] Regiony Rossii. Sotsial'no-ekonomicheskie pokazateli, 2009–2019 gg. [Regions of Russia. Socio-economic indicators, 2009–2019]. URL: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/publications/catalog/doc_1138623506156 (accessed 24 November 2020). Author's calculations.

tion, requiring the construction of a new institution, the establishment of “new rules of the game” in the labour market. On the other hand, it is possible to maintain the status quo, reconsider the current situation, leave the existing institution of wages, add the necessary changes to the “rules of the game”. Otherwise, the result of the development of the Northern regions without changes and transformations would be a dead-end, since the resource abundance must contribute to the development of the Northern macro-region. Alternatively, in the near future, this deadlock could result in an immediate stagnation of the northern regions' economic development, which would in any case require the federal and regional authorities to make radical decisions.

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Vocational and Educational Attitudes of Young People in the Context of the Migration Outflow of the Population of the Arctic Territories (on the Example of the Murmansk Oblast) *

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Abstract. The article deals with the peculiarities of the regional context of socialization of the youth of the subjects of the AZRF in the field of implementation of vocational and educational attitudes. The paper presents a summary analysis of statistical indicators of migration gain (loss) in the AZRF, including the structure by age groups, as well as data on the dynamics of the number of students studying at different types of educational institutions from 2005 to 2020. Statistical indicators of migration gain (loss) have revealed a trend of a sharp decrease in the outflow of population in the Russian Arctic. The obvious reasons for this situation were the consequences of the COVID-19 pandemic, which significantly increased the changes in the logic of the reproduction of the social structures, in particular, there was a migration turn towards provincial subjects, as the most favorable for life, in contrast to megacities and large cities. It actualizes and problematizes the possibilities of the environment of remote regions for the optimal socialization of young people. The authors of the article focus on environmental factors that contribute to the formation and implementation of professional and educational attitudes of young people in the region. The purpose of the article is to study the professional and educational attitudes of young people in the conditions of the migration outflow of the population. The object of the research is young people studying in the Murmansk Oblast. The choice of a specific subject of the Russian Arctic (Murmansk Oblast) is due to a number of reasons: intensive migration loss of population; significant reduction in the number of educational institutions; reduction in the number of students in comparison with other subjects of the Russian Arctic. The empirical basis of the article was formed by the results of a sociological study conducted in April–May 2021 in the Murmansk Oblast using the online survey method among graduates of educational institutions of secondary general (523 people), secondary vocational (519 people) and higher education (bachelor level) (283 people).
Keywords: *youth, educational and professional attitudes, the Arctic, migration, migration outflow.*

Introduction

The Arctic zone of the Russian Federation is one of the priorities of the national and foreign policy. This provision is reflected in such regulatory documents as the "Strategy for Developing the Russian Arctic Zone and Ensuring National Security until 2035" [1] and the Decree of the Govern-

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[1] Ukaz Prezidenta Rossiyskoy Federatsii ot 26 oktyabrya 2020 g. № 645 «O Strategii razvitiya Arkticheskoy zony Rossiyskoy Federatsii i obespecheniya natsional'noy bezopasnosti na period do 2035 goda» [Decree of the President of the Russian Federation of October 26, 2020 No. 645 "Strategy for Developing the Russian Arctic Zone and Ensuring National Security until 2035"]. URL: https://www.garant.ru/products/ipo/prime/doc/74710556/ (accessed 30 June 2021).

ment of the Russian Federation of April 21, 2014 No. 366 "On Approval of the State Program of the Russian Federation "Social and Economic Development of the Arctic Zone of the Russian Federation" [2]. The Arctic zone of the Russian Federation (AZRF) today includes all the municipalities of the Murmansk Oblast, the Nenets, Chukotka and Yamalo-Nenets Autonomous okrugs (4 subjects), as well as some municipalities of the Arkhangelsk Oblast, the Republics of Komi, Karelia, Sakha (Yakutia), and also Krasnoyarsk Krai (5 subjects).

The economic attractiveness and geopolitical significance of the Arctic zone of the Russian Federation remain the most important factors in the managerial vision of the region. The planned large-scale transformations require significant labour resources, the main source of which is the youth of the AZRF subjects. However, despite the actualization at all management levels of problems related to the development of the Russian Arctic territories, the population retention and the creation of optimal living conditions, the analysis of migration indicates a steady decline in the population in almost all AZRF regions.

The purpose of this article is to identify the professional and educational attitudes of young people in the conditions of an intensive migration outflow from the region.

Theoretical and methodological foundations

The study of vocational and educational attitudes is an important component of the process of monitoring the social well-being of young people, which makes it possible to track in dynamics the intensity of changes in plans and subjective assessments of the future, which is especially important in the context of regional development. Despite the existence of the problem of a "gap" between intentions and actions, the formation and severity of attitudes underlies intentions, which in turn are embodied in purposeful behavior. This fact has its own empirical evidence in the theory of planned behavior by I. Ajzen, according to which, the stronger the intention, the more likely it will be fulfilled [1].

The relevance of studying vocational and educational attitudes is also determined by the rapidity of changes taking place in the "fluid modernity" [2, Bauman Z.], which is characterized by the complexity of predictability and complete dependence on the personal choice. Moreover, an important factor was the coronavirus pandemic, which launched and intensified crisis processes in all spheres of society. The pandemic has led to a more pronounced change in the logic of the reproduction of the social structure. The availability of favorable conditions of remoteness (while maintaining a wage and/or a workplace) has become a new type of social inequality. An example of this is the increasing centrifugal tendency, as shown by the explosion in demand for housing in

[2] Postanovlenie Pravitel'stva Rossiyskoy Federatsii ot 21.04.2014 g. № 366 «Ob utverzhdenii gosudarstvennoy programmy Rossiyskoy Federatsii «Sotsial'no-ekonomicheskoe razvitie Arkticheskoy zony Rossiyskoy Federatsii» [Decree of the Government of the Russian Federation of April 21, 2014 No. 366 "On approval of the state program of the Russian Federation "Socio-economic development of the Arctic zone of the Russian Federation"]. URL: https://www.garant.ru/products/ipo/prime/doc/70544266/ (accessed 30 June 2021).

the province. This circumstance was confirmed in the statistical indicators of internal migration for 2020, which will be analyzed below. In this context, the opportunities and potential of remote regions become key factors in the sustainable development of territories in general. Creating optimal conditions that meet the needs of young people in terms of vocational and educational self-realization is a key expectation and a guarantee of the resilience of provincial subjects.

Studies of the professional and educational attitudes of young people have a certain tradition and accumulated scientific groundwork. The influence of social stratification on educational attitudes, the dependence of professional orientations on parental status, place of residence and resources are presented in the works of Yu.A. Zubok, V.I. Chuprov [3, 4], V.T. Lisovskiy [5], D.L. Konstantinovskiy [6], Yu.R. Vishnevskiy [7, 8, 9].

Educational attitudes as an element of life strategies were touched upon in the works of N.D. Sorokina [10, 11], S.G. Kosaretskiy [12], U.V. Trokhirova [13], M.A. Yadova [14, 15]. The authors studied the educational and professional strategies of young people in the context of innovative requests and came to conclusions about the discrepancy between Russian education and the expectations of young people. An important research result was the statement of the lack of equal opportunities for the accessibility of education in terms of social property and territorial factors.

From the authors' point of view, it is important to take into account regional specifics that contain conditions for the socialization of young people in order to deeply understand the mechanisms of implementation of these or those attitudes. In this vein, the works of A.A. Dregalo, V.I. Ulyanovskiy [16] deserve special attention, analyzing the educational, cultural, political and professional attitudes of the youth of the Arkhangelsk Oblast; A.S. Konstantinov [17], E.Z. Galimullin [18], Vasilyeva O.V. [19] explore the migration trends of young people in the Arctic zone; O.V. Osipova [20] touches upon various aspects of the social well-being of young people in general.

Results

Returning to the research problem, it is necessary to focus on migration processes in the Russian Arctic as factors that can influence the vocational and educational attitudes of young people. Migration characteristics in the Arctic region have their own features.

Table 1

Dynamics of migration growth in the AZRF subjects from 2015 to 2020 (people, indicator value per year) [3]

AZRF subjects	2015	2016	2017	2018	2019	2020
Republic of Karelia	-734	-1 008	-1 916	-1 320	-708	7
Komi Republic	-8 738	-6 932	-9 470	-9 276	-7 789	-3 324
Arkhangelsk Oblast (except for the Nenets Autonomous	-8 119	-6 266	-7 814	-6 701	-3 069	-2 183

[3] Source: Calculated by the authors based on data from the Federal State Statistics Service. URL: https://fedstat.ru/indicator/37613 (accessed 30 June 2021).

Okrug)						
Nenets Autonomous Okrug (Arkhangelsk Oblast)	101	-320	-231	-392	77	129
Murmansk Oblast	*-4 384*	*-4 343*	*-3 503*	*-4 402*	*-4 863*	*-4 459*
Yamalo-Nenets Autonomous Okrug	-11 972	-3 491	-2 418	-1 735	-1 318	-1 071
Krasnoyarsk Krai	2 753	4 828	929	-278	-2 778	1 842
The Republic of Sakha (Yakutia)	-5 387	-4 153	-4 649	-2 940	-229	6 065
Chukotka Autonomous Okrug	-589	-516	-656	237	554	-760

The data in Table 1 draw attention to the indicators of migration growth (loss) for 2020, which state a sharp decrease in the outflow of the population to the Russian Arctic. Among the regions, the Republic of Sakha (Yakutia) became the leader in terms of migration growth: +6.5 thousand people. Krasnoyarsk Territory is in second place, with an increase of +1.8 thousand people in 2020 from a sharp loss in 2019. In third place in terms of migration growth are the Nenets Autonomous Okrug (+129) and the Republic of Karelia (+7) — the subjects went from absolute negative values of decrease to increase. The only subject with a stable migration outflow since 2015 is the Murmansk Oblast, where the negative migration balance is recorded in 2020. This region is the clear leader in the Russian Arctic in terms of migration losses. The Chukotka Autonomous Okrug is in the second place: for the first time in three years (+237 people in 2018), the migration growth turned into an intensive decline (-760 people in 2020). Arkhangelsk Oblast and the Yamalo-Nenets Autonomous Okrug are in third place; in these subjects, a reduction in migration loss is planned, but the trend of population loss is still very stable. Of course, changes in migration flows were largely determined by the consequences of the coronavirus pandemic, which significantly affected this process.

Table 2

Dynamics of migration growth in the AZRF subjects by main age groups of migrants from 2015 to 2020 (people, indicator value per year) [4]

AZRF subjects	under working age		working age		over working age	
	2015	**2020**	**2015**	**2020**	**2015**	**2020**
Republic of Karelia	-4	61	-1 005	25	275	-79
Komi Republic	-1028	-411	-6 026	-1 802	-1 684	-1 111
Arkhangelsk Oblast (except for the Nenets Autonomous Okrug)	-1229	-559	-5 700	-935	-1 190	-689
Nenets Autonomous Okrug (Arkhangelsk Oblast)	57	-4	80	89	-36	44
Murmansk Oblast	***587***	***-667***	***-2 606***	***-2 196***	***-2 365***	***-1 596***
Yamalo-Nenets Autonomous Okrug	154	638	-9 233	-796	-2 893	-913
Krasnoyarsk Krai	331	824	2 725	948	-303	70
The Republic of Sakha (Yakutia)	-589	607	-3 321	5 985	-1 477	-527

[4] Source: Calculated by the authors based on data from the Federal State Statistics Service. URL: https://fedstat.ru/indicator/37613 (accessed 30 June 2021).

Chukotka Autonomous Okrug	-17	-43	-310	-528	-262	-189
TOTAL	**-1738**	**446**	**-25 396**	**790**	**-9 935**	**-4 990**

Table 2 presents an analysis of migration gain (loss) in the structure by age groups. It is important to note that the trend in almost all subjects is associated with the outflow of the population over working age (with the exception of the Krasnoyarsk Krai). There are also subjects, where significant losses are due to working age: Murmansk Oblast, Komi Republic, Arkhangelsk Oblast, Chukotka Autonomous Okrug. The trend of losses in the subgroup below working age in the Murmansk Oblast and Chukotka Autonomous Okrug since 2015 is also noteworthy.

From the authors' point of view, a significant contribution to understanding the causes of migration is made by the analysis of indicators of the state of the vocational training sector in the region. The educational potential of the residence territories and related employment prospects are priority factors in building the life strategies of young people in general. The number of students of universities and colleges by AZRF subjects (data for 2005–2020) is presented in tables 3 and 4.

Table 3

The number of students in higher educational institutions by the AZRF subjects [5]

AZRF subjects	**2005/ 2006**	**2019/ 2020**	**2005/ 2006**	**2019/ 2020**	**2005/ 2006**	**2019/ 2020**	**2005/ 2006**	**2019/ 2020**
	thous. people		per 10 thous.		RF rating		AZRF rating [6]	
Republic of Karelia	24.1	10.9	346	178	61	63	6	4
Komi Republic	35.8	14.6	363	179	57	62	5	3
Arkhangelsk Oblast (except for the Nenets Autonomous Okrug)	47.7	17.7	369	156	52	68	4	5
Nenets Autonomous Okrug (Arkhangelsk Oblast)	0.3	-	77	-	84	85	9	9
Murmansk Oblast	39.0	7.0	461	94	30	81	2	6
Yamalo-Nenets Autonomous Okrug	14.7	0.6	277	10	73	84	7	8
Krasnoyarsk Krai	132.0	68.7	454	240	32	39	3	2
The Republic of Sakha (Yakutia)	46.8	23.8	492	245	21	35	1	1
Chukotka Autonomous Okrug	0	0.1	0	27	-	83	8	7

During the period from 2005 to 2019, the greatest losses were incurred by the YaNAO (almost 24.5 times — from 14.7 to 0.6 thousand people) and the Murmansk Oblast (almost 5.6 times — from 39.0 to 7.0 thousand people). Data for all AZRF subjects correlate with the all-Russian trend of an almost two-fold decrease in the number of university students both in absolute terms (total in thousand people) and in relation to the total population (per 10 thousand people). Certainly, this dynamics was also influenced by the general demographic situation due to the decline in the birth rate of the 1990s. [21, Nedoseka E.V., Sharova E.N.].

[5] Regions of Russia. Socio-economic indicators. URL: https://rosstat.gov.ru/folder/210/document/13204 (accessed 30 June 2021).
[6] AZRF rating calculated independently.

The intensive migration outflow of the population indicates that there is a "washout" of the intellectual potential of the population in the Arctic region as a result of a powerful flow of educational emigration.

Table 4

The number of students in secondary vocational education institutions by the AZRF subjects [7]

AZRF subjects	number of students enrolled in specialist training programmes of mid-level				number of students enrolled in skilled worker training programmes			
	2005/2006	2019/2020	2005/2006	2019/2020	2005/2006	2019/2020	2005/2006	2019/2020
	thous. people		per 10 thous.		Thous .people		per 10 thous.	
Republic of Karelia	14.0	11.2	200	182	8.3	2.6	NA	43
Komi Republic	15.7	15.2	160	175	17.5	4.6	NA	56
Arkhangelsk Oblast	25.3	19.6	177	171	22.1	8.1	NA	71
Nenets Autonomous Okrug	0.9	0.9	205	203	0.5	0.3	NA	61
Murmansk Oblast	13.1	14.0	152	189	10.2	3.1	NA	42
Yamalo-Nenets Autonomous Okrug	4.6	8.3	87	152	3.6	1.8	NA	33
Krasnoyarsk Krai	61.5	55.4	160	193	34.7	14.6	NA	51
The Republic of Sakha (Yakutia)	17.4	20.7	183	213	7.0	5.6	NA	57
Chukotka Autonomous Okrug	0.7	0.7	143	149	0.8	0.1	NA	18
RF	2905.7	2576.2	105	176	703.0	543.4	NA	37

The situation is ambiguous in terms of the number of students in secondary vocational education in the regions. Thus, the reduction in the number of students is typical for the Arkhangelsk Oblast (-22.6%), the Republic of Karelia (-20%) and the Krasnoyarsk Krai (-10%). The increase in the number of students is typical for the Yamalo-Nenets Autonomous Okrug (+80%), the Republic of Yakutia (Sakha) (+19%) and the Murmansk Oblast (6.8%). Over the past 18 years, the situation has remained unchanged in the Chukotka Autonomous Okrug.

Speaking in general about the system of vocational education in the territories of the AZRF subjects, it can be concluded that for 2020, higher education programs are not being trained in the territories of the Nenets Autonomous Okrug, the Republic of Karelia, the Republic of Yakutia (Sakha). Training in the branches of universities with less than 50 people is carried out in the Komi Republic, the Yamalo-Nenets Autonomous Okrug and the Chukotka Autonomous Okrug. Predominantly vocational education is concentrated in the European part of the Russian Arctic, 16 out of 60 universities and 91 out of 306 colleges and branches located in the AZRF subjects operate in the Arctic territories (Table 5).

[7] Regions of Russia. Socio-economic indicators. URL: https://rosstat.gov.ru/folder/210/document/13204 (accessed 30 June 2021).

Table 5

Distribution of universities and colleges in the Arctic territories of the AZRF subjects [8]

AZRF subjects	Number of higher education institutions (with branches)	Number of secondary education institutions (with branches)
Republic of Karelia	-	3
Komi Republic	2	8
Arkhangelsk Oblast	5	25
Nenets Autonomous Okrug	5	19
Murmansk Oblast	2	11
Yamalo-Nenets Autonomous Okrug	1	8
Krasnoyarsk Krai	-	4
The Republic of Sakha (Yakutia)	1	4

Over the past 15 years, the following changes have occurred: admission to Arctic universities decreased by 3 times; the number of branches of universities decreased by 6 times (the admission to branches of universities decreased by 9 times). According to data provided by the Agency for the Development of Human Capital in the Far East and the Arctic, about 60% of school graduates can count on admission to vocational education institutions located in the Arctic regions [9]. Thus, the limited opportunities for obtaining professional education within the AZRT subjects stimulate the outflow of young people from the designated territories.

An analysis of statistical indicators draws our research attention to the Murmansk Oblast, which suffered the most losses in terms of reducing the number of higher education institutions (from 32 units in 2007 to 5 units in 2020) and the number of university students (5.6 times from 2005 to 2020). Let us consider the migration situation in the Murmansk Oblast in comparison with other AZRF subjects (Table 6).

Table 6

Migration growth rate (per 10 thousand people) by AZRF subjects, 2015–2020 [10]

AZRF subjects	2015	2016	2017	2018	2019	2020
Republic of Karelia	-11.6	-16.0	-30.6	-21.2	-11.5	-0.8
Komi Republic	-101.5	-81.2	-111.9	-111.0	-94.4	-41.7
Arkhangelsk Oblast (except for the Nenets Autonomous Okrug)			-69.9	-60.6	-28	-22.7
Nenets Autonomous Okrug (Arkhangelsk Oblast)	23.1	-72.9	-52.5	-89.2	17.5	28.9
Murmansk Oblast	***-57.3***	***-57.1***	***-46.3***	***-58.6***	***-65.3***	***-69.2***
Yamalo-Nenets Autonomous Okrug	-222.9	-65.2	-45.0	-32.1	-24.3	-21.6
Krasnoyarsk Krai	9.6	16.8	3.2	-0.9	-9.7	5.4
The Republic of Sakha (Yakutia)	-56.2	-43.2	-48.2	-30.4	-2.4	61
Chukotka Autonomous Okrug	-116.9	-103.2	-132.3	47.8	110.9	-157.3

[8] Website of the Federal Service for Supervision in Education and Science. URL: https://map.obrnadzor.gov.ru/ (accessed 30 June 2021).

[9] Statistical data obtained from the Agency for the Development of Human Capital, in the Far East and the Arctic, based on the results of an official request to the department.

[10] Source: Compiled by the authors based on data from the Federal State Statistics Service of the Russian Federation. URL: https://www.fedstat.ru/indicator/43017 (accessed 30 June 2021).

The data in Table 6 clearly demonstrate that the Murmansk Oblast is steadily losing population, this is especially noticeable in 2020, when most other AZRF regions (except Chukotka) are characterized by a decrease in the rate of decline and even growth. The significant migration inflow in 2018–2019 in Chukotka (+132.0%) is noteworthy: according to experts, the reason for the growth is related to the abolition of the border regime for the entry of Russian citizens. The Murmansk Oblast moved from the fourth place in 2015–2018 to the second place in 2019–2020 in terms of migration loss among the AZRF subjects.

Returning from the migration context to the vocational and educational potential of the Murmansk Oblast, it can be noted that at present, training of specialists in vocational education is carried out by 5 organizations of higher education, 3 are state and municipal (87.8% of students) and 2 are private (12.2% of students). Real educational opportunities for applicants are limited to the 2 biggest and oldest state universities, which specialize in humanities and technical education [11].

The reduction in the number of institutions of higher education has led to a reduction in the opportunities for choosing professions. An important fact is the annual reduction in the number of budget places allocated to universities for training personnel in the areas of bachelor's and master's programs, which also narrows the opportunities for both applicants and graduates to self-realization and runs counter to the declared plans of the Government of the Russian Federation and the Murmansk Oblast for training and staffing sectors of the region's economy. According to the Agency for Human Capital Development in the Far East and the Arctic, graduates of the vocational education system provide only 33% of the staffing needs of the economy of the Russian Arctic.

It should be noted that 20% of 11th grade students in the Murmansk Oblast's vocational education system settle down (14.6% in higher education, and 5.3% in secondary vocational education), the remaining 80% (according to the results of a study in 2019) do not enter the system of vocational education in the Oblast in the year of graduation [12].

Training in universities in the Murmansk Oblast is mainly conducted in the following areas: engineering, technology and technical sciences — 39.8%; social sciences — 23.1%; education and pedagogical sciences — 19.0%; mathematical and natural sciences — 10.0%; humanities — 4.0%, etc.

[11] Strategiya sotsial'no-ekonomicheskogo razvitiya Murmanskoy oblasti do 2025 goda. Utv. Rasporyazheniem Pravitel'stva RF ot 13 fevralya 2019 g. № 207-r. [Strategy for socio-economic development of the Murmansk Oblast up to 2025. Approved Order of the Government of the Russian Federation dated February 13, 2019 No. 207-r.]. URL: https://www.economy.gov.ru/material/file/2d73ae0995822a891524f19779bc6499/strategm.pdf (accessed 30 June 2021).

[12] Statistical data obtained from the Agency for the Development of Human Capital, in the Far East and the Arctic, based on the results of an official request to the department.

Summarizing the statistical data, let us focus on the factors, determining movement of population in general, and the intentions of young people in particular in the AZRF subjects. Along with objectively existing macro-factors associated with the natural and climatic features of the Arctic region, mesolevel factors play an increasingly important role in building life strategies of young people in the AZRF:

- Socio-economic. This group of factors is closely related to the peculiarities of the industrial development of the Arctic. The production binding of the Arctic regions to a limited number of industrial enterprises remains a serious problem, the consequence of which is low diversification of employment [23, Leksin V.N., Porfiriev B.N.]. With regard to the Murmansk Oblast, this link remains relevant and continues to be assigned to the territory at the level of official documents, for example, the Strategy for the Spatial Development of the Russian Federation for the period up to 2025, where spheres of perspective effective economic specialization are mainly designated as branches of industrial production [13]. In addition, a factor of a socio-economic nature that determines the outflow of the population is the once attractive feature in the form of financial advantages in the wages of residents of the Far North. At present, this financial advantage has actually lost its attractive migration force, primarily due to an insignificant or actually equalizing ratio (depending on employment areas) with other regions of Russia [22, Volgin L.A., Shirokova N.L., Mosina L.L.].
- Socio-structural. Interregional differentiation in the socio-economic development of the territories of the Russian Federation led to systemic shifts that gave rise to relationships between the center and regions on the principle of “center — periphery”. In this sense, the remoteness of the Arctic regions is associated with the main characteristics of the periphery, such as backwardness and stagnation, which initially sets the direction in the life planning of young people to find the best place for self-realization [18, Galimullin E.Z.; 21, Nedoseka E.V.; 23, Sharova E.N.].
- Socio-cultural. This group of factors is closely related to the historical features of the development of the Arctic zone. With the advent of Soviet power at the beginning of the 20th century, the studied territories were developed mainly through forced migration. Later, starting from the second half of the 20th century, the attractiveness of the North was associated with material wealth due to various kinds of financial incentives for working conditions in difficult climatic conditions. Low rootedness and weak regional identity were and are distinctive features of the majority of the population of the Arctic

[13] Strategii prostranstvennogo razvitiya Rossiyskoy Federatsii na period do 2025 goda. Utv. Rasporyazheniem Pravitel'stva RF ot 13 fevralya 2019 g. № 207-r. [Spatial development strategies of the Russian Federation for the period up to 2025. Approved Order of the Government of the Russian Federation of February 13, 2019 No. 207-r.]. URL: static.government.ru/media/files/UVAlqUtT08o60RktoOXl22JjAe7irNxc.pdf (accessed 30 June 2021).

regions (of course, excluding the ethnic minority of the indigenous peoples of the North) [18, Galimullin E.Z.; 24, Nedoseka E.V., Anufrieva T.V.; 25, Sharova E.N.].

The indicated groups of factors have a significant impact on the process of building professional and educational attitudes, which is especially characteristic of young people, who are considered as the main resource for large-scale transformations in the Arctic region. The specificity of various youth groups is determined by the specific conditions of socialization and opportunities for self-realization in a particular local community (country, region, locality). In other words, the place of residence of young people is an important differentiating and stratifying factor that creates the external (objective) framework of life plans.

Let us turn to some results of an empirical sociological study conducted in April–May 2021 in the Murmansk Oblast using an online survey among the graduates of secondary general educational organizations (523 people), secondary vocational (519 people) and higher education (bachelor's level) (283 people). The focus of research attention was on the vocational, educational and migration attitudes of the studying youth of the region [14].

A single questionnaire was designed for all three groups of graduates, which also included specific questions depending on the level of education (general secondary, vocational secondary, higher education). The presence of common questions made it possible to compare the life attitudes of young people. At the same time, it is quite obvious that the attitudes of school graduates who do not yet have a special education and are faced with the choice of a profession (a direction of training) possessed the greatest distinctive ability.

Despite the growing demand for the secondary vocational education system, the vast majority of 11th grade students are still oriented towards higher education (79.3%). The choice in favour of secondary vocational training was made by no more than 5% of the respondents, every tenth one has not yet fully decided whether it is a university or a college. In comparison with the results of previous studies of school graduates in the Murmansk Oblast, there was a slight decrease in interest in higher education: for example, in 2009, 84.5% of 11th grade students planned to enter universities, in 2005 — 92% [26, Sharova E.N., Mulina T.V., p. 55].

The educational plans of graduates of institutions of secondary vocational and higher education (hereinafter referred to as SVE and HE, respectively) are characterized by greater uncertainty (40–42% found it difficult to answer the question). At the same time, every fourth or fifth respondent who completes professional training is oriented to get higher education in the future (university graduates plan to continue their education in the master's program). 16–17% of SVE and HE graduates plan to implement horizontal educational trajectories within the framework of the already achieved level (i.e., receive additional qualifications in courses, etc., or master another profession / field of study at a college / university).

[14] The questionnaire was developed and tested by the authors of the article.

In general, the above results indicate a fairly high educational demand of graduates of all levels. A certain problem is the region's ability to satisfy this request and subjective assessments of these opportunities. In this regard, graduates who intend to study further were asked about the location of the priority educational institution. Only 15.5% of school graduates, 28.9% of college graduates, and 30.0% of university graduates made their choice within the region (Table 7). Schoolchildren form the main flow of educational migration, most of them intend to study in St. Petersburg, as well as in other regions of the Russian Federation: almost 80% prioritize education outside the Murmansk Oblast, 74.2% of respondents do not even consider it as a possibility (including alternate) option. The most important criteria when choosing an educational institution for students are the availability of the required area of study (62.4%) and budget places (60.4%); the second most popular are a real opportunity to enrol (46.5%) and high chances of employment after graduation (44.9%).

Comparatively more respondents with specialized education (secondary or higher) wanted to continue their education in the Oblast, but at the same time more than a quarter viewed St. Petersburg as a priority destination, and every fifth found it difficult to give a definite answer.

Table 7

Distribution of respondents' answers to the question: "Specify the location of your priority educational institution", (closed, % of the number of respondents)

alternatives	schools	SVE	HE
within the region	15.5	**28.9**	**30.0**
Moscow	8.8	6.5	6.4
St. Petersburg	**46.6**	**26.9**	**26.4**
another region of the Russian Federation	21.6	10.9	14.5
other country	2.8	**7.0**	3.6
find it difficult to answer	4.8	**19.9**	**19.1**
Total	100.0	100.0	100.0

For graduates of colleges and universities, employment is a more pressing issue: 48.4% of college graduates and 60.1% of university graduates will look for work after graduation. At the same time, college graduates feel a little more confident in the labour market than university graduates: if among SVE students, one in five noted that there is no certainty with the future place of work (21.1%), then among the HE ones, more than a third do not know where to work (35.0%). The relative majority of college and university graduates (54.2% and 49.7%, respectively) have several employment options available, but without clear guarantees. 13.5% of SVE students and 18.1% of HE students are already working and are not going to change their place of work.

We suppose that the older the age group and the higher the educational level of young residents, the less developed are their migration attitudes: 84.7% of school graduates plan to leave the Murmansk Oblast after graduation (including 66.7% definitely intend to leave), 59.9% of SVE graduates (including 33.9% definitely intend to leave), 38.4% of HE graduates (including 19.2% definitely intend to leave).

It turns out that the attitude to receive education (mainly higher education) in the near future determines the migration potential. University graduates who have already implemented this goal are more oriented to work or look for a new job; relatively more often they plan to stay in the Oblast (31.4%). It should be noted that quite a lot of people among university students found it difficult to answer the question about their migration plans (30.3%), which, coupled with high uncertainty about the future place of work, indicates the potential for territorial mobility of this group as a whole.

The migration intentions of the studied group of young people are supported by the appropriate attitudes of the closest environment (relatives, friends, teachers, etc.), which actively support plans to move (the level of support averaged 4.3 points on a 5-point scale, where 5 means full support).

The average assessment of the attractiveness of life in the Murmansk Oblast (on a 5-point scale, where 5 is very attractive) on the whole corresponds to attitudes towards moving: the lowest value of this assessment is typical for school graduates (2.72 points), graduates of colleges (3.09 points) and universities (3.24 points).

Respondents were also asked to assess their satisfaction with certain aspects of the quality of life in the Oblast, which were considered as opportunities for self-realization. In general, school graduates are less satisfied with all the proposed aspects. The possibility of obtaining education in accordance with their needs is assessed at the average level by all graduates (from 3.00 to 3.61 points). At the same time, in the "rating" of the answers of school youth, this opportunity occupies one of the last places in terms of satisfaction among the eight proposed options, while for university youth — one of the first. It is assumed that schoolchildren initially have higher ambitions and expectations, planning to enter the country's central universities, and representatives of regional students, having remained to study in the region, generally demonstrate loyalty to the conditions that are created locally, although they do not give high marks. In dynamics, there was a decrease in the satisfaction of young people with the educational opportunities of the region: for example, in a 2013 study, the opportunity to get a good general secondary and vocational education was estimated at 3.9 and 3.8 points, respectively [cit. according to 27, Tsylev V.R., Sharova E.N., p. 136].

Table 8

Distribution of respondents' answers to the question: "Assess on a 5-point scale how satisfied you are with the following opportunities for self-realization created in the region. Average value (from 1 — not at all satisfied to 5 — quite satisfied)"

alternatives	schools	SVE	HE
build a system of relationships, connections (friends, business)	3,79 (1)	3.91 (1)	3.97 (1)
meet a loved one and start a family	3.47 (2)	3.82 (2)	3.93 (2)
achieve the desired level of well-being	3.33 (3)	3.35 (6)	3.49 (4)

realize oneself in creative and sports activities	3.29 (4)	3.47 (3)	3.37 (6)
find an attractive job	3.12 (5)	3.41 (4)	3.41 (5)
get an education according to your needs	***3.00 (6)***	***3.39 (5)***	***3.61 (3)***
create and develop your own business	2.98 (7)	3.17 (7)	3.20 (7)
realize oneself in the public and political spheres	2.88 (8)	2.99 (8)	3.13 (8)

Thus, according to the results of the study, it is possible to draw some conclusions that are of practical importance for the further development of the region.

Despite the general decrease in the migration loss in the AZRF subjects, recorded by statistics in 2020, the established demographic trends have been preserved in the Murmansk Oblast. Currently, the region occupies a leading position in terms of migration losses of the population, especially of working age and younger, which is generally not typical for the northern territories. The traditional model of migration, associated primarily with the development of northern experience and retirement, is giving way to new life strategies.

In the Murmansk Oblast, the so-called “educational” migration, which is family-oriented, is becoming more and more common. It is typical to move with all family members immediately after the children receive a general secondary education in order to enter the country's central universities. The most popular destination for choosing both a place of residence and receiving further (mainly higher) education is the city of St. Petersburg.

This model of migration is reflected in the statistics (there is a decrease in the number of higher education institutions and students), as well as in the vocational education and migration attitudes of the youth of the Murmansk Oblast (especially relevant for school graduates). Graduates of secondary vocational and higher educational institutions are more rooted in the region, largely due to institutional involvement in the process of obtaining vocational education, as well as experience in a particular workplace (often in parallel with training). At the same time, these groups of young people are not devoid of indefinite migration plans, which requires greater attention from regional authorities in terms of managing the employment of young professionals.

The choice in favour of the scenario of sustainable development of the Murmansk Oblast determines the need to preserve and expand the human potential of the territory, investing in the system of professional education in the areas of training that are in demand in the region and meet the challenges of tomorrow.

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Scientific Cooperation: Supporting Circumpolar Permafrost Monitoring and Data Sharing *

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Abstract. Scientific cooperation is a well-supported narrative and theme, but in reality, presents many challenges and counter-productive difficulties. Moreover, data sharing specifically represents one of the more critical cooperation requirements, as part of the "scientific method [which] allows for verification of results and extending research from prior results." One of the important pieces of the climate change puzzle is permafrost. Currently, most permafrost data remain fragmented and restricted to national authorities, including scientific institutes. Important datasets reside in various government or university labs, where they remain largely unknown or where access restrictions prevent effective use. A lack of shared research—especially data—significantly reduces effectiveness of understanding permafrost overall. Whereas it is not possible for a nation to effectively conduct the variety of modeling and research needed to comprehensively understand impacts to permafrost, a global community can. However, decision and policy makers, especially on the international stage, struggle to understand how best to anticipate and prepare for changes, and thus support for scientific recommendations during policy development. This article explores the global data systems on permafrost, which remain sporadic, rarely updated, and with almost nothing about the subsea permafrost publicly available. The authors suggest that the global permafrost monitoring system should be real time (within technical and reasonable possibility), often updated and with open access to the data. Following a brief background, this article will offer three supporting themes, 1) the current state of permafrost data, 2) rationale and methods to share data, and 3) implications for global and national interests.

Keywords: *permafrost, permafrost monitoring, permafrost data, data sharing, national security.*

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Введение

While the world continues to work toward an understanding and projections of climate change impacts, the Arctic is widely recognized to be a critical component as a bellwether region [1]. Global scientific cooperation, including data sharing, is recognized to be an integral element, but in reality, it presents many challenges and counter-productive difficulties [1, Akiho S., Raita M., pp. 129–162]. As John Porter noted in his work on the Long-Term Ecological Research Network (established in 1980), "In the abstract, the advantages of sharing data are manifest. No individual scientist, or even a small group of scientists, can collect all the data that are needed to address today's major ecological research questions, especially those dealing with global, regional, or long-term phenomena [2, Porter J., p. 14]." As Porter acknowledged, despite all of this intuitive value in data sharing, the scientists concerned struggled to share with one another throughout the 1980s.

Porter's cautious study of ecological data sharing mirrors other studies by historians of science and technology, especially those focusing on the Cold War era [3, Aronova E., pp. 307–327]. Much of this scholarship has revealed a mélange of challenges, barriers, and opportunities for data sharing by posing three questions: First, what makes data sharing possible? Second, what is the perceived and actual value of data sharing to local, national, and international stakeholders, and how does protocols around data quality assurance and control influence sharing economies? Third, how does prevailing geopolitics and security dynamics complicate those data-sharing practices and experiences [4, Turchetti S., Roberts P.]? Depending on the discipline and geographical region, the histories and geographies of data sharing have been shown to depend on the intersection of epistemologies, ideologies, personalities, practices, and technologies. Additionally, while we might focus on data sharing as a mechanism for making data available to those who were not involved in the generation of that material, the role of data repositories (for example, World Data Centers during and after the IGY) has also been an area of scholarly interest, with implications for what has been termed 'data diplomacy' [5, Boyd A. et al.]. Moreover, data reuse specifically represents one of the more critical cooperation requirements, as part of the "scientific method [which] allows for verification of results and extending research from prior results [6, Tanopir C., et al. p. 6; 7, Michener W.K., pp. 33–44]." Reuse is integral to the scientific practice of reproducible research and thus considered to be highly desirable.

One of the important pieces of the climate change puzzle is permafrost, and the state of permafrost data sharing illustrates well that scientific practices such as reproducibility and verification have not been as straightforward as these norms might imply [8, Jasny B.R., pp. 1–15]. In general, observational data on permafrost characteristics are limited. As Boris Biskaborn and colleagues concede, "The current global coverage of permafrost temperature monitoring is not yet

[1] The Intergovernmental Panel on Climate Change (IPCC). United Nations Intergovernmental Panel on Climate Change's Special Report on the Ocean and Cryosphere 2019. URL: https://www.ipcc.ch/srocc/ (accessed 17 December 2020).

ideal, due to the limited sampling and lack of collaborative network in regions such as Siberia, central Canada, Antarctica, and the Himalayan and Andes mountains." To be sure, collaboration exists, but perhaps not to nominal or ideal standards for collective permafrost purposes. Currently, most permafrost data remain fragmented and restricted to national authorities, including scientific institutes. The preponderance of permafrost data is not available openly—important datasets reside in various government or university labs, where they remain largely unknown or where access restrictions prevent effective use [9, Bush E., p. 86; 10, Joseph M.P., pp. 24–28]. Although highly authoritative, separate data efforts involving creation and management result in a very incomplete picture of the state of permafrost as well as what to possibly anticipate. While nations maintain excellent individual permafrost research programs, a lack of shared research—especially data—significantly reduces effectiveness of understanding permafrost overall. Improvements can be pursued. For example, cost benefits would easily be captured by the lack of need to duplicate borehole efforts for proximal data, especially in remote locations. Nations with scientific comparative advantages could help provide information or services to others toward contributions in support of shared data. Current efforts by the World Meteorological Organization (WMO), Global Cryosphere Watch and the Global Terrestrial Network for Permafrost (GTN-P) are demonstrating the need to continue progress to implement permafrost temperature interoperability. Lastly, a single touch point of shared data will invariably be cheaper than the current multiple systems.

The importance of shared scientific data continues to be demonstrated by other global actors, like the WMO. The WMO Global Telecommunications System (GTS) was established in the 1970s to enable support of World Weather Watch (WWW). This worldwide coordinated telecommunication system allows members to share data and products with each other in support of operational weather forecasting. In November 2020, the WMO hosted a data conference to review the flow of data and updated protocols on data production, monitoring and sharing. In Africa, it was estimated that only 25 percent of weather monitoring stations met WHO reporting requirements recently which indicates a significant digital and equipment divide.

Different nations resource and employ various approaches to studying permafrost, including the growing complexity of scientific modeling [2]. Some are more effective than others and some achieve different purposes than others. Whereas it is not possible for a nation to effectively conduct the variety of modeling and research needed to comprehensively understand impacts on permafrost, a global community of permafrost researchers could in principle. What other studies in fields such as geonomics have demonstrated is that scientific communities are not necessarily invested in sharing data—for reasons that range from concerns about intellectual property rights, data policies and protocols, military-industrial-strategic sensitivities, funder restrictions and cross-national scientific rivalries. However, decision and policy makers, especially on the international

[2] Stanford Encyclopedia of Philosophy Stanford University. Models in Science. 2020. Available online: https://seop.illc.uva.nl/entries/models-science/ (accessed 5 August 2020).

stage, struggle to understand how best to anticipate and prepare for changes to permafrost, and thus connect scientific recommendations to robust policy development [11, Kowarsch M., et al.].

To date, there is a lack of research exploring the drivers that have shaped limited circumpolar permafrost data and what is required to cultivate a more generous data-sharing economy. This article will explore the global data systems on permafrost, which remain sporadic, rarely updated, and with almost nothing about the subsea permafrost publicly available. The authors suggest that there is scope and potential for the development of a global permafrost monitoring system which should aspire to be real time (where this is feasible), often updated and with open access to the data. Other subject areas such as oceanography have had the benefit of an Intergovernmental Oceanographic Commission (established in 1960), involving nearly 150 countries who commit themselves to sharing data on sea-based measurements. Permafrost research data, by way of contrast, has not had that high-level investment by a UN body for reasons that are closely tied to geographical specificity and national sensitivities about cold environment research [12, Herzberg J., et al.].

Following a brief scientific background to permafrost, this article will advance and interrogate three supporting themes, 1) the current state of permafrost data and their availability, 2) rationales and methods to share data, and 3) implications for global and national interests with a particular focus on the United States, Canada, Russia, and emerging permafrost scientific powers such as China, and 4) the state of play regarding permafrost data recognition. This interdisciplinary investigation contributes to studies on the historic data-sharing activities as well as responds to the challenge of thinking about how methods, resources and tools such as data-sharing systems mediate between global scientific co-operation and national security priorities.

Background

Permafrost

Permafrost is typically defined as a ground layer with a temperature remaining at or below 0 °C for at least two consecutive years. It refers to a physical state rather than material form. Every year, the surface layer of frozen ground that freezes in the winter but thaws in the summer is referred to as the active layer. The active layer will freeze again in the autumn. Changing climatic conditions affect the state of permafrost in direct and indirect ways: among the factors that influence a frozen ground are rising air temperatures, changing snow regimes, and condition of vegetation [13, Romanovsky V.E., et al., pp. 106–116; 14, Rasmussen L.H., et al., pp. 199–213]. A typical classification, first developed in 1927 [15, Sumgin M.I., p. 372], recognizes continuous permafrost (underlying 90–100% of the landscape), discontinuous permafrost (50–90%), and sporadic permafrost (0–50%). The permafrost region covers approximately 24% of the Earth's land surface in the Northern Hemisphere, including large areas of the Arctic. Permafrost (continuous, discontinuous, sporadic or isolated) covers some 22.8 million square kilometers: Canada and Russia contain the

most extensive areas of permafrost—approximately 50% and 65% of their territories, respectively [16, Streletskiy D., Shiklomanov N.I., pp. 201-220]; 22% of China; and 82% of Alaska (approximately 15% of total land mass in the continental United States) [3].

The area of near-surface permafrost in the Northern Hemisphere is projected to decline by 20% relative to today's area by 2040 and could be reduced by as much as two-thirds by 2080 under a scenario of high greenhouse gas emissions. Impacts will vary widely at regional and local scales, but local effects are difficult to project given the lack of fine-scale detail in models and will involve a range of other environmental risks such as mercury contamination [4].

Why is it important to monitor permafrost state? With thawing permafrost projected to release significant amounts of carbon and methane in response to climate change, as well as being a reason for ground subsidence [17, Hjort J., et al., p. 5147], it may even reawaken dormant diseases. Widespread permafrost degradation is permanently changing local hydrology, increasing the frequency of fire and erosion disturbances. Moreover, the environmental transformations caused by climate change affect indigenous peoples and their traditional way of life, for example, reindeer herders have to find new areas available for use of grazing land due to disruption to food availability and the establishment of campsites integral to reindeer management [18, Doloisio N., Vanderlinden J.P., p. 26]. In other parts of the Arctic, thawing permafrost can play havoc with traditional ice cellars. In northern Alaska, it is not uncommon for Inupiat to dig underground vaults where the frozen ground helps to preserve whale and seal meat. Thawing ground leads to traditional food supplies spoiling [5]. Urban landscapes have been dramatically changed by thawing permafrost. According to researchers, a significant (approximately 25%) decrease in the urban infrastructure stability throughout Russia (permafrost region) should be expected by the mid-21st century [19, Shiklomanov N.I., et al., pp. 125-142]. Additionally, thawing permafrost poses a challenge for the oil and gas industry, as soon as the degradation of frozen ground results in damaged industrial installations [6].

Current State of Permafrost Data Sharing

Global permafrost data collection and sharing are patchy. Efforts have been made by the World Meteorological Organization (WMO), Global Terrestrial Network for Permafrost (GTN-P),

[3] Canadian Geographic. Arctic Permafrost is Thawing: Here's What that Means for Canada's North and the World. URL: https://www.canadiangeographic.ca/article/arctic-permafrost-thawing-heres-what-means-canadas-north-and-world (accessed 12 April 2021).

[4] Strong W. Arctic Understanding Limited by Patchy Field Work, Scientist Say. CBC News. URL: https://www.cbc.ca/news/canada/north/arctic-study-understanding-limited-climate-change-1.4781405 (accessed 30 April 2021).; Schaefer K., Elshorbany Y., Jafarov E., Schuster P.F., Striegl R.G., Wickland K.P., Sunderland E.M. Potential impacts of mercury released from thawing permafrost. *Nat. Commun.* 2020. URL: https://www.nature.com/articles/s41467-020-18398-5 (accessed 2 June 2021).

[5] CBC News. Failing Ice Cellars Signal Changes in Alaska Whaling Towns. 2019. URL: https://www.cbc.ca/news/canada/north/alaska-ice-cellars-permafrost-whaling-1.5372449 (accessed 2 June 2021).

[6] Harball E. Oil Industry Copes with Climate Impacts as Permafrost Thaws. NPR, 2018. URL: https://www.npr.org/2018/06/11/617240387/oil-industry-copes-with-climate-impacts-as-permafrost-thaws (accessed 5 May 2021).

International Permafrost Association (IPA), Circumpolar Active Layer Monitoring (CALM), Arctic Coastal Dynamics (ACD), Thermal State of Permafrost (TSP), GlobPermafrost and others to improve data coordination and exchange. Two global networks cover most areas of permafrost in the Arctic region with the TSP network measuring permafrost temperature at various depths in 860 boreholes, and the CALM network addressing the thickness of the active layer at 260 sites.

The Global Terrestrial Network for Permafrost (GTN-P) was initiated by the International Permafrost Association (IPA) to organize and manage a global network of permafrost observatories for detecting and monitoring changes in permafrost system which is critical in climate change impact assessments (Fig. 1) [7]. As Figure 1 suggests, borehole stations are highly concentrated in select parts of Alaska, Russia, Northern Scandinavia, China, and northern Canada but vast areas of the Canadian, Greenlandic and Russian Arctic are without such coverage.

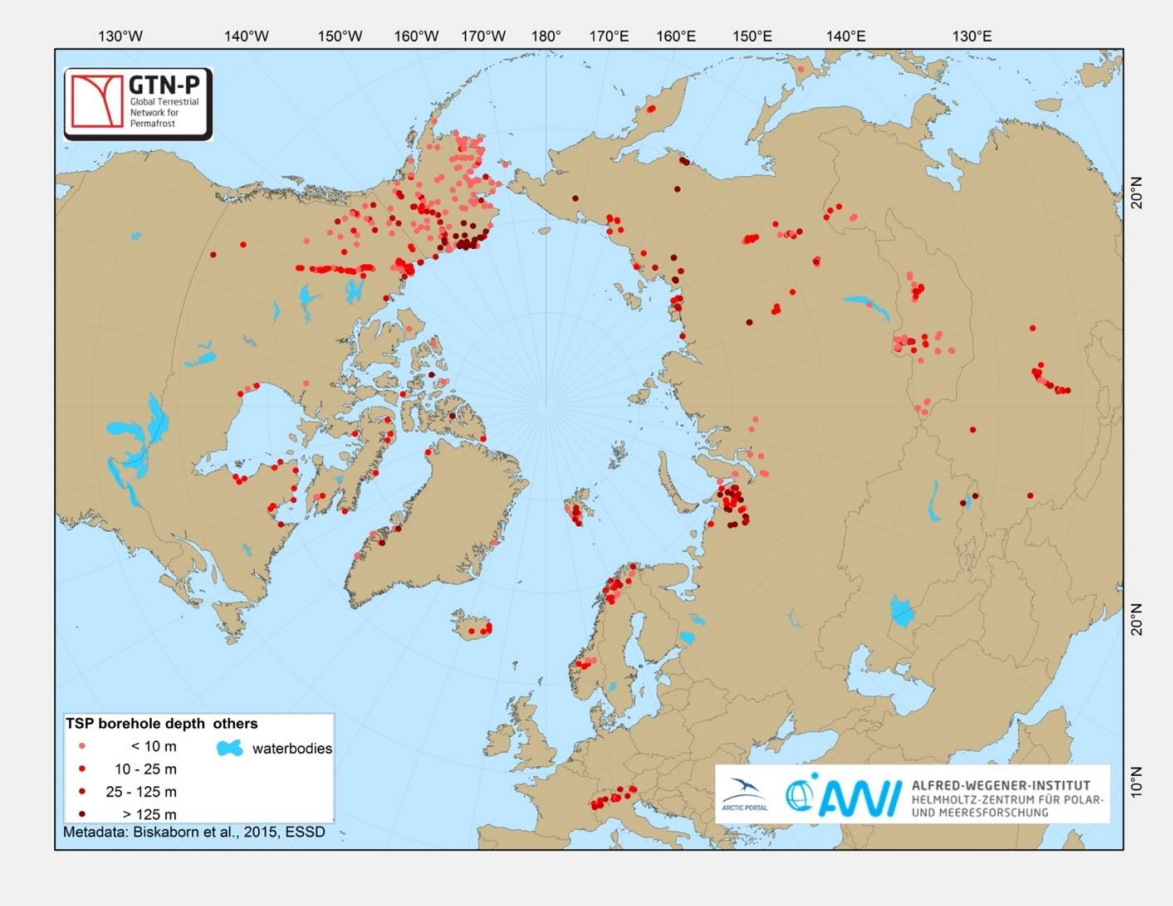

Fig. 1. Arctic Borehole Map. Accessed 02 June 2021 [8].

The network, authorized under the Global Climate Observing System (GCOS) and its associated organizations, consists of two observational components: the active layer (the surface

[7] IPA Artic Portal. The Global Terrestrial Network for Permafrost (GTN-P). URL: https://ipa.arcticportal.org/products/gtn-p (accessed 20 April 2021).

[8] Source: URL: https://gtnp.arcticportal.org/resources/maps/12-resources/37-maps-boreholes (accessed 20 April 2021).

layer that freezes and thaws annually) and the thermal state of the underlying permafrost [9]. The Global Climate Observing System (GCOS) and the Global Terrestrial Observing System (GTOS) under the Terrestrial Observation Panel for Climate (TOPC) and the World Climate Research Program (WCRP) have identified permafrost thermal state and permafrost active layer as key variables for monitoring the cryosphere. Permafrost cannot be directly observed from space, but in order to understand the permafrost state scientists can use a combination of data obtained from in situ measurements and the satellites (monitor indicators and parameters used in models) to put together a picture of what is happening.

The development of a spatially distributed set of observations on past and present status of thermal characteristics of permafrost and thickness of active layer were a focus for the International Permafrost Association during the International Polar Year (2007–2008). While the importance and need of a shared permafrost monitoring system is considered overwhelming to many permafrost experts, it has proven challenging to implement [10]. Limited access to remote locations and a sparse system of sampling sites in Siberia, central Canada, Antarctica and Alpine regions (Andes, the Himalayas) result in substantive gaps in the time series of existing data [20, Biskaborn B.K., et al., p. 264].

In 2020, a non-profit center GRID-Arendal (Norway), as a part of Nunataryuk research project (an EU-funded Horizon 2020 project coordinated by the Alfred Wegener Institute in Germany), produced a new map (Fig. 2) that shows terrestrial and subsea permafrost in the Northern Hemisphere [11]. Some areas are observed better than others and this in turn reflects national funding priorities, shaped by infrastructural and military commitments in the Canadian North and Alaska, including the Alaska-Canada (ALCAN) Highway [21, Ferrians O.J., et al., pp. 1–37; 22, Lackenbauer P.W., Farish M., pp. 920–950].

With a more extensive borehole network, there would be opportunities to improve our understanding of terrestrial permafrost, while subsea permafrost remains understudied rather than simply subject to patchy data collection [12]. As a result of a significant lack of borehole data, the awareness of the state of the subsea permafrost is only recently known, and very little at that. Additionally, emerging subsea knowledge clearly indicates that such data development will be significantly more expensive and dependent on technological challenges still being explored.

[9] Streletskiy D., Biskaborn B., Smith S.L., Noetzli J., Viera G., Schoeneich P. GTN-P—Strategy and Implementation Plan 2016-Technical Report, Global Terrestrial Network for Permafrost. URL: http://library.arcticportal.org/1938/ (accessed 3 April 2021).

[10] Streletsky D. We Need a Permafrost Monitoring System. The Arctic. URL: https://arctic.ru/analitic/20200616/948752.html (accessed 12 December 2020).

[11] GRID-Arendal. Permafrost in the Northern Hemisphere. URL: https://www.grida.no/resources/13519 (accessed 15 March 2021).

[12] MacKenzie S. UN Environmental Assessment Shows a Need for More Offshore Permafrost Research. Eye on the Arctic. URL: https://www.rcinet.ca/eye-on-the-arctic/2020/12/24/un-environmental-assessment-shows-need-for-more-offshore-permafrost-research/ (accessed 2 April 2021).

Pressure (clathrates) also plays a critical role in the state of subsea permafrost unlike its terrestrial counterpart.

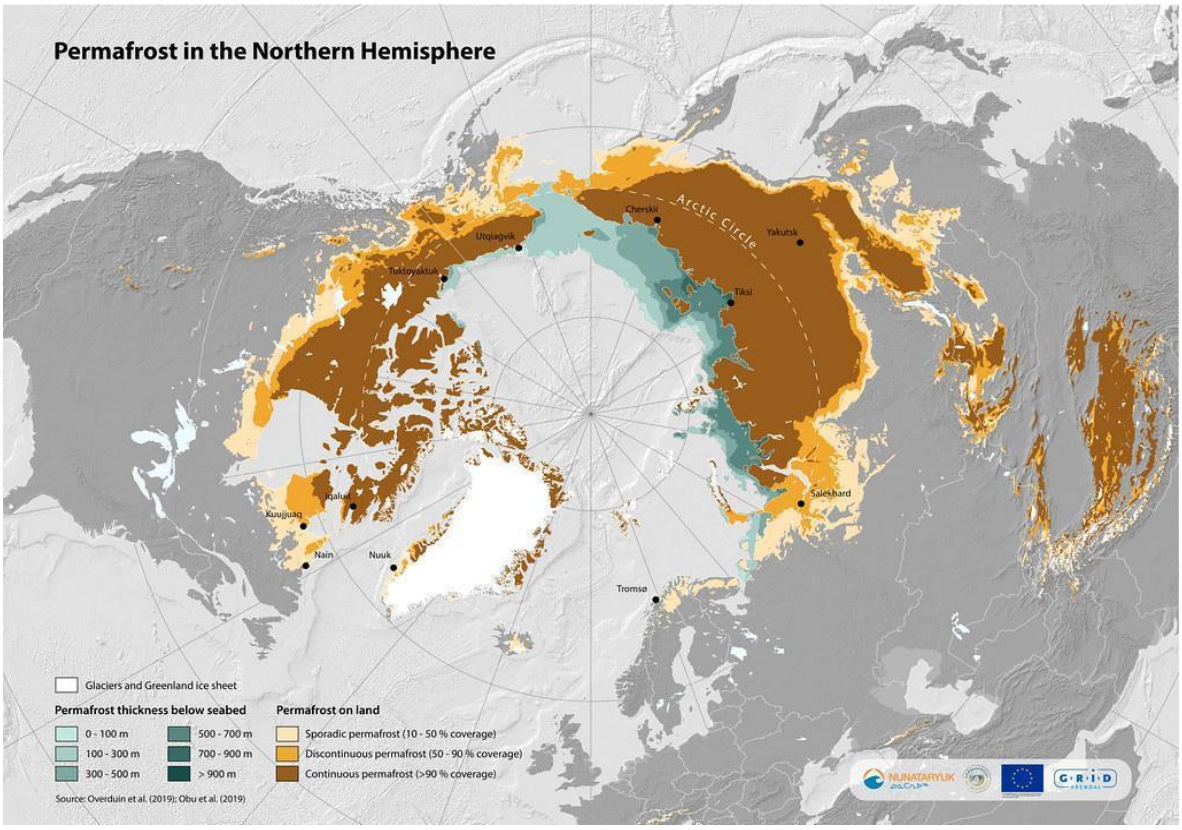

Fig. 2. Permafrost in the Northern Hemisphere [13].

Here, we aim at highlighting critical gaps that exist in a global permafrost monitoring. In the Arctic, the needs are acute for monitoring of terrestrial and subsea permafrost. Among numerous voids are the following:

- Existing permafrost temperature and active layer networks need to be expanded in order to get reliable control and to forecast situations in the permafrost areas.
- Satellite monitoring measures variables that can be used to derive permafrost temperature and extent, but has high uncertainty and does not provide information about deeper layers of frozen ground which require field-based investigation.
- Different types of permafrost require appropriate study techniques. Another challenge is to integrate data obtained from different sources (satellites and ground-based data).
- An irregular distributed system of sampling sites in the Arctic region, with 'gaps' in northern Canada and Russia, in particular—government support with collaborative networks, staff and facilities to aid research in specific areas of interest has helped to reduce spatial gaps.
- Past histories of restriction and access control, especially in Russia.

[13] Source: URL: https://www.grida.no/resources/13519 (accessed 13 January 2021).

Rationale and Methods to Share Permafrost Data

Challenges of Data Networks

Data hold significant importance in the domains of both scientific research and applied decision making. The process of gathering, curating, and making a dataset available often involves substantial time, funding, and resources on the part of research teams or collaborators, making that data an asset (which carries with it implications for data access and sharing). The level of quality of a dataset influences not only the ability to derive useful scientific knowledge, but also a level of trust and reliability in the underlying information that it contains, and therefore in the ability to develop plans or decisions based on that data [14]. However, the quality of a dataset alone is not sufficient for its use in large-scale decision making. For it to have broader utility to the research community, it is important that the data conform to field standards and that they are made available to interested groups—all of which remain a work in progress as Sjoberg et al. acknowledge:

Research in northern Europe, Russia and the USA is relatively well integrated, while Canadian research is more dispersed and either focused on the Eastern Arctic or Western Arctic, and similarly, China is relatively isolated but with some ties to US institution. Our survey respondents mentioned the importance of International Permafrost Association permafrost conference proceedings as sources of inspiration, especially the earlier ones (Supporting Information). More recent international collaboration efforts include developments of databases, such as the databases for permafrost region soil carbon, ponds and the thermal state of permafrost.

The standardization of data involves tasks like the conversion into commonly available formats for ease of use, conformity to units of measure, proper geospatial references for the region (where applicable), and additional information such as metadata that helps describe the dataset, its features, and additional information that may be relevant for its use and understanding. Common formats allow for greater use in industry or field standard analysis programs and toolsets, making the barrier to entry lower for working with that dataset, and this increases the likelihood that it may be explored by groups outside of the initial research team—a form of open science that has been described as an exemplar of the democratic school—open access to data and publications [23, Feche B., Friesike S., pp. 17–47]. Metadata also play a significant role in that wider adoption as well, as they convey vital information about the collection, utility, and even limits that can be applied to certain datasets. However, metadata are often limited in completeness, making it difficult for end users to understand the nuance required for performing subsequent research, or for searching and identifying relevant datasets [24,

[14] Elsevier Customer Insights. Trust in Research—Research Survey Results June 2019. URL: https://www.elsevier.com/__data/assets/pdf_file/0011/908435/Trust_evidence_report_summary_Final.pdf (accessed 2 June 2021).

Streletskiy D., et al. p. 42]. While standards for metadata exist in geospatial data, large portions of those fields remain optional and are subject to the time and resources of data producers [15]. Implications involving a shortage of permafrost data sharing indicate broader, holistic problems also, stated by O'Neill et al. (2019): "Northern communities and stakeholders require expert knowledge and predictive models to support adaptation strategies. Such predictions are useful only if the representation of landscape-scale processes is accurate. Invoking simplifying assumptions to operate global-scale simulations can generate predictions that may be misleading".

Another major hurdle to widespread adoption of scientific data is often less about the data than it is about the ease of accessing that data. Availability concerns in this case include those related to people, technological and policy. In the past, many researchers have shown a hesitancy to openly share data when there is a perceived loss of value through sharing, concerns over misuse of data, and potential competition when the data are made more broadly accessible. When the value gained through data sharing from collaboration or new research opportunities is made clear, however, most are open to the idea so long as the advantages outweigh the disadvantages. Additionally, recent surveys have indicated that when proper assurances of credit are made for datasets, organizational support is increased, and that financial support is given, data-sharing interests further improve [25, Steiglitz S., et al., pp. 1–20; 26, Tenopir C., et al.]. Coordination with related climate observation sites to collocate select boreholes with weather stations could help improve monitoring or surface and subsurface conditions, to improve understanding of microclimate conditions, and provide a more comprehensive assessment of permafrost responses to climate change and by extent may empower the individual researchers and amplify the findings. On the technology side, scientific datasets have continued to grow in size as the ability to gather data at high resolution has rapidly increased. Low-cost sensors, an increasing number of open-access satellite systems, and the computational resources to generate massive datasets have fueled this growth, but computational power, storage resources, and network technologies have been unable to keep pace with the increase in data volume [16]. Making data available broadly, and freely to end users, requires continuing financial resources to support the assets needed to serve and distribute that data effectively over long distances, including storage infrastructure, network services, and staffing to support and maintain these systems. One of the few studies on long-term availability of research data indicates that datasets used in research may become unavailable at a rate of up to seventeen percent per year after publications are completed, indicating broader issues in the maintenance of long-term research data [27, Vines

[15] International Organization for Standardization (ISO). ISO Geographic Data. URL: Standard https://www.iso.org/standard/53798.html (accessed 2 June 2021).

[16] Business Wire. Data Creation and Replication Will Grow at a Faster Rate Than Installed Storage Capacity, According to the IDC Global DataSphere and StorageSphere Forecasts. URL: https://www.businesswire.com/news/home/20210324005175/en/Data-Creation-and-Replication-Will-Grow-at-a-Faster-Rate-Than-Installed-Storage-Capacity-According-to-the-IDC-Global-DataSphere-and-StorageSphere-Forecasts (accessed 2 June 2021).

H.T., et al., pp. 94–97]. This permanent loss of data results in gaps in long-term analysis in some fields, and costly reproduction of research in others. Efforts by the NSF and similar funding organizations hope to change this, but this would require broader adoption in the research and data relevant communities, similar to current efforts demonstrated by the NSF-funded Arctic Data Center [17].

Beyond technology and infrastructure, there also has to be a willingness to share that data openly on behalf of data owners and governments. The value of a dataset can go beyond its value to researchers, including strategic value from business or national perspectives. When it comes to permafrost data, large amounts of borehole data are gathered by private organizations and used for site-based risk or engineering design purposes. Without proper incentives to share this data, it may be seen either as proprietary, or an unnecessary financial burden. In other sectors, data gathered by government agencies may even be viewed as a national security concern if it relates to controlled sites, and/or offering insights to foreign competitors. While some grant-awarding agencies now mandate long term, such as the National Science Foundation in the US or the Natural Environment Research Council (NERC) in the UK, many agencies in countries such as Russia and China have no such mandate, leaving it up to the research team to decide [18]. A data-sharing mandate alone is not always sufficient without additional resources and tools being provided to researchers [28, Couture J.L., et al., pp. 1–13]. When strictly enforced and supported, though, data-sharing efforts can lead to not only higher data retention rates, but also increases in citations for authors and related journals [29, Garret C., et al., pp. 1–13]. NERC takes this one step further, and not only mandates data sharing, but provides this as a service to funded projects, outside of award funds, but few options like this exist on international scales, and are largely limited to specific projects [19].

Despite these challenges, prior efforts in data-sharing networks in fields such as oceanography, seismology and ecology have successfully highlighted the importance of multilateral data sharing, and what proved possible during the Cold War era for example [30, Km J., p. 19].

Success Stories in Related Disciplines

A number of successful projects have highlighted the importance of consistent multilateral data-sharing agreements in both security and non-security related realms. The Global Seismographic Network, a network of over 150 seismic stations in 80 countries, was established to help identify seismic events at regional to global scales, to monitor seismic events, their origins, intensi-

[17] Arctic Data Center. Data and Software from NSF Arctic Research. URL: https://arcticdata.io/ (accessed 2 June 2021).
[18] National Science Foundation. PAPPG Chapter XI—Other Post Award Requirements and Considerations. URL: https://www.nsf.gov/pubs/policydocs/pappg20_1/pappg_11.jsp#XID4 (accessed 2 June 2021).
[19] Natural Environment Research Council (NERC). Data Policy. URL: https://nerc.ukri.org/research/sites/environmental-data-service-eds/policy/ (accessed 24 April 2021).

ty, and to provide mechanisms for notification and further research. This network identifies over 30,000 seismic events annually and provides large amounts of data for scientific research [20]. It also allows follow on systems to warn of potential tsunamis, or for response to begin mobilizing for disaster response and recovery. Over 50 stations in this network are also used to support international peacekeeping efforts through monitoring of nuclear detonations as part of the International Monitoring System for the Comprehensive Nuclear Test-Ban Treaty Organization (CTBTO). This network helps notify member states of potential nuclear tests or non-geological events. The testing network has improved over time and has led to advances in both detection of nuclear events, as well as improvements in seismic detection capabilities from research purposes.

Another perspective on the value of multilateral data sharing can be seen through the Argo buoy networks maintained and operated by a consortium of 30 countries. This network, which consists of over 4 000 buoys, is used to monitor a range of oceanic conditions, including temperature, salinity, pressure, biological nutrients, and other variables at depths of up to 6000 m, gathering vertical data profiles by descending and resurfacing at regular intervals [21]. Each country is responsible for purchasing, maintaining, and providing for the processing of data retrieved by these buoys. The data are then standardized and made freely available for those interested through a public data portal. The data have been used in the production of over 4,000 research papers to date and have been the basis for improved strategic planning and decision making [22].

The history of data sharing goes back to the 19th century and is widely recognized to be useful because of the importance of weather forecasting. This has accelerated in recent decades due to the exponential growth in travel and transportation by air and sea, exposure to hazards such as flooding, drought and sea level rise, and dependency on intensive farming methods to improve food security. In the late 1840s, a telegraph network was established in the United States with the help of the Smithsonian, which issued standardized equipment and helped organize the collection of observational data to develop early weather maps and forecasts [31, Miller E.R., p. 59]. Data collection efforts were often reduced or interrupted over the next several decades due to funding challenges or political conflicts. In 1950, the WMO was established as part of a concerted attempt to support international collaboration on meteorology, with emphasis given to the coordination of international exchange of observational data. During the 1957–1958 International Geophysical Year, the World Weather Watch (WWW) was established and they were charged with gathering and processing near-real-time observational data collected by a ring of stations around the world. The WMO's global observing system coordinates data sharing but it has been noted

[20] Gee L.S., Leith W.S. The Global Seismographic Network. U.S. Geological Survey Fact Sheet 3021. URL: https://pubs.usgs.gov/fs/2011/3021/pdf/fs2011-3021.pdf (accessed 2 June 2021).
[21] Roemmich D., Alford M.H., Claustre H., Johnson K., King B., Moum J., Oke P., Brechner Owens W., Pouliquen S., Purkey S. et al. On the Future of Argo: A Global, Full-Depth, Multi-Disciplinary Array. *Front. Mar. Sci*. 2019. URL: https://www.frontiersin.org/articles/10.3389/fmars.2019.00439/full (accessed 2 June 2021).
[22] Argo Program Office. Argo Bibliography. URL: https://argo.ucsd.edu/outreach/publications/bibliography/ (accessed 2 June 2021).

that data sharing is under pressure due to increased commercial sensitivity towards weather data and a lack of investment and infrastructure suitable for long-term observation. In 2019, the WMO membership agreed to establish the Global Basic Observing Network and to create financial support for countries in the global South so that it was possible to collect and exchange surface-based observational data. In 2020, WMO held a data-sharing conference and reaffirmed the need for investment and continued support for data-sharing protocols.

What these 'success' stories reveal, however, is the intersection of scientific-technical and geopolitical orders in enabling data sharing. National governments and militaries valued geophysical and oceanographic data for surveillance and strategic power projection purposes. Further, scientists, some of whom worked for national security organizations, were often eager to encourage data sharing and international collaboration. Reconciling the impulse to hoard and to share was endemic during the Cold War, and thus researchers in oceanography and seismology were often caught up in protocols and practices establishing what was either classified or freely available data. To share or not to share was part and parcel of individual and collective calculations that were occurring all over the world. However, following the Soviet Union collapse, the exchange of information and international collaboration became possible between former Soviet and Western scientists. Of course, the digital revolution also contributed unprecedentedly to the opportunity and ability to share information.

Implications for National and Global Interests

Scientific and Political Histories of Permafrost

In his magisterial account of Red Arctic: Polar Exploration and the Myth of the North in the Soviet Union, John McCannon writes about the extraordinary efforts the Soviet Union made to exploit, develop and even conquer the 'frozen North') [32, McCannon J., pp. 15–31]. Much of his analytical account rests on a close reading of the intersection of institutional bodies and leading personalities charged with that developmental labor. It is not an environmental history of the 'Red Arctic', with substances such as permafrost meriting some but not detailed attention [33, McCannon J., p. 40]. What emerges is a complex story involving the Soviet Union and its repeated desire to industrialize its extensive northern territories through ambitious and aggressive resource exploitation, infrastructural investment and political prioritization. Two decades later, the field of environmental history addressing the polar regions has expanded greatly. In 2020, the environmental historian Pey-Yi Chu published The Life of Permafrost: A History of Frozen Earth in Russian and Soviet Science and offers a detailed reading of how Soviet scientists conceptualized permafrost [34, Chu P.Y.]. Nearly 50% of the Soviet Union was covered by frozen earth. She argues that Russian and Soviet framing of permafrost/frozen ground was informed by two historic and cultural currents; first, frozen ground was approached as an engineering challenge that needed to be managed even 'conquered'. Second, to connect permafrost to a holistic even planetary perspective

where the materiality of the Arctic was understood to involve the interchange of energy and matter.

In her auditing of Soviet permafrost science, Chu highlights the 'frustrating' quality of frozen ground. On the one hand, 'nature' was supposed to be a resource to be exploited and developed. The will of the Soviet people could not be allowed to be blocked by a recalcitrant nature. On the other hand, if frozen earth was a barrier to development, then someone had to be held to be responsible. Were there subversive elements in the Soviet North secretly undermining attempts to develop and exploit Soviet resources? The problem posed by permafrost was not one, as Soviet researchers later noted, could easily be 'defeated'. In his *The Conquest of the North (in the Region of Permafrost)*, the scientist Sumgin and writer Demchinskii wrote in 1938 that frozen earth was framed as a highly dynamic and challenging opponent [23]. Permafrost was dangerous because of its capability to manipulate the intersection of ice, water, soil, land. Could it be removed? Could it be thawed? How could the Soviet Union overcome it? It might be framed as a 'cunning adversary' by Communist Party officials, but what emerges is a more complicated story involving adaptation and concession. In Chu's survey, what emerges is Soviet scientists and planners moving away from 'conquest' to a series of pragmatic accommodations including de-icing roads, elevating buildings, and avoiding accidental thawing by an over-concentration of infrastructure.

The game-changer for permafrost science was the Cold War. Aided and abetted by the militarization of the Arctic, both Soviet and US administrations recognized the strategic importance of the earth sciences including glaciology, meteorology, geology, physical geography, marine biology. Permafrost, sea ice, and Arctic weather were topics of considerable importance to those charged with defending and developing northern territories. As the historical geographer Matt Farish observed, frozen earth was framed as a 'frontier engineering' challenge that carried with it a medley of implications for national security planning). What made frozen ground challenging and even discombobulating was that it has a dynamic materiality—alternating from frozen, thawed and refrozen. The depth and dynamism of 'active layer' carried with it a medley of implications for the infrastructural resilience of roads, pipelines and military bases, with concordant financial liabilities in the event of subsidence and slippage.

What has changed from the Cold War framing of permafrost to contemporary rhetoric is how the materiality of frozen ground has been explicated—from a frontier engineering challenge to an underground milieu that is more likely to be understood as a methane 'time bomb' and threat to communal resilience rather than exclusively infrastructural. Frozen ground is 'unreliably frozen' to echo the conclusion of the NOAA Report Card on the Arctic (2017) and this has led to repeated fears that permafrost thaw will scramble existing projections regarding not only the scale

[23] Sumgin M.I., Demchinskii B.N. *The Conquest of the North (in the Region of Permafrost)*. 1938. (in Russ.). URL: https://www.prlib.ru/en/node/411707 (accessed 2 June 2021).

and pace of anthropogenic change in the Arctic but also the wider world [24]. Land and sub-sea permafrost are being recognized as integral to how we assess and calculate 'locked up carbon' as well as how thawing brings the fore newer risks such as disease transmission (e.g., Anthrax) due to exposed and rotting animal carcasses [35, Hueffer K., et al., pp. 174-180]. By the end of this current century, it is predicted that the global coverage of permafrost could decrease by up to 30%–70% depending on warming trends with "potentially hundreds of gigatons" of total carbon release Thus, far, Arctic carbon (carbon dioxide and methane) emissions are comparatively under-counted in global carbon budget analysis [25].

One continuity that remains a shared one is the costs and challenges of adaptation for Arctic communities. If permafrost thaw and re-freeze placed additional cost pressures on those seeking to maintain Arctic infrastructure and buildings, worsening rates and extent of thaw is contributing to the imperilment of local communities in Alaska. As the Bering Strait Elders Group (2020) has highlighted recently through a series of short films, coastal villages have been buffeted by sea ice loss and coastal erosion and assaulted by landslides and slippages caused by permafrost thaw. In some cases, re-location becomes the only option as access to immediate higher ground is not available [26].

Actors and Interests Involving Permafrost Data Gaps and Sharing

As we have noted, permafrost data sharing has had to grapple with a series of long-term challenges that bedevil attempts to form a more comprehensive understanding of its current state and possible future trajectories. With approximately 14 million square kilometers of global permafrost, the vast majority of which is found in Russia, China, and North America including Greenland, there are geopolitical as well as geographical and scientific-technical reasons at play. As an example, one immediate parallel is the bathymetric data in and around the Arctic Ocean and the understandable reluctance of the US and Soviet navies to share what they had with civilian scientists because of national security concerns. Mapping and surveying the Arctic Ocean was integral to planning underwater surveillance operations and the tracking of enemy submarines [36, Doel R., pp. 605–626]. In both cases, an unwillingness to share can weaken shared understandings of the scale and pace of environmental change, foster decision making that is insufficiently attentive to current and future trajectories of change, and hinder planning for long-term investment in adaptation, dislocation and mitigation. Arctic communities in Alaska are facing a spectrum of challenges and the eventual consequences of ongoing warming trends range from adaptation measures (such as re-

[24] NOAA Report Card on the Arctic (2017). URL: https://arctic.noaa.gov/Report-Card/Report-Card-2017 (accessed 2 June 2021).
[25] Miceli R. Why Arctic permafrost is thawing and how its affects the planet National Academy of Sciences, Engineering, and Medicine 2020. URL: https://www.nationalacademies.org/news/2020/05/why-arctic-permafrost-is-thawing-and-how-it-affects-the-whole-planet (accessed 2 June 2021).
[26] Bering Strait Elders Group. URL: http://www.beringseaelders.org/ (accessed 2 June 2021).

treat to higher ground) to painful dislocation (e.g., abandonment) depending on cost and timeliness.

First, there are spatial gaps in data collection. Access to the Russian Arctic is harder for non-Western scientists and some of this is rooted in Cold War military and national security legacies, which ensured that there were simply forbidden zones or areas of restricted access (even for Soviet/Russian scientists). Permafrost research was informed by Cold War geopolitical agendas, with militaries being reluctant to share their own data in some of those restricted zones. Second, there are national variations in how borehole data are organized, collected, archived, and shared. Some of this might be simply down to the fact that there are a multitude of data collection agencies from energy and construction companies to local and state authorities as well as federal agencies. Data mapping might, for example, reveal where borehole locations are without giving any sense of what sort of data is being generated. Permafrost data might be open, partial and/or closed access, as a consequence. Third, if interested parties cannot access raw data then it not only complicates the work that climate change modelers might wish to undertake (harder to standardize data across vast geographical areas) but also makes it harder to account for any biases and limitations of data, such as relative distribution of borehole sites. Fourth, the role of traditional indigenous knowledge and citizen science in permafrost science has been arguably neglected. Native Alaskan communities have not only aided and abetted agencies such as the US Army Corp of Engineers and US Geological Survey for decades but also acquired first-hand experience and understanding of permafrost thaw and the implications for communal living and food security. Increased active engagement with indigenous peoples and national and regional commitments to develop and fund a collaborative network that actively looks to co-produce work that thinks about data in a pluralistic manner and sharing protocols. Pressing human security issues such as contamination to soil and water via increased concentrations of contaminants in the plants and/or disruption to animals relied on by community members for subsistence economies.

Impacts to Security

As early as 2012, US authorities began to provide focused assessments concerning climate change impacts to defense-related infrastructure. In one instance, the Government Accountability Office learned from Department of Defense officials that “the combination of thawing permafrost, decreasing sea ice, and rising sea levels on the Alaskan coast has increased coastal erosion at several Air Force radar early warning and communication installations.” Based on high and low forecasts from RCP8.5 and RCP4.5 and infrastructure modeling, Melvin et al. assessed, from 2015 to 2099, that after flooding “damages to buildings associated with near-surface permafrost thaw accounted for highest costs in most of Alaska [37, Melvin A.M., *et al.,* pp. E122–E131]”. More specifically, Karlovitch et al. discovered in 2020 that, at Eielson Air Force Base in Fairbanks, Alaska, construction issues related to permafrost cost approximately $164 million in the last three years, with $5 million alone going towards preventing permafrost thaw under critical ammunition storage fa-

cilities (2020). Growing awareness and analysis of permafrost thawing threats and impacts to both civil and military infrastructure continues to illustrate alarming vulnerabilities and challenges to the engineering aspects of changing conditions. Both the US Army and the US Air Force acknowledge a full spectrum of problems associated with permafrost thaw in their inaugural Arctic strategies, ranging from housing issues to critical defense installations [27].

Elsewhere, a recent Arctic national strategy of the Russian Federation established a requirement to establish a state system of monitoring and prevention of the negative impacts involving the degradation of permafrost [38, Putin V.V.]. In Canada, experts think that approximately half of the northern roads constructed in permafrost areas are at risk of becoming unstable, as a result of thawing [28]. In an assessment of the Circumpolar North by Hjort et al., the authors estimate that a mean of 69% of pan-Arctic fundamental human infrastructure is at potential risk in areas where near-surface permafrost is expected to thaw by mid-century [17, Hjort J., et al., p. 514]. The immediate connection to fiscal shocks and components of disintegrating security capabilities naturally becomes the leading tangible, as well as conceptual, struggle. Threats to human and national security remain inextricably linked. Governments continue to wrestle with how best to respond to the growing threat and where to focus funding. Finite resources and time further complicate issues, especially in areas where most of a national constituency lacks interest or tolerance in allocating public spending to problem areas in more remote areas of a national territory.

Permafrost Science Diplomacy

Science had been recognized and credited with building trust and establishing confidence building measures in global politics [39, Flink T., Schreiterer U., pp. 665–677]. Terms such as science diplomacy have been popularized to account and evaluate for the efforts made by governments and relevant actors to build networks and partnerships designed to encourage either the co-production and or circulation of authoritative knowledge [29]. Science and scientists are part of what are termed ‘epistemic communities’, with their own global codes, norms, values and scholarly rules for the production and circulation of knowledge. Scientific communities in the Arctic context have been widely recognized in identifying problems, shaping policy agendas, and advocating for greater coordination between Arctic and non-Arctic stakeholders. Notable reports such as *Arctic Environment Impact Assessment* (2005), organized under the auspices of the Arctic Council, have been lauded as significant examples of science diplomacy—reciprocal, non-hierarchical and multi-disciplinary in focus and delivery. It also helped to pave the way for subsequent reports such

[27] United States Air Force. The Department of the Air Force Arctic Strategy; USAF: Washington, DC, USA, 2020. URL: https://www.af.mil/Portals/1/documents/2020SAF/July/ArcticStrategy.pdf (accessed 2 June 2021).

[28] BBC. The Fragile Future of Roads and Buildings Built on Permafrost. URL: https://www.bbc.com/future/article/20210303-the-unsure-future-of-roads-and-buildings-on-melting-ground (accessed 21 April 2021).

[29] The Royal Society. New Frontiers in Science Diplomacy: Navigating the Changing Balance of Power; AAAS: Washington, DC, USA, 2010. URL: https://www.aaas.org/sites/default/files/New_Frontiers.pdf (accessed 2 June 2021).

as *Arctic Marine Shipping Assessment* (2009) and *Snow Water Ice and Permafrost in the Arctic* (2017), which foregrounded collaborative social scientific and scientific labor around a sensitive topic, namely accessibility of shipping lanes around the edges and through the middle of the Arctic Ocean [40, Berkman P.A.].

The 2017 Agreement on Enhancing International Arctic Scientific Cooperation (Fairbanks Agreement) was a notable milestone for the Arctic Council, coming as it did in the wake of US–Russian tension over Crimea, Ukraine and Syria. It reaffirms the importance of scientific co-operation within and across international boundaries and the urgent need to share information. What the Agreement is less specific on is how that appeal for science diplomacy will be implemented in practice, and how that might complement data diplomacy (Berkman et al. 2017). Additionally, organizations such as the Permafrost Young Research Network (PYRN), the World Meteorological Organization, the United Nations Environment Program, the International Permafrost Association (IPA), and the Intergovernmental Panel on Climate Change (IPCC) all represent important network bridges and enablers that can provide guidance on how and why to effectively share data through global cooperation.

Conclusion

Thawing permafrost, especially near-surface, increasingly presents alarming challenges to all academies of knowledge, including the sciences (natural and social), engineering, and medicine. Individually, nations continue to maintain or grow effective research and studies involving thawing permafrost problems. Evidence, both obscure and obvious, indicate that the degradation of permafrost is part of a global dilemma that requires international solutions. In order to facilitate multinational approaches in solving such issues, the relevant authorities need to collectively establish the most valid and trustworthy science-based information from which to unilaterally advise the decision and policy makers. However, potential competing scientific models could impact confidence in scientific recommendations—indicative of the current climate change circumstances involving so much uncertainty. Models provide a representative, systematic description of a phenomena in order to better understand and/or predict key aspects of the world. Models often focus on answering specific questions involving temporal, topical and / or spatial components where supercomputing power becomes more and more necessary to handle such complex interactions. Fragmented, even competitive, efforts to present authoritative models involving an accurate understanding or prediction of permafrost thaw and effects leave the scientific community vulnerable to marginalized consideration in policy development and implementation as well as frustrations affecting permafrost-related diplomacy.

To be sure, individual modeling endeavors do provide value, especially in support of achieving a consensus on best practices forward. However, part of the current problem of shared data involves restrictive national policies, and other parts include a lack of opportunity or motiva-

tion, where many experts simply continue to maintain career-supporting research within national systems. The authors suggest that the scale of the permafrost problem and the amount of data that exist urgently require that the global permafrost expert community transition to a collective enterprise involving shared data in order to pursue cohesive models. A surprisingly significant amount of permafrost data currently exists from which to conduct extremely robust analysis and computational modeling, including improved methods of monitoring. Clearly, such an undertaking would come at a cost, but the ability to advise national authorities and wider publics with increased accuracy, and relatively quickly given how much data currently exist, would seemingly pay for itself exponentially both domestically and foreign.

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Conservation and Evolution of Marine and Coastal Ecosystems: Polar Factor *

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Abstract. The paper presents an analysis of polar ecological policy actors. From this perspective, authors discuss in detail a role of state in conservation and development of marine and coastal ecosystems. Furthermore, they describe a green agenda for polar regions. At last, some ways for creating of ecological policies in the Arctic and the Antarctic regions, most especially on behalf of sea and marginal ecosystems conservation and evolution, are proposed. One of the most vital parts of such policies is staff training. The authors have attempted a comprehensive analysis of the Green Agenda at the global, national and local levels in terms of the effectiveness of its proposed mechanisms for the protection of biodiversity in polar areas. Researchers have also reviewed plans of Russia according to the new set of strategies for Arctic and Antarctic regions, which were adopted in 2020. The ideas proposed by the authors can be used in a real-case scenario both for strategies implementation and for public discussion on the global ecological problems.
Keywords: Arctic region, Antarctic region, strategic planning, environmental safety, ecology, sustainable development, marine and coastal ecosystems, green agenda, staff training.

Green agenda beyond the Arctic Circle

It is well known that the World Ocean, which occupies more than 70% of the Earth's surface, have a decisive influence on global climate, as it regulates the circulation of water in its various forms (Fig. 1, 2). Looking at the facts, it turns out that the World Ocean is facing the threat of losing its ability to maintain climate balance and protect living organisms from negative human impacts. In total, more than 200 thousand identified species are at risk. This danger, in addition to the excessive exploitation of living resources, is caused by the direct deterioration of their habitat due to increase of the World Ocean's temperature [1, Khrapov P.V., Kaniber V.V., pp. 33–35], its pollution with hazardous substances and wastes, noise pollution, and ocean acidification by the high degree of carbon absorption. Only a negligible part of the World Ocean (less than 1%) is completely protected from human interference [1].

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[1] ASOC — Antarctic and Southern Ocean Conservation Coalition. See more about this in the Marine Protected Areas presentation.

Fig. 1. The role of the World Ocean in human life.

The escalation of this situation and the inaction by humans can have disappointing consequences. The United Nations (hereafter, the UN) and the United Nations Environment Programme (hereafter, UNEP) have estimated that, by 2050, the proportion of plastic in the oceans will exceed the weight of all its fish resources [2], the acidity may increase by 150% [3], by 2100, up to 70% of corals, which are the most important ecosystems for many commercial fish species, may be destroyed [4], and the increase in the level of the World Ocean is predicted in the range from 62 to 238 centimeters [5].

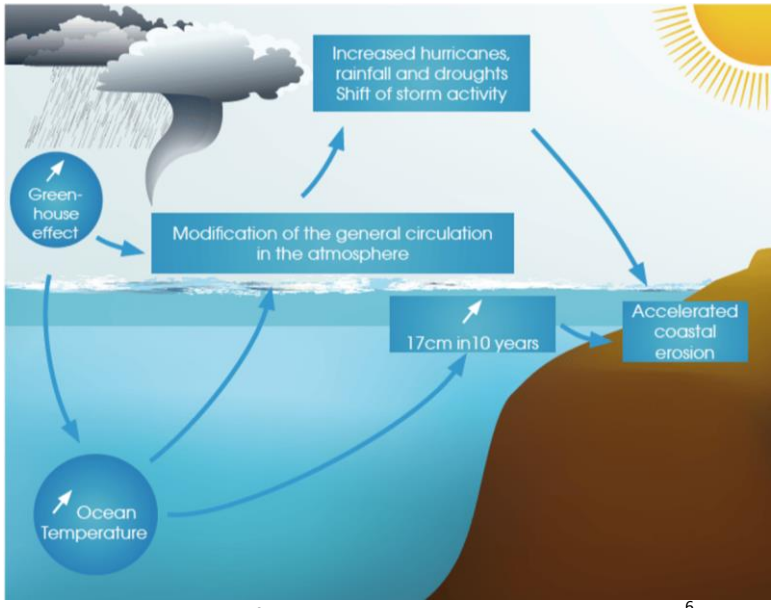

Fig. 2. The role of the World Ocean in climate regulation [6].

[2] URL: https://news.un.org/ru/story/2017/06/1305751 (accessed 31 July 2021).
[3] URL: https://ria.ru/20091214/199151535.html (accessed 31 July 2021).
[4] URL: https://ria.ru/20091214/199151535.html (accessed 31 July 2021).
[5] URL: https://rg.ru/2019/05/22/uroven-okeana.html (accessed 31 July 2021).
[6] URL: https://ocean-climate.org (accessed 31 July 2021).

Thus, the deformation of the World Ocean ecosystems, including the Arctic and Antarctic sector, is evident [2, Kennicutt M., Bromwich D., Liggett D. et al., pp. 98–100] (Fig. 3). The green agenda is not just a tribute to fashion, but a way to slow down and overcome the negative consequences of anthropogenic impact in these areas of the planet.

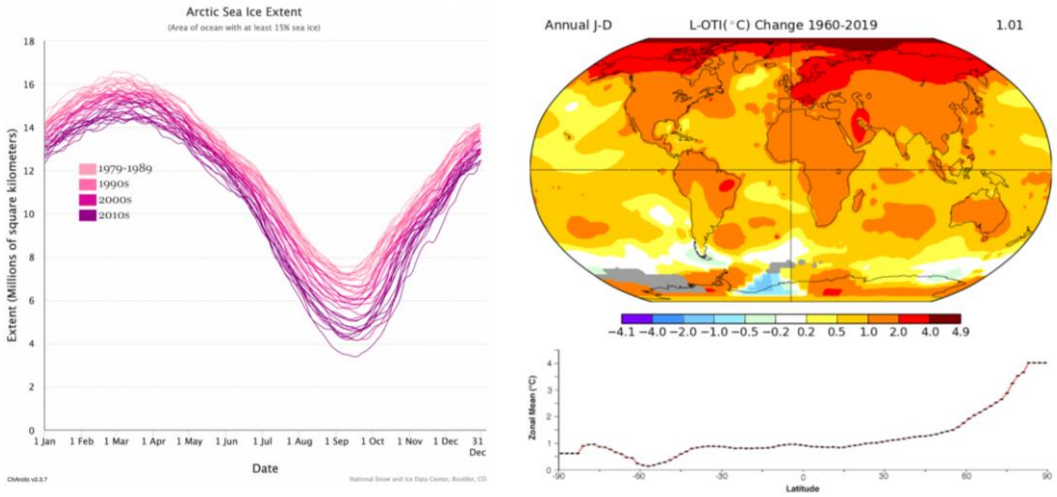

Fig. 3. Dynamics of average temperatures and ice distribution in the Arctic region during the year [7].

Environmental policy beyond the Arctic Circle

A person, on the one hand, is a consumer in relations with the oceans, since, for example, the demand for seafood over the past 70 years, according to the UN Food and Agriculture Organization, has shown growth almost all the time, and in 2018, industrial fishing indicators reached the highest value in history — 96.4 million tons [8]. Humanity is no less active in the exploration, development and production of hydrocarbons (oil and gas) in the World Ocean, the total volume of its reserves is estimated at 264 billion tons in oil equivalent. Despite a slowdown in drilling activity on average worldwide over the past 6–7 years, interest in offshore production remains high, including interest in hydrocarbon reserves in the Arctic sector [9]. At the same time, no one on the planet, except for humans, is able, if not to stop the growth of anthropogenic pressure on the World Ocean, then at least to slow down its positive dynamics and mitigate possible negative consequences. Let us try to show how humans have been able to organize themselves for such work at three levels of action: global, national and personal (Fig. 4).

[7] URL: https://nsidc.org (accessed 23 June 2021).
[8] URL: http://www.fao.org/3/ca9231ru/CA9231RU.pdf (accessed 19 July 2021).
[9] URL: http://tng.elpub.ru (accessed 16 July 2021).

Fig. 4. Levels of organization of work on the World Ocean ecosystem conservation.

The UN is one of the main and system-forming actors at the global (supranational) level (Fig. 5). This organization is tasked not only with promoting the green agenda, but also with "soft-pressuring" its member states to take active joint action. This is a very important area of work, because, firstly, not all countries have direct access to the polar territories due to existing international agreements and regimes of national borders and territorial seas [3, Zukhba D.T., pp. 72–73]; secondly, the scientifically accessible territory of the Southern Arctic does not promise obvious and quick economic benefits as the space of the world ocean, far from attractive logistics chains, and, finally, the state as an actor in environmental policy acts in several forms at once.

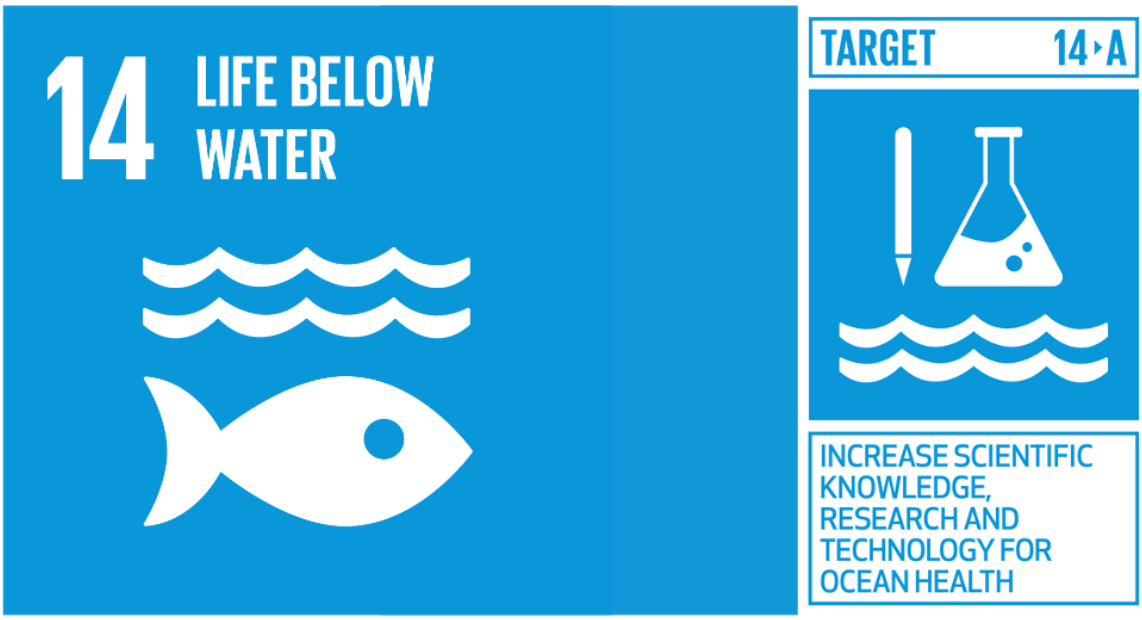

Fig. 5. One of the UN Sustainable Development Targets 2030 [10].

The first role of the state is limited to the function of a regulator, which impartially (it should at least act in this vein) establishes the rules of conducting economic activity on its territory

[10] URL: https://sdg.openshkola.org (accessed 06 July 2021).

for the participants [4, Lipina S.A., Smirnova O.O., Kudryashova E.V. et al., pp. 199–207]. At the same time, the state indirectly acts as an active participant in this turnover through companies with state capital. Obviously, in this case, the interests of the economic entity come to the fore. The third role of the state is reduced to the formation of law enforcement practice in situations of environmental damage. Thus, the proclamation of green agenda initiatives at the national or global level does not always mean their active promotion, since such promotion largely depends on the will of a particular government. At the same time, the state also has a unique opportunity to influence the content of the green agenda at the global level in relation to the protection of marine and coastal areas beyond the Arctic Circle.

The average participant of the turnover lacks this perspective. Only a very few transnational corporations with specific economic interests in these territories have the opportunity to advance them through lobbying and other tools. Thus, the Arctic and Antarctic are more likely to be the objects of close attention of “interest clubs” than ecosystems, the state of which is closely monitored by billions of people, as is the case, for example, with air quality. The presence of speculative lines of the polar circles seems to throw a veil of mystery over these regions. Instead of ensuring the preservation and careful study of this special natural environment, people are often removed from this topic, or it is given secondary importance.

At the individual level, the situation is exacerbated by the fact that only a few study these regions professionally, thousands are involved in the work of international governmental and non-governmental organizations, and billions are concentrated on solving other problems. On the one hand, this is par for the course, given the division of labour. On the other hand, the energy of billions could be of great help in promoting the global initiatives of the UN at the national, regional and local levels. It is not a question of urgent need to become environmentalists or volunteers. It is much more important to create a culture of perception of the world, which, as an imperative, would contain the concept of the planet (including marine and coastal ecosystems) as a common home for every person who is fully responsible for the present and future of this home. Such a culture could contribute to the gradual adjustment of people's everyday behavior, the formation of eco-habits, which in turn could gradually reduce the anthropogenic load on the ecosystems of the Arctic in both hemispheres.

Thus, the actors of the environmental policy concerning the territories of the Polar Regions currently have different degrees of involvement in the implementation of this policy [5, Balobanov A.E., p. 9]. It seems that the depth of immersion in projects depends on the quality of the ecological culture of local communities, on the national conditions for environmental work, determined by the government, and on the degree of environmental threats to human life and health.

Rules of the game beyond the Arctic Circle: international consensus

Despite the varying degree of involvement of environmental policy actors in Arctic and Antarctic issues, they all work in these areas in accordance with universal international rules (Fig. 6).

Fig. 6. Universal international rules for work in the Arctic and Antarctic.

The most status rules in terms of their centralization include the UN Sustainable Development Goals up to 2030 [6, Degai T.S., Petrov A.N., pp. 519–521], which, according to the developers, can be achieved through the solution of seven tasks, including (1) prevention and significant reduction of marine pollution; (2) sustainable use of coastal ecosystems by 2020; (3) minimization and elimination of the consequences of ocean acidification through the development of scientific cooperation; (4) effective management of fisheries, taking into account the capabilities of ecosystems, by 2020; (5) implementation of conservation measures for at least 10% of coastal ecosystems by 2020; (6) regulation of subsidies for fisheries by 2020; (7) increasing access to technology and scientific knowledge for the sustainable management of marine ecosystems, including by small island states. As can be seen, the stated objectives are quite ambitious and cover a wide range of issues of human activity in the ocean. Many of the presented tasks were planned to be solved by 2020. The actual state of affairs is recorded in the 2020 Sustainable Development Goals Report, which was prepared by the UN Department of Economic and Social Affairs based on the national reports of the member countries of the organization.

What does the analysis of last year's report reveal about the conservation of marine ecosystems? [11] The level of ocean acidification in 2019 was declining relative to 2016. Since 2010, the surface area of the World Ocean protected by environmental legislation has more than doubled (the 200-mile coastal zone). In 2020, the number of countries participating in the

[11] The full text of the 2020 report is available at URL: https://unstats.un.org/sdgs/report/2020/ (accessed 06 July 2021).

Agreement on Combating Illegal Fishing has expanded from 58 to 66, including participation of European countries. There has also been an increase in the number of countries that have developed and adopted national measures to combat illegal fishing on the basis of the Agreement. At the same time, the report notes that it is necessary to continue active work in this direction. The problem of small seafood companies remains unresolved, which, on the one hand, cause the greatest harm to marine ecosystems, as they violate the rules for the rational use of marine resources, and on the other hand, play a crucial role in supplying local communities with food. Experts are also concerned about indicators of a slow decline in biodiversity, particularly in the Black Sea and the Mediterranean.

Thus, the UN has seen a positive trend in some marine conservation issues and a continued threat to others. The Decade of Action (as the UN calls the period from 2020 to 2030) should be a turning point for all work [7, Claudet J., Bopp L., Cheung W. et al., p. 36–37]. At the same time, it is clear that the UN program in the field of conservation of marine ecosystems is not provided with an enforcement mechanism in case any of the Member States evades active participation and cooperation. It seems that this agenda is rather an image tool for national governments to promote their own interests in the international arena or on the eve of elections in one of the countries [12].

International rules for working in the Arctic and Antarctic are different due to the status of these regions. To begin with, let us take a closer look at the international documents that define the mechanisms for the conservation of marine ecosystems in the Arctic region. As it's known, the Arctic is a state territory, the sovereignty of which was divided by Russia, the USA, Canada, Denmark and Norway [8, Koltakova A., Pankova V., p. 30]. Thus, any environmental initiatives are under the close attention of the listed national governments, which does not exclude interaction and cooperation (Fig. 7).

[12] If you look at the positions of the "greens" in Germany on the eve of the 2021 parliamentary elections, it turns out that there is a significant demand for the rational use of the environment and its resources in society.

Fig. 7. Directions for the implementation of projects in the Arctic region [13].

At the supranational level, the Arctic Council operates, the decisions of which largely determine the possibilities for the conservation of marine and coastal ecosystems. This refers to the 1993 Nuuk Declaration on Environment and Development in the Arctic and the 1996 Programme for Military and Environmental Co-operation in the Arctic (hereinafter the Arctic Package). **The Arctic package** of documents is a special mechanism for international cooperation for the conservation of marine ecosystems in the region. The Nuuk Declaration is entirely aimed at solving the environmental problems of the Arctic, contains specific and tangible proposals for cooperation in this area, but does not offer any mechanisms for forcing the participating country to comply with the provisions of the declaration or to intensify its work. The concept of "responsibility", for example, appears twice in the document in the context of its awareness at the level of ministers who signed this declaration. The concept of "consequences" occurs more often (10 times), but only in relation to the description of the negative consequences for nature from human activities in the region. Finally, the term "mechanism" is used twice by the developers to describe the joint work of countries in case of emergencies. Thus, despite the completeness of the document in terms of a set of measures to preserve the marine ecosystems of the Arctic, the declaration is completely "toothless" in front of possible violators. Neither financial sanctions (which are often the most sensitive), nor sanctions of a different nature, nor special environmental arbitrations are provided for in this regulatory instrument. This approach seems to allow for the behaviour of any of the participants, which may deviate from the norm. As long as ecological behavior and rational use of resources has not become the simplest element of culture, it is impossible to start effectively protecting nature without intimidating potential violators with harsh measures of responsibility.

[13] URL: https://forumarctic.ru (accessed 06 July 2021).

The 1996 Programme of Co-operation in the Military Field with Norway is an example of an instrument of a different order. This is a bilateral agreement aimed at solving a specific range of tasks in the field of nuclear waste management, including in the Arctic region [14]. Without going into details of the document, it is "capital-intensive" and (probably therefore) sufficiently definite as to the financial liability of the parties in case of damage caused to the other party or third parties. Moreover, in order to resolve disputes arising in connection with attempts to prove the amount of damage, the parties agreed to appoint an arbitrator in accordance with the arbitration rules of the UN Commission on International Trade Law.

Thus, the agreement with Norway, in terms of its structure and content, is very close to an ordinary civil contract between individuals, which includes a materially measurable subject, the rights and obligations of the parties to such an agreement, measures of liability for violation of its terms, as well as a dispute resolution procedure which, as we have seen, is absent in international instruments with multiple parties. Such an agreement offers the parties a real choice of behavior, on which the fate of each of the parties directly depends. It seems that such an approach is more effective, since (no matter how cynical it may sound) it "packs" all national interests into a simple formula for calculating and compensating for the damage caused.

The Antarctic region has a different history and international legal status. When Argentina and Chile began claiming the territory, the international community insisted on signing the Antarctic Treaty of 1959. This treaty gave the territory the status of a demilitarised international zone free for scientific research. The Treaty was later supplemented by the 1980 Convention on the Conservation of Antarctic Living Marine Resources, the 1988 Convention on the Regulation of the Development of Mineral Resources in the Antarctic and the 1991 Protocol to the 1959 Treaty on Environmental Protection (hereinafter referred to as the Antarctic Package). The main international platform dedicated to the protection of Antarctic ecosystems is the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR). One of the main areas of work of this commission is to promote the idea of expanding the territories of marine protected areas in the South Sea. During 2014–2019, Australia, Chile, Argentina and the European Union have repeatedly made proposals for the creation of new protected areas, which increases the chances of preserving Antarctic ecosystems. Russia, along with 25 other countries (including the countries of the European Union), is a member of the commission and participates in the work of its bodies [9, Chown S.L., Brooks C.M., Terauds A. et al., pp. 4–5].

As for the Antarctic package itself, for example, the Antarctic Treaty of 1959 does not offer its participants any enforcement mechanism [10, Timokhin K.V., p. 107]. In turn, the 1991 Protocol (on environmental protection) contains a direct reference to the creation of a special Arbitration Tribunal to resolve disputes between the contracting parties. The status of arbitration is regulated

[14] A more detailed text of the agreement is available at URL: https://docs.cntd.ru/document/8318663 (accessed 06 July 2021).

by a special annex to the protocol [15]. In this way, an understandable mechanism for dispute resolution is offered to the parties to the 1959 Treaty, which seems to be an effective incentive for preventing violations in the area of ecosystem protection in the region.

In this case, it seems likely that states accept the possibility of establishing a special enforcement mechanism to resolve a dispute in a situation where such a dispute is not related to state activities on their territory, i.e. within the framework of their national sovereignty. The question of sovereignty as a kind of dividing line in this material was not raised by chance. It seems that humanity is going through a period of rejection of the principles of globalization in the context of an easy parting (delegation) with a part of sovereignty in favour of supranational organizations. At the same time, the world economy is moving towards a gradual monopolization and consolidation of sources of capital, which often begin to replace national governments. In order to survive in such a situation, in order to be stronger than business, states “twist” the rules of the game at their own level and abandon global alliances at the international level.

Rules of the game beyond the Arctic Circle: national plans or corporate interests?

Regulation of marine ecosystems conservation issues at the international level is the result of a compromise between individual countries or groups of countries. In the case of national regulation, the parties to the social contract are different. On the one hand, the national government participates in it, and on the other, there is a society. Each of them acts on the basis of international and national rules and their own interests. In reality, the parties to such an agreement are divided rather conditionally; society, like the government, is heterogeneous in its composition (Fig. 8).

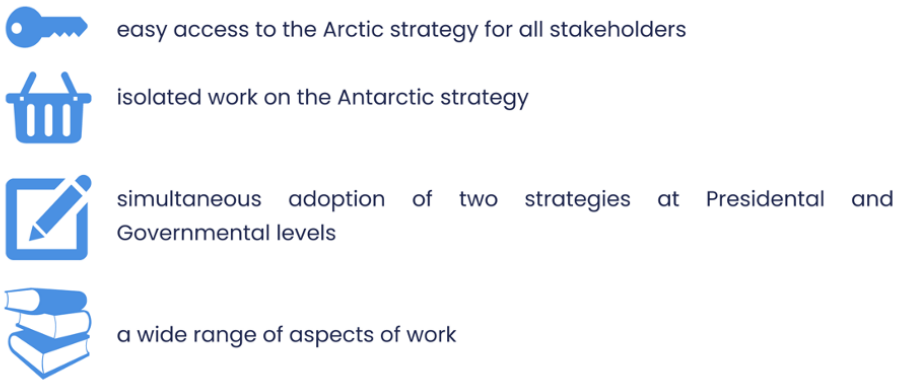

Fig. 8. Features of Russia’s national plans for work in the Arctic and Antarctic.

Russia has adopted two strategies for working in the Arctic and the Antarctic region in 2020. The documents have partly different status in terms of their level of approval, but in general they represent an example of a strategic view of the country's role in these areas. In fact, the

[15] Text of the 1991 Protocol and annexes. URL: https://docs.cntd.ru/document/1901494 (accessed 06 July 2021).

documents represent some of the most sensitive issues for Russia's engagement in the Arctic and Antarctic.

Fig. 9. Russia's strategy for working in the Arctic region.

The Arctic Strategy was published on October 26, 2020 [16] (hereinafter referred to as the Strategy) (Fig. 9). The Government of the Russian Federation was instructed to submit an action plan for the implementation of this strategy within 3 months (approximately by the beginning of February). The plan was approved on April 15, 2021, and does not provide that a report on the Strategy implementation will be prepared in 2021. The first report will be published only in 2022, which seems inconsistent, since the plan envisages quite a few specific activities for 2021.

Immediately after the adoption of the Strategy, it received sufficiently high-quality information support. It is planned to cover the progress of its implementation, main achievements, etc. on a special website [17]. It seems to be an excellent idea, since a wide range of interested people have access to a platform for discussing current issues of the Strategy along with experts, civil servants and the local population. Any strategy involves setting goals and objectives to achieve them. This approach does not cause discussions and disputes. The question of responsibility for failure to achieve the goals outlined in the Strategy remains open. Who should be responsible for this? What measures of responsibility can be applied to those responsible for the disruption of plans? Can a strategy involving budget expenditures be an effective development tool when it does not contain a mechanism for enforcement or does not offer specific measures of personal (not collective) responsibility?

[16] For more details, see the text of the Strategy on the URL: http://publication.pravo.gov.ru/Document/View/0001202010260033 (accessed 06 July 2021).
[17] URL: https://www.arctic2035.ru (accessed 06 July 2021).

The implementation of the Strategy is expected in two stages and includes many areas for the development of the region, including the rational use of natural resources. The document contains targets to be achieved as a result of its implementation. Among them are the share of investments in science and education (growth by 4 times by 2035) and the share of investments in fixed assets for the rational use of resources (growth by almost 4 times by 2035). At the same time, the production of oil and natural gas in the region is also growing. Thus, the load on ecosystems will grow (mining companies will become the beneficiaries of this approach) [11, Karataeva K.E., pp. 241–242].

The mechanism of responsibility for the implementation of the Strategy is not proposed. Its provisions will be implemented by state and local authorities, state-owned companies and entrepreneurs. The main curator of the document is the President of Russia.

The text of the Strategy for the Development of the Activities of the Russian Federation in the Antarctic up to 2030 (hereinafter referred to as Strategy 2) (Fig. 10), in turn, is not available on the official portal of the Government of the Russian Federation, although it is indicated that on August 21, 2020, the Government of the Russian Federation adopted an order for the approval of such a document [18]. This information was duplicated in the reports of a number of mass media [19]. Moreover, at the end of February 2021, the official website of the Parlamentskaya Gazeta reported, with reference to representatives of the Ministry of Nature, that the agency had submitted an action plan for the implementation of Strategy 2 to the Government of the Russian Federation.

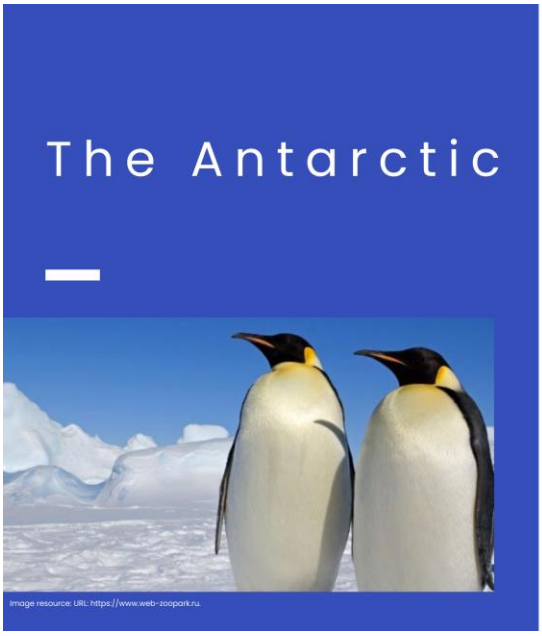

Fig. 10. Russia's strategy for working in the Antarctic region.

[18] See also URL: http://government.ru/news/40250/ (accessed 06 July 2021).
[19] See also URL: https://tass.ru/ekonomika/9254551 (accessed 06 July 2021); URL: https://portnews.ru/news/300552/ (accessed 06 July 2021).

Partially about what Russia is going to do in Antarctica in accordance with the adopted Strategy 2 is stated in the communication of the Ministry of Natural Resources dated February 19, 2021. The key areas of work in this region should be environmental protection and development of comprehensive fundamental scientific research.

Thus, currently, Strategy 2 and the action plan for the implementation of its goals are not available for analysis. This approach seems unattractive from the standpoint of the possibility of expert discussion of these documents, of the interests of taxpayers who have the opportunity to know about the spending of budgetary funds, as well as of demonstrating the role of Russia as one of the leading countries in the global environmental movement to preserve marine ecosystems, both in regions with active human economic activity, and in regions where such activity is prohibited by international treaties. Russia's "Arctic" activity can be explained in terms of the possibility of implementing logistics projects here, projects in the field of strategic weapons, projects for the extraction of minerals. Antarctica, given its international status, is the territory of science. We believe that in this respect there is no need to play down the importance of this region for Russia, since the scientific potential of the country, as was seen in 2020, is very important.

Moreover, Russia, more than any other country in the world, is affected by climate change because it has the largest territory. Up-to-date information about the state of the climate on the planet and trends in its change can be used to make strategically important decisions about the present and future of the country. Such decisions are driven by people whose environmental culture influences the quality of such decisions and of the international rules of conduct.

Thus, the question of the quality of the intellectual resource that Russia has for the implementation of a balanced environmental policy in the Arctic is of decisive importance. Taking into account the plans of Russia as a country with the longest Arctic frontier to develop economic activity in the Arctic, as well as to increase its influence in the Antarctic, the issue of training specialists becomes a purely practical matter.

Personnel decide everything, or everything is decided without personnel

This part of the article presents an analysis of Russia's capabilities in terms of its provision with professionals who are able to manage projects in the Arctic and Antarctic not only as consumers of resources, but also as defenders of the ecosystems of the World Ocean (Fig. 11, 12). In other words, Russia needs specialists to implement a balanced state environmental policy in the human-marine ecosystem chain. For evaluation of Russia's plans for training such specialists, let us turn to Strategy and Strategy 2.

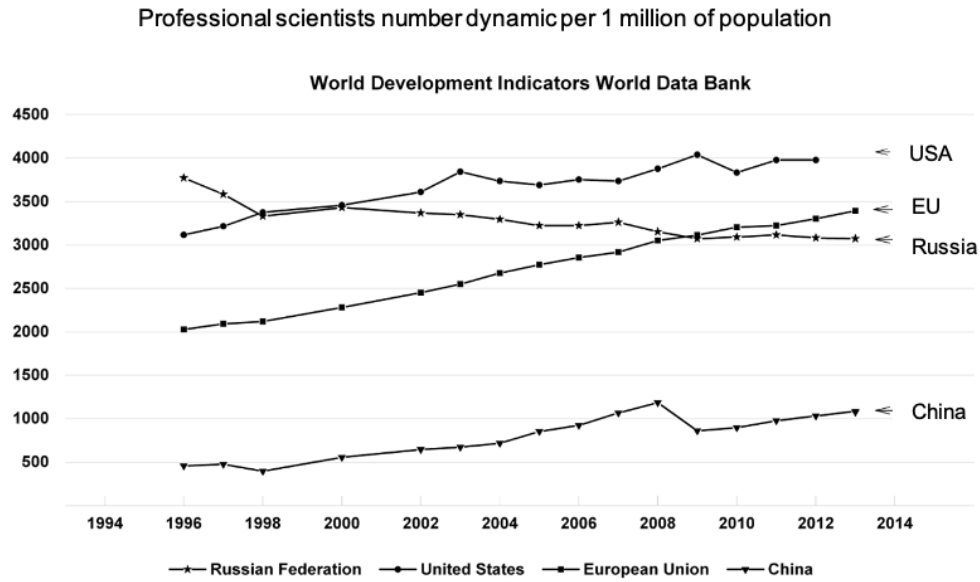

Fig. 11. Dynamics of the number of professional researchers per 1 million people by country [20].

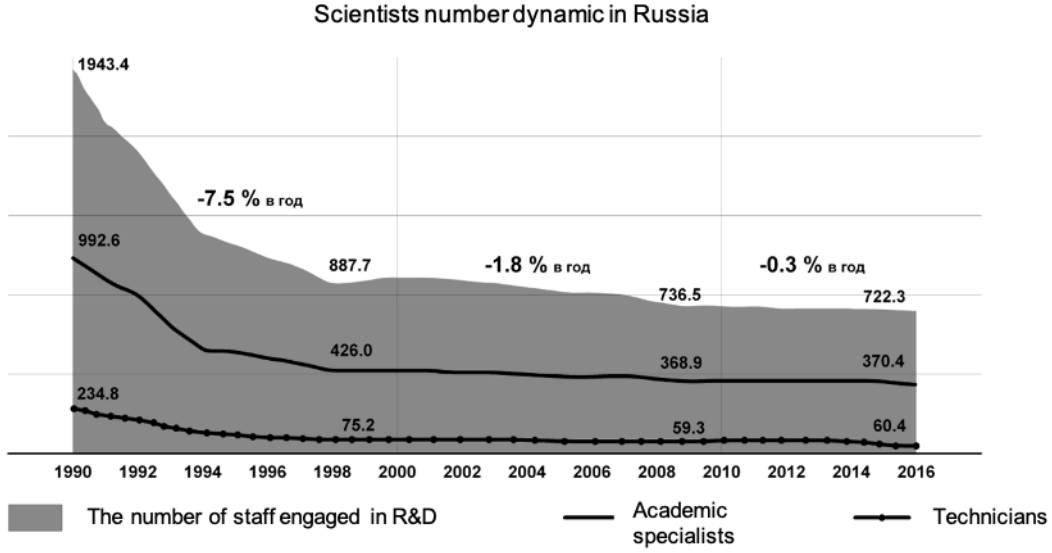

Fig. 12. Dynamics of the number of personnel engaged in research and development in Russia [21].

The Action Plan to Implement the Strategy (hereinafter referred to as the Plan) includes a number of provisions that are directly related to the support and development of the existing, as well as the formation of a new intellectual resource for the Arctic [22] (Fig. 13).

[20] URL: https://acur.msu.ru (accessed 06 July 2021).
[21] URL: https://acur.msu.ru (accessed 06 July 2021).
[22] The Strategy also points out, for example, the discrepancy between the system of secondary and higher vocational education to the needs of the economy and the social sphere in the region, the need to create centers for advanced education and professional retraining, including in accordance with the Wordskills standard.

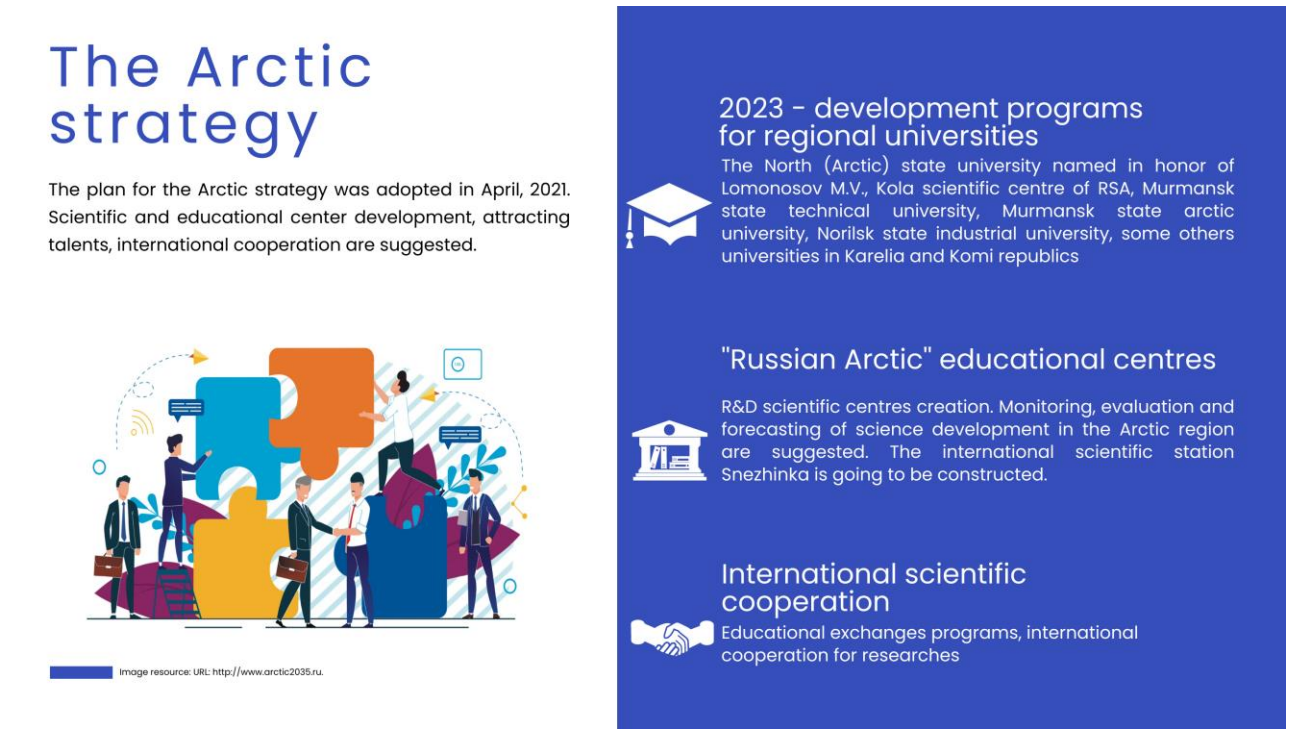

Fig. 13. Russia's Arctic strategy: training activities and scientific cooperation.

For example, section 1 of the Action Plan, dedicated to solving the social problems of this region, assumes that by 2023 (three years after the adoption of the Strategy during a decade of active actions), development programmes will be prepared for several regional higher education institutions, research centres (the Northern (Arctic) Federal University named after M.V. Lomonosov, Kola Scientific Center of the Russian Academy of Sciences, Murmansk State Technical University, Murmansk Arctic State University, Norilsk State Industrial University, a number of educational and scientific organizations in the Republic of Karelia and the Republic of Komi). Unfortunately, it is impossible to conclude how useful such plans will be, whether they will concern only the development of the material and technical base of the centers or will also be focused on expanding the range of specialists and scientific disciplines for the formation of the previously mentioned balanced environmental management.

Other sections of the Plan also imply actions to develop (create conditions for development) an intellectual resource. Thus, one can pay attention to paragraphs 110–112, which envisage implementing the programme of activities of educational centres "Russian Arctic: new materials, technologies and research methods", the development of scientific and educational centers in the areas of fundamental research conducted in the interests of the Arctic development, monitoring, assessment and forecasting of science and technology development in the Arctic zone, as well as the creation of two international Arctic stations “Snezhinka”. Paragraph 141 of the Plan promises the development and implementation of an international educational exchange programme for the younger generation. Paragraph 146 of the Plan proposes the development and implementation of a scheme for international Arctic scientific cooperation.

Thus, the presented parameters of the Plan look encouraging and inspire confidence that the work of training highly qualified personnel for work in the Arctic, not only in the field of exploration, development and extraction of minerals, will be one of the priorities of state environmental policy. At the same time, all programs and plans proposed for development should be available for analysis by the current generation of highly qualified specialists who declare the need to find the very balanced approach to using the resources of the World Ocean ecosystems. Is this possible for the Strategy? Probably, yes, since a special portal on the Internet allows posting up-to-date information on the progress of the Strategy implementation, which can be available for wide public discussion and discussion among professionals.

Analysis of Russia's prospects in terms of building up its intellectual potential in the field of Antarctic research is currently difficult (Fig. 14).

Fig. 14. Russia's strategy in Antarctica: plans for nature protection, scientific activities and training.

In the media over the past two years, there are a lot of publications about who and how prepares specialists for work in the Arctic, what specialties are in most demand, etc [23]. Among the educational institutions, there are those mentioned in the text of the Strategy (universities in Murmansk and Arkhangelsk, for example). However, the relevant request for specialists for Antarctica presents only the Arctic and Antarctic Research Institute in St. Petersburg. However, the research institute is still not a university, but an organization that is ready to hire specialized specialists with a diploma. Thus, Russia's strategic approach to training personnel for work in the

[23] See an example of such a publication at URL: https://postupi.online/journal/kuda-postupat/vuzy-s-arkticheskim-uklonom-v-kakih-specialistah-nuzhdaetsya-arktika-i-gde-ih-gotovyat/ (accessed 06 July 2021).

Antarctic region for the next 10 years is incomprehensible to a wide range of experts and specialists.

Conclusion

Proposals. Preservation and development of marine ecosystems beyond the Arctic Circle is possible through the use of effective universal international and national mechanisms provided with intellectual resources. Both components of a successful recipe for the struggle for the future of the Arctic and Antarctic depend on each other, since the development of these mechanisms is possible only by highly qualified specialists in their field, and the institutional framework for the protection of marine ecosystems should a priori provide for scenarios for continuous education of new and advanced training of existing professionals in the field of polar environmental policy.

The preparation of a personnel reserve for the Arctic and Antarctic could make a tectonic shift in the public perception of the role of man in terms of its negative impact on the environment, as highly qualified specialists in the field of balanced (sustainable) project management in the Arctic and Antarctic, on the one hand, will moderate the ardor of "greedy businessmen" and point them to the need for a discreet approach to the depletion of regional ecosystems, and on the other hand, activate local communities (in the Arctic case) and representatives of the countries that own the Antarctic infrastructure and international organizations (in the Antarctica case) in the conservation of marine biological diversity and protecting the human environment from degradation.

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About Russian Alaska and Its Ruler A.A. Baranov [*]

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Abstract. The purpose of this study is to analyze the present and past of the history of Alaska. Such a combination of times highlighted the most difficult problem of ambiguous attitude to the historical past in the USA from the standpoint of modernity. In the process of destroying monuments under the onslaught of the Black Lives Matter movement, the local Indian population accused the long-gone A. A. Baranov of racism, persecution of the indigenous population, enslavement of Tlingits and Aleuts for hunting fur-bearing animals. On July 14, 2020, the Sitka town and district assembly supported these accusations and decided to move his monument from the town square to the local museum. The review article reveals the objective conditions of the historical process during the period of A.A. Baranov's activity in Alaska in 1790–1818, using the methods of historicism, search and systematization of information, analysis and synthesis. The assessment of his personality is updated. The article shows the beginning of G.I. Shelikhov's and A.A. Baranov's activity in the North-Eastern Company, and then its transformation in 1799 into the Russian-American Company (RAC). The article examines the war with the Tlingit people of 1802–1804, the missionary work of Herman Alaskinskiy, three assessments of the nature of Russian colonization, N.P. Rezanov's plan for the modernization of RAC. The episode with Russia's sale of Alaska to the United States is also being clarified.
Keywords: *Alaska, G.I. Shelikhov, A.A. Baranov, German Alaskinskiy, N.P. Rezanov, Russian-American Company (RAC), Tlingits, monument, Sitka.*

On the relocation of A.A. Baranov's monument in the city of Sitka in 2020

Monument to A.A. Baranov was erected in downtown Sitka, Alaska on October 25, 1989. A statue of sculptor Joan Bugby-Jackson was donated to the municipality by the Hames family and installed in the park in front of the Harrigan Centennial Hall community center on the ocean.

Fig. 1. Ambassador A.I. Antonov and R. Hames, June 2019. [1]

The inscription on the pedestal of the monument is "So that we may always remain in friendship and peace in this region". Unfortunately, in the summer of 2020, a group of local activists opposed the

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[1] URL: https://pbs.twimg.com/media/EG9-tAzWwAAPfks.jpg (accessed 20 July 2021).

historical past and started pushing for the monument to be removed from the city centre. The Municipal Administrator's Office held to its stated value: "We respect and support the changing needs of our customers, their elected representatives and our employees. We appreciate their ability and contribution to making Sitka the benchmark—in every way—by which all other cities are measured" [2]. City manager John Leach remarked at the time: "The performances of this group, in a sense, are on a par with everything else that is happening in the USA right now" [3]. Relations between people, values and historical events are increasingly subjected to critical scrutiny in the modern world. Alaska in the USA is no exception.

The demand of local activists in Sitka took place against the background of the activist movement "Black Lives Matter" (BLM) in 2020. This socio-political protest movement against police brutality and racial violence, advocating various political changes related to the liberation of blacks, functioned in 2013–2020. The movement received further international attention during global protests following the killing of George Floyd by Minneapolis police officer Derek Chauvin, who was sentenced to 22.5 years in prison [4]. Black Lives Matter is a decentralized network of activists without a formal hierarchy, includes many different opinions and a wide range of requirements, a heterogeneous composition. It concerns not only the provision of basic human rights for all black people under "white supremacy", but also the alleged general injustice of the American system, the ideology of oppression (identity politics). A June 2020 Pew Research Center poll found that 67% of American adults expressed some support for the Black Lives Matter movement. In September 2020, support for this movement among American adults dropped to 55%. It is mainly supported by the black population, a noticeable decrease was observed among whites and Hispanics [5].

In the city of Sitka, Alaska, on June 23, 2020, about 90 people gathered around the statue of Baranov, asking the city authorities to move the monument to a less conspicuous place, since it might offend the feelings of the Tlingits.

[2] City and Borough of Sitka. URL: https://www.cityofsitka.com/government/assembly/administrator/index.html (accessed 20 July 2021).
[3] Sidorchik A. Baranov protiv indeytsev. Snesut li pamyatnik pravitelyu Russkoy Ameriki? [Baranov against the Indians. Will the monument to the ruler of Russian America be demolished?]. URL: https://aif.ru/politics/world/baranov_protiv_indeycev_snesut_li_pamyatnik_pravitelyu_russkoy_ ameriki (accessed 14 July 2021).
[4] Dereka Shovina prigovorili k 22 godam tyur'my za ubiystvo Dzhordzha Floyda [Derek Chauvin was sentenced to 22 years in prison for killing George Floyd]. URL: https:// usa.one/2021/06/dereka-shovina-prigovorili-k-22-godam-tyurmy-za-ubijstvo-dzhordzha-flojda/ (accessed 14 July 2021).
[5] Black Lives matter. URL: https://en.wikipedia.org/wiki/Black_Lives_Matter (accessed 20 July 2021).

Fig. 2. President of the Alaska Native Sisterhood Paulette Morin is speaking.
Dion Brady-Howard is drumming and singing [6].

At the Sitka Assembly meeting, Doug Osborne presented a petition with about 900 signatures. Over the years, people have called for the removal of the statue, which has been damaged several times. “This monument is not about telling our story, not about recognizing it. This is a monument, this is a place of honor for someone who does not deserve our honor,” said Dion Brady-Howard, whose Tlingit name is Eidikuaa. During the meeting, Nikolai Galanin stated: “Baranov is a historical figure responsible for murders, enslavement, rape and genocide. This history is still being felt by our indigenous communities. The number of indigenous women is statistically higher than all the missing and killed throughout North America. Our languages must be revived because they were forcibly taken from us” [7].

However, analyzing all the performances, it is necessary to emphasize one important feature. The motivation of the protesters was not only and not so much in the events of the past, but, on the contrary, in the reaction to the events of the present, an attitude towards the realities of the US in 2020. It was said that women from the indigenous population are statistically significantly more likely to go missing and become victims of murder throughout North America here and now. Assembly member Valorie Nelson, in turn, said that she considers the discussion around the statue of Baranov controversial. She told about her unpleasant incident in the past and declared her fatigue from all this [8].

When it became known that some local residents were in favour of the demolition of this monument, the CCORC — the Coordinating Council of Organizations of Russian Compatriots in the United States — launched an online petition to the Sitka authorities to keep all the monuments in their current locations and installations. The history of Alaska in the past was “sixteen shades of gray”: wars, peace, mutual trade, cultural exchange, intertribal and interethnic marriages. Approximately 6 thousand people have signed the US CCORC petition. In contrast, the petition of the

[6] Sitkans gather to demand the relocation of controversial Baranov Statue. KCAW, Jun 24, 2020.
[7] Sitkans gather to demand the relocation of controversial Baranov Statue. KCAW, Jun 24, 2020. URL: https://www.ktoo.org/2020/06/25/sitkans-gather-to-demand-the-relocation-of-controver-sial-baranov-statue/ (accessed 18 July 2020).
[8] Ibid.

supporters of moving the statue got less than 3 thousand votes [9]. The keynote of supporters of preservation of the monument to A.A. Baranov was the following: "It is a big mistake to judge the history and historical monuments by the modern standards. If we follow the slippery slope of distorting history to suit the desires of particular racial, ethnic or identity groups, we will only exacerbate existing ethnic, racial and cultural conflicts" [10].

On July 14, 2020, at a meeting of the city Sitka and District Assembly, a decision was discussed to transfer the monument to A.A. Baranov to the Museum of the Sitka Historical Society. Another alternative proposal was to include the question of removing the monument to Baranov from its current location on the ballot of the next municipal elections on October 6, 2020 [11]. However, this proposal did not find support. The adopted resolution of the Sitka Assembly dated July 14, 2020 listed a number of accusations against A.A. Baranov. It was said that "The Baranov Monument continues to normalize a figure saturated with racial division, violence and injustice. Sitka has a choice about the values it can project" [12]. According to the decree, A.A. Baranov led enslavement of the Tlingit and Aleuts for hunting fur-bearing animals until they completely disappeared; abuse of local women, families and the law; murders and theft of local property — often justified by theories of racial and cultural superiority. The locals nicknamed him "no heart". "His violent legacy continues to ripple through time, waves of historical trauma still hurting indigenous people to this very day," the Sitka City and District Assembly noted [13].

It is quite clear that the Sitka City and District Assembly resolution was adopted in 2020 in the mass wave of the toppling of statues of Confederates and colonialists in the USA, caused by mass protests against racism in the USA.

It is important to note that previously, in the recent past, the situation was still different. For example, in March 2017, the nature of the protests on the 150th anniversary of the sale of Alaska was more objective. Chief of the Tlingit Tribe, 12th Lieutenant Governor of Alaska 2014–2018 Byron Mallott (1943–2020), stated at the time that "We are looking at 150 years with very wide open eyes. Both under Russian and American rule there have been pro-problems for Alaska Native peoples". Sergei A. Kan, a professor at Dartmouth College in New Hampshire, who has studied the ethnology and ethnohistory of Native Americans, including the Tlingit, said that when

[9] Zlodorev D. Grozit li peresmotrom russkoy istorii v SShA bor'ba s pamyatnikami [Does the fight against monuments threaten to revise Russian history in the USA?]. URL: https://rg.ru/ 2020/07/16/grozit-li-peresmotrom-russkoj-istorii… (accessed 21 July 2020).

[10] Save the Baranov Monument in Sitka, Alaska. URL: https:// www.change.org/p/sitka-city-assembly-save-the-baranov-monument-in-sitka-alaska-спасите-памятник-баранову-в-ситке-на-аляске... (accessed 15 July 2020).

[11] Zasedaniya gorodskogo i rayonnogo Sobraniy Sitka. 7/14/2020 [Meetings of the city and district Assemblies of Sitka. 7/14/2020]. URL: https://sitka.legistar.com/ MeetingDetail.aspx?ID (accessed 18 July 2020).

[12] Alaska's Sitka Assembly Adopts Resolution Relocating Baranov Statue to Historical Museum. 15 July 2020. URL: https://sputniknews.com/us/202007151079887840-alaskas-sitka-assembly-adopts-resolution-relocating-baranov-statue-to-historical-museum/ (accessed 21 July 2020).

[13] Another day, another statue: Sitka council rules to remove monument to first Russian governor of Alaska. 15 July 2020. URL: https://www.rt.com/usa/494777-sitka-baranov-statue-removal/ (accessed 21 July 2020).

the Russians arrived in Alaska, they used coastal people to hunt sea otters. After the sale of the land, the indigenous groups were freed, but the Americans brought new problems. “The Russian era was associated with paternalistic control, but the task of Russia was not a radical transformation of life, but the use of people for economic purposes. With the Americans, this was accompanied by a much stronger Westernization”. Bob Sam, a Tlingit born and raised in Sitka, remarked in 2017 that not everyone was happy about the 150th anniversary: “It's time to heal and find unity so Alaska Natives can continue to be the people they were meant to be” [14].

The Sitka History Museum, also known as the Sitka Historical Society and Museum, proudly displays the entire history of the Tlingit indigenous people and the period of Russian colonization from Tlingit totem poles to artefacts of the Russian Orthodox Church. St. Michael's Cathedral, the Baranovskiy Castle State Historical Monument are among the 9 amazing places to visit in Sitka. The restored “Russian Bishops’ House” speaks of Russia's little-known colonial heritage in North America [15]. The Sitka National Historical Park preserves the scene of a battle between “invading Russian traders and the native Kiksadi”.

In relation to the monument's 2020 relocation, Hal Spackman, director of the history museum, said: “The museum's placement facilitates a respectful compromise in a difficult, somewhat controversial discussion” [16]. He explained that the museum already has a space that talks about Alexander Baranov, his life in Sitka, the Russian-American Company and its influence, and the conflicts the Russians had with the Tlingit at the time. According to the director, the Tlingit perspective on these conflicts and their resolution is also presented. He also admitted that the monument to A. Baranov could someday be brought to Russia as part of the exchange of exhibitions between museums. Sale is excluded, exchange is possible [17]. In the summer 2020, there were offers from Arkhangelsk, Irkutsk, Magadan, St. Petersburg, to buy out the statue of A.A. Baranov and transport it to Russia.

Brief review of literature sources about A.A. Baranov

In order to understand the mission and significance of A.A. Baranov in the development of Russian America, it is necessary to return to the end 18th – beginning of the 19th centuries. Alaska and part of California in 1741–1867 were positioned as Russian America. The history of its development is inextricably linked with the activities of the Russian-American Company (abbreviated as RAC), named after A.A. Baranov, who was born in Kargopol, Olonets Gubernia, and was engaged in

[14] Gershkovich E. 150 Years after Sale of Alaska, Some Russians Have Second Thoughts. The New York Times. 30.03.2017. URL: https://www.nytimes.com/2017/03/30/world/europe/alaska-russia-sale-150.html (accessed 21 July 2020).
[15] Currents of Change. URL: https://www.nps.gov/sitk/index.htm (accessed 20 July 2020).
[16] Alaska city relocates Russian colonist statue to museum. URL: https://apnews.com/article/ 557c73e5c0 771f1d960 48b0cfb5885a0 (accessed 21 July 2020).
[17] Direktor muzeya v Sitke dopustil, chto statuyu Baranova mogut privezti iz SShA v Rossiyu [The director of the museum in Sitka admitted that the statue of Baranov could be brought from the USA to Russia]. URL: https://tass.ru/obschestvo/ 8988211 (accessed 21 July 2020).

commercial and industrial activities in the North, in Moscow, St. Petersburg, Siberia, and then in Alaska.

One of the well-known domestic researchers of the history of Alaska, S.N. Markov (1906–1979), obtained access to some documents, which were previously considered hopelessly lost. Private archives of Grigory Ivanovich Shelikhov (1747–1795) and his son-in-law Mikhail Matveyevich Buldakov (1766–1830), the leading director of the Russian-American Company in 1799–1827, were not preserved as a whole. We are talking about a part of the archive of M.M. Buldakov, a native of Velikiy Ustyug, discovered in 1923 [1, p. 46]. In Russia, the materials of the RAC are stored in the Russian State Archive of Foreign Affairs (f. 1605) and Russian State Historical Archives. There are two fonds "Siberian Affairs" and "Russian-American Company" in the Archive of Foreign Policy of Russia. The US Library of Congress has a collection of the Russian merchant and famous collector G.V. Yudin (1840–1912), including documents from the RAC, as well as the archives of Novoarkhangelsk, Ross, Kodiak, Unalashka, and the Pribyloviy Islands [18].

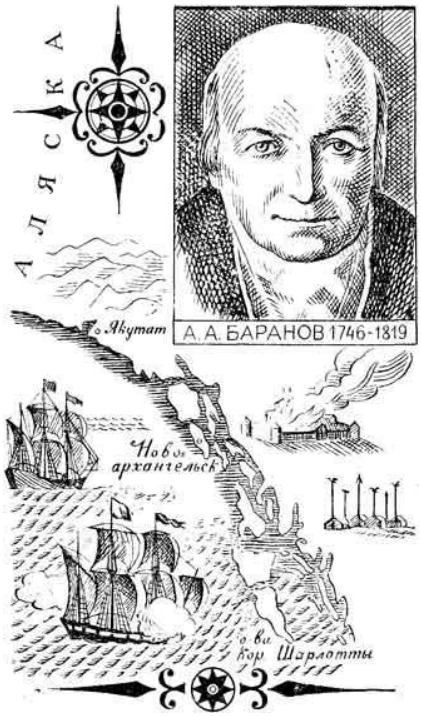

Fig. 3. Baranov A.A. From the book of S.N. Markov "History of Alaska", p. 14.

American historian F.A. Golder (1877–1929), Doctor of Philosophy and author of the book "Russian Expansion on the Pacific, 1641–1850", referred to the history of Alaska as part of American history during the period of Russian expansion [2, p. 13]. A brief historical overview of the discovery and colonization of the North-West of America by Russia (1741–1867) was given in the book of the American professor V.P. Petrov "Russians in the history of America" [19].

[18] Meeting of Frontiers: Gennadii V. Yudin. Collection of Russian-American Company. URL: https://memory.loc.gov/intldl/ mtfhtml/mfdigcol/lists/mtfyumTitles3.html (accessed 17 July 2020).

[19] Petrov V. Russkie v istorii Ameriki [Russians in American History]. Science Publ., 1991. URL: https://itexts.net/avtor-viktor-porfirevich-petrov/254635-russkie-v-istorii-ameriki-viktor-petrov/read/page-1.html (accessed 19 July 2020).

It is worth to mention the fundamental project by the team of authors “History of Russian America” (1732–1867) in three volumes, ed. by RAS Academician N.N. Bolkhovitinov (1930–2008) [3, 1511 p.]. The Russian scientist N.N. Zubov (1885–1960) in his work “Domestic Sailors — Explorers of the Seas and Oceans”, devoting two chapters to the activities of G.I. Shelikhov (1775–1795) and A.A. Baranov in Russian America (1790–1818) [4, pp. 124–127, 132, 206–211]. Review of sources and literature, history of the Tlingit Indians, their relations with the Europeans during Russian America 1741–1867 are described in the works of Professor A.V. Grinev, Chairman of the Russian Association of American Anthropologists [5].

The problems of Russian Alaska are periodically discussed at scientific conferences. In the materials of the 14th Kargopol Scientific Conference (August 15–16, 2016), the third section “Russian North and Russian America” has 11 articles about A.A. Baranov, his family tree, Russian America [6, pp. 318–384]. Bibliographic indexes of available literature, sources about “Russian America”, published in 2012 in Vologda [20] and in Moscow in 2013 [7], include documents, letters, maps, reference books, monographs, collections, teaching aids, articles, abstracts, electronic and other resources.

Life and destiny of A.A. Baranov, RAC activities in North America are reflected in journal articles, media, Wikipedia [21]. Media sometimes report minor inaccuracies: instead of the Olonets province as the birthplace of A.A. Baranov, the Astrakhan Oblast or Arkhangelsk Gubernia are indicated [22]. In general, there is a permanent public and scientific interest both to A. A. Baranov personality and Alaska history. Historiography, the source base of the research question, of course, is not limited to these works. In this article the author studies only a small part of available materials on the history of Russian America and the fate of our countryman A.A. Baranov.

A.A. Baranov's beginnings in North America

Expansion (extension, growth) is a characteristic of any empire, a necessary condition for its stability, regardless of the real need for new territories. Spanish expansion to America began in the 15th century (Columbus, 1492), British one — in the 16th century [23]. However, by the middle of the 18th century, neither Britain nor Spain owned any possessions, nor had any information

[20] Russkaya Amerika: annotirovannyy ukazatel' literatury [Russian America: an annotated index of literature]. Vologda, Vologda Regional Universal Scientific Library named after I.V. Babushkin, 2012. URL: https://www.booksite.ru/fulltext/russ_america/index.html (accessed 21 April 2020).

[21] Kryuchkova M. Pervyy pravitel' russkoy Ameriki [The first ruler of Russian America]. Moscow Journal, 1998, no. 11. URL: http://mj.rusk. ru/show.php?idar=800038; Ermolaev A., Petrov A. Glavnyy pravitel' Russkoy Ameriki [The main ruler of Russian America]. Rodina, 2017, no. 1 (117). URL: https://rg.ru/2017/01/10/rodina-baranov.html; Baranov Aleksandr Andreevich. URL: https://dic.academic.ru/dic.nsf/ruwiki/23248; https://ru.wikipedia.org/wiki/Баранов,_Александр_Андреевич (accessed 21 April 2020).

[22] See, for example: “was born in the city of Kargopol, Astrakhan region”. URL: https://herocron.ru/aleksandr-andreevich-baranov-pravitel-russkoj-ameriki; “Kargopol of the Arkhangelsk province”. URL: https://megabook.ru/article/Баранов%20Александр%20Андреевич (accessed 21 April 2020).

[23] English colonization of America. URL: https://ru.wikipedia.org/wiki/Английская_колонизация_Америки (accessed 21 April 2020).

about the northwestern half of North America, called Russian America. Major geographical discoveries of the 18th century in North America were made by Russian sailors [4, Zubov N.N.]. "Only thanks to the exploits of Russian explorers of the 17th century (most of whom, by the way, came from the basins of the Northern Dvina and Onega), Bering's voyages of the 18th century and further expansion to America of the Russian Empire, followed by the expansion of Britain and Spain, and then the USA became possible" [6, Shmakin V.B., p. 324].

Fig. 3. Grigoriy Shelikhov [24].

Entrepreneur G.I. Shelikhov (1749–1795) together with the merchant I.I. Golikov (1735–1805) founded the North-Eastern Company in 1781. Its mission was to explore and develop new lands and industries on the North American continent, expanding the possessions of the Russian Empire. The expedition of G.I. Shelikhov in 1783 set off from Okhotsk to the shores of North America and arrived in the summer of 1784 on Kodiak Island, where he lived for about two years [3, pp. 73–84]. In 1787, G. Shelikhov returned to Russia. Together with their companion, I. Golikov, they reported to Catherine II the results of their research and work, as well as their project of a monopoly private company for the further development of Russian America, but were refused [3, p. 87]. G.I. Shelikhov understood that real development, raising the culture and wealth of the Aleutian Islands, nearby regions of North America, is possible only on the basis of permanent Russian settlements and establishing relations with local residents there [3, p. 82]. The main reason that drew many Russian industrialists on difficult and dangerous voyages to the Commander and Aleutian Islands was the hope for rapid enrichment [4, p. 219].

On August 15, 1790, in the port city of Okhotsk, a successful fur trader, founder and owner of the North-East Company "Grigorey Ivanov, son Shelikhov, a noble citizen of Ryol, and Alexander Andreyev, son Baranov, a merchant of Kargopol, a guest from Irkutsk" signed an agreement. It clearly stipulated the division of shares into 210 parts, depending on fishing, exchange, purchase of goods, "in soft loot or other goods". There should be 192 people in the company, excluding seamen and others. Baranov was obliged to follow the instructions only from the governments and his companion Shelikhov, "I am not obliged to follow anyone else's instructions and have

[24] URL: https://historylost.ru/wp-content/uploads/2018/09/Alaska-Purchase-07.jpg (accessed 21 April 2021).

nothing to do with me". In general, A.A. Baranov, as the main ruler in America, "as the head of the American coast and settlements, at the disposal and management of the North-Eastern Company" received large powers to manage and organize all the life in the American land and islands [25].

After the mysterious death of Grigoriy Shelikhov on July 20, 1795, his cousin Ivan Shelikhov and widow Natalia Shelikhova managed the affairs of the North-Eastern Company. G.I. Shelikhov made an extremely important step in strengthening the family, having married his eldest daughter Anna in January 1795 to N.P. Rezanov, who launched an active support to the Shelikhovs in the late 1790s. In 1797, M.M. Buldakov became the husband of Avdotya Shelikhova. He was one of the richest and most famous fur dealers, who later played a prominent role in the affairs of the Russian-American Company [3, p. 98].

A.A. Baranov founded the Archangel Michael redoubt at the mouth of Starrigavan Bay in 1799. After the war with the Tlingit in 1802–1804, the settlement was moved to a strategically more convenient place, was named Novo-Arkhangelsk and became the main city of Russian America since 1808, from 1867 — Sitka. According to the English sailor Peter Korney, who visited these places in the 1810s, Novo-Arkhangelsk consisted of a fort on a mountain and a settlement of 60 wooden houses, as well as a church, a blockhouse, and a shipyard. Each house had a vegetable garden with potatoes, carrots, radishes, turnips and other vegetables [26].

Fig. 4. Novo-Arkhangelsk. Drawing by I.G. Voznesenskiy (1839–1849).

The North-Eastern Company was transformed into the Russian-American Company (RAC) by decree of Emperor Paul I of July 8 (19), 1799. According to A.S. Grinev, the combination of the interests of national entrepreneurs and the tsarist bureaucracy resulted in their symbiosis in the form of the RAC. Although formally the company was a private organization, in reality it was a kind of branch of the state apparatus and existed under strict government control. The "nationalization" of the RAC was also manifested in the ease of receiving government loans for hundreds of thousands of rubles by this seemingly private company received. In 1802, for example, the treasury gave the company 200 thousand rubles, in 1803 —150 thousand rubles more [3, Bolkhovitinov

[25] August 15, 1790. From the agreement between G.I. Shelikhov and Kargopol merchant A.A. Baranov on the terms of cooperation in the Northeast American Company. URL: http://www.vostlit.info/Texts/ Dokumenty/Reisen/XVIII/1740-1760/Issl_russ_tich_ok_XVIII/81-100/92.phtml?id=3892 (accessed 21 April 2021).

[26] Novo-Arkhangelsk. URL: https://ru.wikipedia.org/wiki/Ново-Архангельск (accessed 21 April 2021).

N.N., vol.2, pp. 230–231]. It is also very symbolic that the RAC was granted a special flag in 1806, repeating the colors of the national one, with a double-headed royal eagle [27]. The special status of the RAC is also shown by the company's numerous privileges and the possibility to inform the Emperor about its problems directly. The RAC of the 19th century can be compared in this sense with PJSC Gazprom or Rosneft in modern Russia of the 21st century.

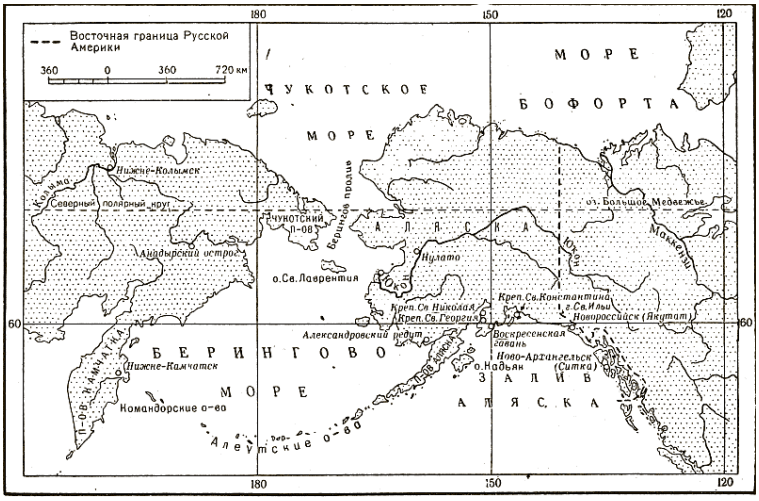

Fig. 5. Possessions of the RAC in North America under the agreements of 1824 and 1825 [28].

The sea fur trade constantly motivated the Russians to move further and further along the coast of the New World, looking for new places for their economic activities. The advance of the Russians went along the coast to the west and south, including Alaska, the Aleutian Islands, settlements in California, the Hawaiian, Kuril and Commander Islands. Russian settlements in North America often experienced an acute need for bread and salt, weapons and gunpowder, as trades were impossible without it. The supply of food and goods to the settlements of the Russian-American Company, the delivery of tools and equipment for the ships being built in Okhotsk and in Russian America, were extremely difficult. Everything needed was carried on carts through Siberia; thousands of horses were required, the journey lasted about a year, and sometimes more [4, Zubov N.N.]. Developing trade with entrepreneurs from the USA, A.A. Baranov managed to establish a food supply, but the problem of the lack of bread was still not resolved.

The history of Russian America development is difficult to understand without analyzing the relationship between Russians and the indigenous population. Although Russia's possessions in the New World bore the proud name of “Russian America”, the Russians themselves were always a minority, even in their own colonies. The first group of the local population consisted of the Aleuts and Eskimos of South Alaska (Kodiaks, Alaskans and Chugachs), as well as the Tanaina Indians, dependent on the company and living under the control of Russian military-trading and

[27] Po Vysochayshemu poveleniyu ob utverzhdenii risunka flaga dlya Rossiysko-Amerikanskoy Kompanii. Fond departamenta ministra kommertsii [By the Highest command to approve the design of the flag for the Russian-American Company. Fund of the Department of the Minister of Commerce]. Prezidentskaya biblioteka imeni V.N. El'tsina [Presidential Library named after V.N. Yeltsin]. URL: https://www.prlib. ru/node/678424 (accessed 13 April 2021).
[28] URL: https://e-libra.su/files/books/2019/03/02/532296/i_045png.jpg (accessed 22 April 2021).

administrative-economic settlements or directly in them. The second group included the Eskimos Aglegmuts and various Indian tribes: Atna, Eyaks (Ugalakhmuts or Ugalentsy) and Tlingits, not dependent on the RAC. The company traded with those who lived on the border of Russian-controlled territory, took amanata as hostages for the security of its workers, and hired them as volunteers for work at the earliest opportunity. At the very bottom of the social ladder were the so-called "kayurs" or "servants of the Aleuts" (regardless of ethnic origin), the most powerless part of the population [3, Bolkhovitinov N.N., vol. 2, pp. 236–237].

In the life of the Alaska and Aleutian aborigines there have always been tribal wars and blood feuds, mutual trade and cultural exchange. The Indians called themselves "Tlinkit" (Tlingit, Lingit, Klinkit), meaning "person, people". In Russian sources, the Tlingit, as a rule, were denoted by the word "koloshi" with the stressing on the first syllable [5, pp. 21–22]. The economy of the Tlingits was based on fishing, an emerging craft. Men made tools, utensils, boats, weapons; women weaved capes, baskets, mats and hats, sewed clothes. Exchange of goods and material culture developed. Military confrontations and frequent wars played an important role in Tlingit life. In full armor, the Tlingit warrior resembled a medieval European knight [5, pp. 31–42, 66–67].

Tlingit religious ideology was a complex of totemism, animalism, fetishism, magic, animism, and shamanism. A special place in this complex was occupied by totemism — a belief in a supernatural link that seems to exist between a group of people and a certain kind of animal, an object or a model [5, pp. 73–74]. A brochure of the Sitka Historical Museum (2018) noted several types of totem poles — monumental sculptures carved from huge trees. One of them depicted a supernatural Beaver, who, according to the legend, killed the leader of the clan with the help of a miraculous bow and destroyed the village with a blow of his tail. The tomb totem pole of the Chukanedi family contains the ashes of Dahuket, one of the Indian leaders [29].

War with the Tlingit, 1802–1804

The causes of the war with the Tlingits were, according to A.V. Grinev, first of all, a clash of economic interests between the Indians and the RAC, which launched an intensive fishery. This encouraged the Tlingit to protect their fishing grounds. The dissatisfaction of the Indians was caused by the dismissive attitude of some Russian industrialists towards them. Aleut port men plundered Indian burial grounds. The Tlingit themselves would not mind plundering the Mikhailovskaya fortress. Another reason was considered to be the instigation of the English-American sea merchants — RAC competitors [5, pp. 118–120]. Forming the hostility of the Tlingit to the Russians, the English-American competitors of the RAC pursued, first of all, their economic interests. The strengthening of the Russian presence threatened them with a decrease in profits.

[29] Sitka National Historical Park. URL: http://thebillbeaverproject.com/2018/08/04/sitka-national-historical-park/; https://www.nationalparks.org/connect/explore-parks/sitka-natio-nal-historical-park (accessed 21 April 2021).

In 1802–1804, there was an armed conflict between the Tlingit and Russian fur hunters, their Aleut allies, known as the "Battle of Sitka". The reason was the RAC's desire to create its outpost in the southeast of Alaska. Under the leadership of A.A. Baranov, the manager of the company, a group of Russians and Alaska Natives built the St. Michael redoubt near Starrigavan Bay in 1799. The powerful leaders of the Kix.adi Indian clan began to resent this Russian invasion. The Sitka National Historical Park comments on the location of this battle with the phrase "Who Will Control These Lands?", explaining everything by Russian expansion [30].

Fig. 6. Catlian. Modern reconstruction. From the Sitka National Historical Park collection.

In 1802, the Tlingits, in helmets and with animal-headed armor, headed by their leader Katlian, attacked the settlement of Starrigavan. Most of the Russians and the Aleuts who defended it were killed. Terrible armor and invulnerability to rifle fire then made an impression on the Russians. A description of the horrible slaughter on July 27, 1802 in the captured Russian fort is given in a letter from Ambrosiy Plotnikov, which was later found in the office of the Russian-American Company: "I saw one of our people jump out of the window of one of the burning buildings, but was seized by the savages' knives and thrown back into the fire. I saw how they cut off the head of another person and threw the headless body into the fire." [31] The captured Russians were rescued by the approaching British ships. Alfred Peter Swineford (1836–1909) wrote about this in his book Alaska: Its History, Climate and Natural Resources (1898), the fourth chapter of which was devoted to the activities of A.A. Baranov, war of 1802–1804, and other events [8, pp. 37–55].

After the Indians drove the Russians out of Sitka in 1802, the Tlingit shaman Stoonookw predicted that the Russians would return. He urged the clans to build a new fortification, strong enough to withstand cannon fire. The Tlingit chose the area near the river for their new fort, because it was close to food and fresh water, but out of range of naval artillery. Russian ships ap-

[30] Sitka National Historical Park. URL: http://thebillbeaverproject.com/2018/08/04/sitka-national-historical-park/; https://www.nationalparks.org/connect/explore-parks/sitka-natio-nal-historical-park (accessed 21 April 2021).
[31] Russian America: The attack at Old Sitka. URL: https://sitka.com/news/? page_id=42 (accessed 21 April 2021).

peared at the mouth of the Indian River (Kaasda Heen) on September 28, 1804. The siege and several days of bombardment began. The Russian troops bravely came ashore in a frontal attack on the Fort Shis'qi Noow on October 1, 1804. The Tlingit managed to hold it. Hiding behind floating logs, the Kix.adi warriors counterattacked. Russian troops retreated into a siege to their ships. Neither the bombardment of the Tlingit fort, nor the attack on the fort caused them significant damage. Leader of Katlian penetrated the Russian camp several times and crushed everything with his war hammer. Two fatal events worked against the Tlingit — the unexpected arrival of the Russian frigate Neva and the loss of a canoe carrying their reserve ammunition and the most hardened warriors just before the battle. The Tlinglits fired on Russian ships with their cannons (falconets). The Neva ship, which had arrived, returned fire in heavy force, causing considerable damage to the Indians.

A painting from the Sitka National Historical Park brochure depicts a battle scene at the mouth of the Indian River (Fig. 8). In the foreground, Tlingit warriors are armed with long guns and spears. Some had protective wooden battle helmets and a thick wooden chest shield. The sturdy log wall in the right corner is part of a new fort built by the Tlingit for this battle. The leader of the battle, Catlian, wore a raven war helmet and gray fur around his bare torso. His weapon is a blacksmith's hammer, which he holds vertically in a striking position along with his other hand, leading a group of warriors onto the battlefield. It is raining arrows from the Aleuts. Behind them one can see the Sitka Strait with Russian ships and a stream of small canoes, accommodating one person at a time, and a mountain range.

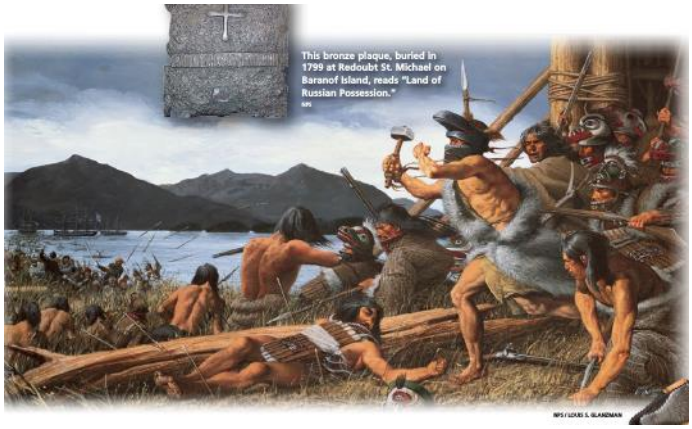

Fig. 7. Battle with the Tlingit. Brochure at Sitka National Historical Park.

After a few days of defense, the Kix.adi Indians themselves left the fort and moved north to the strait. They established a trade blockade while continuing to hunt, fish and gather wild food in and around Sitka. The Battle of Sitka ended open Tlingit resistance, but the Russians were safe only as long as they were vigilant. A.A. Baranov personally survived several assassination attempts by local residents, defending himself with chain mail, which he constantly wore under his clothes.

The Russian-American company headed by A.A. Baranov returned after the war of 1802–1804. Sitka Island, where Novo-Arkhangelsk was founded as a permanent settlement, named after

the ancient city of Arkhangelsk at the mouth of the Northern Dvina, leading its history from the Mikhailo-Arkhangelsk Monastery from the end of the 14th century. In 1808, Sitka was declared the capital of Russian America. In 1821, the Russians invited the Tlingits back to Sitka (Tlingit-Sitka National Historical Park).

On the missionary work of Herman of Alaska

During the reign of A.A. Baranov and later, new settlements were being built in Russian America; industrial and craft production, culture, and religion were developing. The empress Catherine II took control over education in Alaska. In 1794–1796, the first Orthodox Church, the Cathedral of the Resurrection, was built on Kodiak Island. Hieromonks began to travel from island to island, preaching and baptising the Aleuts. In 1793, the monk Herman (secular name — Yegor Ivanovich Popov) began missionary work as part of the Kodiak spiritual mission (1751–1836). He was tonsured a monk on Valaam on October 22, 1782. From 1807, Father Herman became the de facto head of the Kadiak Mission, enduring the hard conditions of life, and continuing to tirelessly baptize, educate and protect the local population.

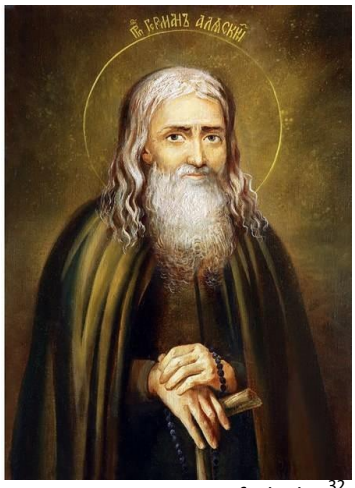

Fig. 8. Saint Herman of Alaska [32].

He expressed his duty with the words: “I am the lowest servant and a nurse of the local people” [9, pp. 14–15]. In the period of 1811–1817, in search of solitude, Father Herman moved to the deserted island of Spruce, calling his monastery New Valaam, doing prayer and housekeeping. A school for the Aleutian orphans was set up, where Father Herman taught them the law of God and church singing. All over the islands, there was a rumor about his holy life and miracles through his prayers. He was adored by both Russians and Aleuts. The Monk Herman spent more than 30 years on the island, and the flame of the Orthodox faith in North America began to flare up brighter and brighter [9, pp. 16–25].

During the reign of Baranov, Orthodoxy was accepted by more than nine thousand local residents. Church ministers contributed greatly to the spread of literacy among Alaska natives [33].

[32] Saint Herman of Alaska. URL: http://img. biografik.ru/ images/...jpg (accessed 13 April 2021).

Many Alaskan natives today still have Russian surnames, honor their Russian ancestry, and remain faithful to the Russian Orthodox Church, the only public institution left from the period preceding 1867. In the 1960s, membership in indigenous associations required issues of affiliation to this status to be resolved. It was resolved by means of Orthodox Church records [10, R. Pierce, pp. 12–15]. Several old Russian settlements in Alaska, where the churches of the Russian Orthodox Church existed from the end of the 18th century till 1867, disappeared over time.

Three assessments of nature of Russian colonization, N.P. Rezanov's RAC modernization plan

There are at least three assessments of the nature of Russian colonization. According to one of them, *Russian colonization was milder and more progressive with regard to the native population than Spanish, English or American colonization*, and among the methods of exploitation of the natives, the capitalist system of free hire and unequivalent trade exchange prevailed [3, vol. 1, p. 115] [34]. Free Aleuts and Tlingits received beads, necklaces, various kinds of clothing and tobacco for the furs harvested in the offshore fishery at very high prices, compared with the low rates for furs. The goods offered to the Tlingit were quite expensive due to the chronic shortage of European manufactured goods in the Russian colonies, which, in turn, was the result of irregular supply, high transport costs and abuses of officials responsible for supplying the necessary goods to Russian settlements Alaska. Goods, offered to the Indians, were also bought by the Russians on British or American ships. American skippers sold guns and even light cannons to the Tlingit [5, pp. 112–114]. At the same time, "*Never and nowhere did the Russians, when communicating with the natives, emphasize any superiority of the white race. This is absolutely not characteristic of the historically developed character of the Russian people*", N.N. Zubov believed [4, p. 133].

Secondly, *the Russian colonization of the North-West of America, as well as the colonization of the English, Spanish or French*, according to the RAS academician N.N. Bolkhovitinov, *was inextricably linked to violence, deception and exploitation of indigenous people* [3, vol. 1, p. 22]. Methods of forced labor varied from the development of new needs among the natives, free employment and economic enslavement. A very effective means of reconciliation and subjugation of the indigenous population was the practice of taking hostages. As a punishment they transferred to the lowest rank, and those who committed serious crimes were severely beaten and driven "through the ranks". For the Aleuts and Kodiaks, this was such a shameful punishment that those who endured it often committed suicide. Such a case, for example, was mentioned in one of Bara-

[33] Russian America: An Annotated Literature Index. URL: https://www.booksite.ru/fulltext/russ_america/01.html (accessed 13 April 2021).

[34] A.V. Grinev created more than 215 publications, including "Tlingit Indians in the period of Russian America (1741–1867)". Novosibirsk, Nauka, 1991. 318 p.; "The Tlingit Indians in Russian America, 1741–1867". Lincoln, Nebraska University Press, 2005. 386 p.; "Alaska under the wing of a double-headed eagle (Russian colonization of the New World in the context of national and world history)". Moscow, Academia, 2016, 2018 (2nd ed.). 590 p.; "Russian Colonization of Alaska: Preconditions, Discovery and Initial Development, 1741–1799". Lincoln, Nebraska, University of Nebraska Press, 2018. 328 p.

nov's letters, which spoke of the punishment of two mushers for the murder of the industrialist Dmitriev in 1794. The concentration of industrialists and natives in permanent Russian settlements depleted the flora and fauna in the area. This often caused starvation and exacerbated the already intractable problem of food supply for the Russian colonies in America. "We don't need gold here as much as we need provisions", Baranov wrote to the owners of his company [3, vol. 1, pp. 116–117]. In order to provide themselves with the necessary supplies of food and furs, the Russians deprived the natives of part of their fishing grounds. The dispersed settlement of aborigines, which provided a relatively uniform load on natural resources, was disrupted after the arrival of the Russians.

The third assessment of the RAC activities was to recognize the fact that *Russia actually laid the foundation for the economy in Alaska*. "The best that can be said in defence of colonial rule is that it introduced the local population to the modern world. In fulfilling this function, the Russian colonial regime was in many respects softer than other colonial regimes in the New World or elsewhere" [10, Pierce R., pp. 12–15]. Professor of History Richard Austin Pierce (1918–2004) contributed to the publication of more than 60 volumes of Alaskan history as an author, translator, editor, and publisher and was considered one of the leading authorities in Russian America [35]. In his report at the Alaska History Conference in Anchorage on the 100th anniversary of the purchase of Alaska by the United States (1867–1967), he stated that Russia had laid the foundation for the Alaskan economy. Its settlers made the first successful attempts to develop agriculture, began exploiting forest and fish resources. Geologists undertook the exploration of mineral resources, especially coal, which was mined on the Kenai Peninsula. Fur production was carried out from the early days of Russian domination and played a significant role in world markets. In the last period of Russian history, measures were taken to protect fur resources. In addition, shipping traffic was developed along the north-west coast of America, transport links were established between distant Russian factories and other settlements and commercial relations established with Victoria, San Francisco and other centres [10, Pierce R., pp. 12–15].

P. Peirce believed that it was not difficult to show that Russian America deserved the best historical assessment. Hundreds of Russian geographical names are preserved on the map of Alaska, and one need only look at the maps of G.A. Sarycheva, I.F. Vasilyeva, M.D. Tebenkova, A.F. Kashevarov and others to see that the winding coastline of Alaska was well known to Russian navigators. Russian maps of Alaska after 1867 became the basis for American maps. Knowledge about Russian America is of practical value to this day. They are significant in border issues, the problems of seal hunting on the high seas, in matters of citizenship, the legal regulation of hunting and fishing of Alaska natives. Modern ethnographers and ethnohistorians regard the ship logs and docu-

[35] Richard Pierce (historian). URL: https://ru.qaz.wiki/wiki/Richard_Pierce_%28historian%29 (accessed 13 April 2021).

ments of the Russian period as invaluable historical information about the Alaskan Native culture at the time of the first contacts with Europeans. [10, Pierce R., pp. 12–15].

N.P. Rezanov's RAC modernization plan

The modernization policy of the Russian-American Company is represented by secret instructions of the diplomat, traveller, count N.P. Rezanov (1764–1807), who, together with his father-in-law, industrialist and merchant G.I. Shelikhov, was at the origin of RAC, spoke five European languages and was the first official Russian ambassador to Japan.

Fig. 10. N.P. Rezanov.

N.P. Rezanov had drafted a set of secret instructions for A.A. Baranov in July 1806, shortly before his untimely death [36]. He recommended improving shipbuilding and crew training, establishing an agricultural colony in the new Albion (Northern California), creating a permanent Russian population, introducing a regional currency, and building schools and medical facilities. In terms of its content, in fact, it was a plan or a brief socio-economic program for the modernization of all Russian America, which logically followed from the mission of the RAC itself, which combined the functions of state administration in the territories of North America with private initiative, entrepreneurship, traditional trade and fishing functions and the creation of an appropriate infrastructure.

N.P. Rezanov, going from the Far East to St. Petersburg, caught a cold on the way, died and was buried on March 13, 1807 in Krasnoyarsk at the cemetery at the Resurrection Cathedral [37]. In 2000, at the site of the alleged reburial of the commander, the main character of the rock opera "Juno and Avos", a marble cross was set up with the inscription: "Kamerger Nikolay Petrovich Rezanov. 1764–1807. I will never see you again", and below: "Maria de la Concepción Marcela Argüello. 1791–1857. I will never forget you". The sheriff of Monterey scattered a handful of earth

[36] A copy of secret instructions by Nikolai Rezanov for Alexander Baranov (left before Rezanov left America). Novoarkhangelsk, July 20, 1807. Meeting of Frontiers: Collection of Gennady Vasilyevich Yudin. Papers of the Russian-American Company. URL: https://memory.loc.gov/intldl/ mtfhtml/mfdigcol/lists/mtfyumTitles3.html (accessed 17 July 2020).

[37] Monument to Commander Rezanov. URL: https://igfn.livejournal.com/47032.html (accessed 11 April 2021).

from Conchita's grave over the grave. He took back a handful of Krasnoyarsk earth to scatter over her grave.

In Alaska, public libraries, schools and hospitals, and nursing homes for the elderly were opened. The first Russian school was opened on Kodiak Island in 1784–1786 on the orders of G. Shelikhov. In 1805, it was transformed into a school by order of N. Rezanov. Many books, magazines and paintings were delivered from St. Petersburg to the library on Kodiak. Teenagers at school were taught not only Russian, but also French, not only crafts, but also geography and mathematics. The RAC inventory of 1815 listed the main territories, buildings, population and capital under the control of the Russian-American Company, including settlements on Kodiak Island, in Novoarkhangelsk, Fort Ross in California, and also an island that was supposed to be bought from the King of Hawaii [38]. A popular song in Alaska was the hymn "Mind of Russia has started a trade, free Russians on the seas, to explore places, to seek benefits", composed by A.A. Baranov long before the appearance of "God Save the Tsar" [39].

In the archive list of the number of Russians and natives born in America and the islands by Russian and native women, who are in the service of the RAC, there were listed 645 people in 1818 (491 men and 154 women). The number of local residents is determined at 8448 people. Most of the autonomous Russian population (80%) were engaged in administration, defence and service to ships, and the fur trade itself was dealt with by quite a limited number of people [3, vol. 2, p. 430]. Russian people, crossed the ocean, thoroughly settled in the New North. Sailors brought breadfruit from Oceania to Novoarkhangelsk. Spanish silver rang in Alaska, women baked bread from Californian flour, men drank rum and wine from Chile and Peru, smoked tobacco from the West Indies. In California, the Russian fort Ross, founded by Ivan Kuskov, flaunted, and his people walked upstream the rivers that flowed into the Gulf of St. Francis. Strong ties were established even with the Hawaiian Islands, King Tamehamea I presented Baranov with a piece of fertile land [1, p. 16].

In Russian America, high-tech shipyards and agricultural production, brick and iron foundries functioned, coal mining was organized, modular wooden houses were made for transportation to other regions [40]. In the 18th–19th centuries, different wooden buildings, which had a lot in common with the buildings of the Russian North, were characteristic not only for the white settlers, but also for the Indian tribes that lived in these places. Sedentary fishing Indian tribes, for

[38] Inventory of the Russian-American Company, 1815. Meeting of Frontiers: Collection of Gennady Vasilyevich Yudin. Papers of the Russian-American Company. URL: https://memory.loc.gov/intldl/mtfhtml/mfdigcol/lists/mtfyumTitles3.html (accessed 17 July 2020).

[39] Sukhanovskaya T. Kol'chuga Baranova. V Kargopole otkroetsya muzey pervogo gubernatora Alyaski [Baranov's chain mail. A museum of the first governor of Alaska will open in Kargopol]. Rossiyskaya gazeta – Nedelya – Severo-Zapad [Rossiyskaya Gazeta - Nedelya - North-West], no. 16 (7479). URL: http://rusnord.ru/public/40344-v-kargopole-otkroetsya-muzey-pervogo-gubernatora-alyaski.html (accessed 06 February 2021).

[40] Posol RF v SShA ogorchen resheniem o demontazhe pamyatnika Aleksandru Baranovu [The Russian Ambassador to the United States is upset by the decision to dismantle the monument to Alexander Baranov]. URL: https://www.interfax.ru/world/717566 (accessed 06 February 2021).

example, built dwellings that resembled log huts. In Russian America, the RAC signs were in circulation — banknotes that were made of leather, dyed in various colors according to the denomination, with the RAC stamp on one side and the denomination on the other [5, p. 293]. To carry out the "sea animal" fishing, connections with neighbouring countries and metropolis, the Russian-American Company built and bought 32 vessels, spending 3.3 million rubles on this. Of the 13 ships, remaining by 1818, 5 were built in the colonies themselves, 4 were bought from the "Bostonians", the brig "Finland" was built in Okhotsk, the American ship "Kutuzov" was bought in France, and 2 more American ships were purchased in Kronstadt — "Suvorov" and "Rurik". In general, for 1797–1818, the company gained 16 376 695 rubles from the fishing of furs, walrus bones, whalebones, etc. or 818 835 rubles per year [3, vol. 2, pp. 430–431].

The Decembrists were at the origin of the idea to develop virgin transoceanic lands. Kondraty Ryleyev was the governor of the main board office of the Russian-American Company. In 1822, Mikhail Kuchelbecker travelled to Russian America; Nikolai Bestuzhev, Zavalishin, Pestel took an active part in its fate and affairs. It is no coincidence that the Tsar Nicolas I, when questioning the member of the rebellion Orest Somov, who also took part in the RAC affairs, jealously said: "It's good that you created a company there" [1, p. 19, 24, 36].

The energetic Russian leader, who established schools in Russian America, erected fortresses, built shipyards and launched Russian ships, admired A.S. Pushkin. When A.A. Baranov, who had many enemies in cruel Russia of Nicholas, was removed by slanderous libel from his post, remained in poverty and died on the way back to Russia, was buried in the water, Pushkin wrote in his Kishinev diary: "Baranov died. It's a pity for an honest citizen, a smart person" [11, p. 306]. M.V. Lomonosov has such lines: "The Columbuses of Russia, despising gloomy fate. Between the ices, a new path will be opened to the east. And our power will reach America" [12, p. 703]. Baranov A.A. and Shelikhov G.I. undoubtedly belong to the number of such discoverers.

Robin Joy Wellman, an employee of Fort Ross State Historical Park, Alaska, using literature and a number of documents, presented his vision of Baranov's personal qualities as a man, leader and nobleman, his role in the history of Russian America and Fort Ross. He noted the significance of the name of Arkhangelsk for Russian America. R. Wellman assessed Baranov as a benefactor, sometimes ruthless, who faced great difficulties, lack of RAC support, became a real loner, his own leader, could not rely on anyone, was even deprived of decent food. "He gained the respect of the natives for the most part, depended on them when hard times came, and he soon became dependent on the children who grew up around him, the Creoles" [6, pp. 332–335].

Novo-Arkhangelsk had a serviceable arsenal, observatory, library, 2 hospitals, sawmill, watermill, club house, pier on a stone foundation, 3 barracks for single and married workers and military seamen. The RAC had 8 ships, including a steamer with fourteen cannons for the straits. Outside and inside the fortress, even while eating or sleeping, each of his team had to carry a gun with

him. And when everyone was drinking, A. Baranov used to say: “drink, but know your business” and suddenly announced the alarm [13, pp. 53–56].

S.N. Markov wrote that Baranov was sometimes heavy-handed. Under his leadership, “on the hardened land and on the islands” of America, there were about two hundred Russian industrialists and a thousand Creoles — people born from mixed marriages with Indians, Aleuts and Eskimos. Among these subordinates were those who “were matured in barbaric cruel customs”, and they had to be “warned and brought to knowledge” on occasion. Along with the industrialists, “violent seekers of easy money and adventures penetrated the Aleutian and Kuril Islands, for whom “gunpowder and vodka” were the only means of their communication with the locals. They did not recognize any power over themselves [4, p. 125]. A well-known fact is that a group of disgruntled colonists, led by the exiled convict Vasiliy Naplakov and the convict's son Ivan Popov, organized a secret society in Novo-Arkhangelsk with the intention of killing Governor A. Baranov, seizing the ship and taking away all the women colonies on the islands of the South Sea to create their own republic in 1809. Upon learning of the conspiracy, Baranov investigated the case and sent the five most culpable men to Kamchatka for prosecution [41].

During the years of his reign, A.A. Baranov made a lot of dissatisfied not only among the local population, but also among American, British, Russian merchants and industrialists. Defending the interests of Russia, he practically competed with the interests of the American, British and Spanish governments. There were permanent conflict situations with high-ranking shareholders and members of the board within the RAC itself.

In November 1817, Lieutenant Commander L.A. Gagemeister (1780−1833), commander of the RAC ship “Kutuzov”, arrived in Alaska. After analyzing the activities of A.A. Baranov, he dismissed him in January 1918. However, during the official verification, A.A. Baranov’s abuses were not identified. On the contrary, his disinterestedness was noted. Instead of 4.6 million, the balance of the RAC amounted of 6.8 million rubles. At the same time, for some reason, there is no correspondence of A.A. Baranov for 1803–1817. [14, pp. 212–216].

A.A. Baranov was not a saint, perfect ruler of Alaska in every respect. He consistently acted in the interests of Russia, managing the RAC, not for his own enrichment. The fate of A.A. Baranov and his second family is tragic. A.A. Baranov, after his resignation, was forced to leave Sitka and to go to St. Petersburg. However, it was not the usual overland route via Siberia, but a long sea voyage from Sitka to Kronstadt via Pacific and Indian oceans around the Cape of Good Hope. During the transition, A.A. Baranov fell ill and died in April 1819. His body was lowered into the abyss of the sea. There is no grave of Alexander Baranov left on Earth. After this, the life and fate of his second wife Anna Grigoryevna and their children turned out to be unhappy and short. His son Antip-

[41] Remarks on criminals: Naplavkov, Popov and their accomplices. 1809. Copies of correspondence with Nikolai Rezanov before his departure on a trip around the world). Meeting of Frontiers: Collection of Gennady Vasilyevich Yudin. RAC papers. URL: https://memory.loc.gov/intldl/ mtfhtml/mfdigcol/lists/mtfyumTitles3.html (accessed 17 July 2020).

ater died on March 8, 1822 (1797–1822). After his death, the 200 roubles a year pension he had obtained for his mother, was abolished by another governor of the RAC, M.I. Muravyov [42]. Anna Grigoryevna died in 1823 in the monastery, having outlived her son by only a year. Irina (1802–1824), the daughter of Alexander and Anna Baranovs, died soon after. There is not enough information about another daughter Catherine (1808–?). It is not clear where and how the will and other documents of A.A. Baranov disappeared. His family found themselves without acquired capital and largely depended on RAC charity.

Russian sale of Alaska to the United States

History was, is and remains a subject of geopolitical struggle, shaping public opinion even in the 21st century. One of the speculations in society was the issue of the sale of Alaska, quite well researched by now. Covering the history of Russian Alaska, it is necessary to touch upon it, at least very briefly, in this article to understand the historical meaning of the relationship between Russia and the USA in the 19th century, to show not only the beginning, but also the end of Russian Alaska. The Russian-American Convention, which regulated relations between Russia and the United States on the American continent, was concluded on April 5/17, 1824. A similar convention between Russia and Great Britain dates back to February 16/28, 1825. Both agreements determined the boundaries of Russian possessions and became the first international acts establishing Russia's ownership of both the Aleutian Islands and part of the territory on the American mainland [43]. RAC activities on the eve of the sale of Alaska to the United States in 1858–1867 are analyzed by A.Yu. Petrov [44]. With his participation, the circumstances of the sale of Alaska were publicly discussed on September 09, 2018 [45].

Alaska was sold as a result of a deal between the governments of the Russian Empire and the United States in 1867 for $7.2 million in gold. The signing of the treaty took place in Washington on March 18/30, 1867. Emperor Alexander II signed the treaty on May 3 (15), 1867, and the Senate adopted a decree on the execution of the treaty on October 6 (18), 1867. Together with a territory of 1 million 519 thousand sq. km of the USA, all real estate, all colonial archives, official and historical documents were transferred. Residents of these territories received the right to re-

[42] Antipatr Aleksandrovich Baranov – syn Glavnogo pravitelya Russkoy Ameriki [Antipater Aleksandrovich Baranov is the son of the Chief Ruler of Russian America]. URL: https://odynokiy.livejournal.com/1922245.html (accessed 12 July 2020).
[43] O prodazhe rossiyskikh severoamerikanskikh koloniy SShA [On the sale of Russian North American colonies to the United States]. URL: https://idd.mid.ru/o-prodaze-rossijskih-severoamerikanskih-kolonij-ssa (accessed 22 April 2021).
[44] Petrov A.Yu. Deyatel'nost' Rossiysko-Amerikanskoy Kompanii nakanune prodazhi Alyaski SShA. 1858–1867 gg. [The activities of the Russian-American Company on the eve of the sale of Alaska to the United States]. URL: https://america-xix.ru/library/petrov-rac-before-sale/ (accessed 19 July 2021).
[45] Kto prodal Alyasku. Alyaska. Tayny sdelki veka [Who sold Alaska. Alaska. Secrets of the deal of the century]. URL: https://historylost.ru/2018/09/08/alaska-purchase/ (accessed 20 July 2021).

turn to Russia within 3 years or, if desired, remain in the United States [46]. The Russian flag was lowered in Novo-Arkhangelsk.

It is important to clarify that the decision to allocate $ 7.2 million provided for by the agreement was made by the House of Representatives of the US Congress only a year later, on July 14, 1868 (113 — "for", 43 — "against" and 44 congressmen did not take part in the voting). On July 15, a warrant was issued to receive the money, and on August 1, 1868, the Russian envoy in Washington, Baron Eduard Stöckl, left a receipt in the treasury stating that he had received the entire amount. He instructed Riggs Bank to transfer $7.035 million to Baring Brothers & Co., a London-based bank. The "missing" 165 thousand were spent by him in the USA. A telegram to St. Petersburg with the news of the conclusion of the agreement cost 10 thousand, 26 thousand was received by the lawyer of the Russian mission, Robert Walker, 21 thousand was the royal award for concluding the agreement to Stokl and another employee of the mission, Vladimir Bodisko. The rest of the money, according to the researchers, Stöckl spent on bribing journalists and congressmen. At least, such a conclusion can be drawn from the instructions of Alexander II to credit the funds spent by the envoy for "the use known to His Imperial Majesty" as a real expense. Such a formulation usually accompanied expenses of a secret and sensitive nature, which included bribes. The same money (7.035 million) that reached London was then spent on the purchase of steam locomotives and other property for the Russian railways [47].

When deciding to sell Alaska to the United States, the Russian government was guided not only by financial, but also by geopolitical considerations. It was argued that the transfer of the colonies would relieve possession, which in case of a war with one of the maritime powers, Russia could not fully protect, that the treaty would help strengthen the alliance between Russia and the United States, etc.

Conclusion

History has always been and will remain the subject of constant discussion at all times and in any society. Today, history is increasingly transforming into politics, acquiring geopolitical meaning. For sober-minded people, it is an axiom that time cannot be turned back. History, unlike politics, cannot be changed, no matter what you do today: demolish monuments in the United States, as was done in 2020, distort facts about the role of the USSR in the Great Victory of 1945, and invent other historical fakes. No one in this world will ever stop the ships of Christopher Columbus going to America in the past, will not change the activities of A.A. Baranov, as the main ruler of Russian settlements in America.

[46] Russo-American Treaty of 1867. URL: http://www.hrono.ru/dokum/ 1800dok/1867alyaska.php (accessed 22 April 2021).
[47] Istoriya Russkoy Ameriki: v 3-kh tomakh [History of Russian America: in 3 volumes]. Moscow, 1999, vol. 3, pp. 425–488, with additions from other sources. URL: https://america-xix.ru/russkie/sale-alaska.html (accessed 14 April 2021).

The connection of the past and present in relation to the development of Russian Alaska and the famous historical figure A.A. Baranov highlighted the most difficult problem of an ambiguous attitude to the historical past from the standpoint of the US politics and modern geopolitics. The political process of the destruction of monuments in the United States under the onslaught of the Black Lives Matter movement has quite expectedly reached Alaska. The local Indian population accused Alexander Baranov, who had long gone to another world, of racism and the persecution of the indigenous population. The Sitka City and District Assembly decided to remove the monument to A. Baranov from the city square and transfer it to the museum.

Russian colonization of Alaska in the 18th and 19th centuries was primarily aimed at taking economic advantage of its natural resources, but did not set the destruction and humiliation of the indigenous peoples of the United States (the Aleuts, Indians, Eskimos) as its goal, the superiority of the white race was not emphasized. European culture, religiosity, civilization and pragmatism in the settlement of vast territories of North America in the 18th–19th centuries came with the Russians. The Russian history of Alaska is covered today as "colonial legacy" in North America. Obviously, there is a need for a comparative analysis of the colonial heritage not only of Russia, but of Spain, Great Britain, the USA and other countries on the American continent.

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Regional Linguistic Worldview Modelling Based on the Texts of Arctic Travels of the 18th – 19th Centuries *

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Abstract. The article considers texts of scientists and public figures of the second half of the 18th–19th centuries, who wrote travel essays on the natural-climatic and historical-cultural peculiarities, social and daily life of the population of the Russian North and the Arctic coast. Ways of modelling the regional linguistic worldview on the basis of text analysis are suggested. The article describes the stages of working with semantically diverse texts, which make it possible to differentiate and systematise texts for the purpose of forming semantically homogeneous discourses allowing identification of the basic parameters of conceptualisation and categorisation of the world objects reflecting the essential aspects of regional life.
Keywords: *texts of the 18th–19th centuries, travel, regional linguistic worldview.*

Introduction

From the middle of the 18th century, works of scientists of various directions, reflecting travel observations and reflections on nature, everyday life, trades, culture of various territories of the Russian Empire, have been widely published. There are many works that describe the Russian North and the Arctic coast among them. Such works are often used as a source of information by historians, culturologists, ethnographers, folklorists, and specialists in various fields of natural science. Episodically, they are referred to by philologists, identifying ways of depicting local images in the regions [1, Antipova A.S; 2, Dubina L.V.; 3, Kosheleva I.G.; 4, Sudakov G.V.]. However, linguists practically do not study the works of scientists of this period, the only exceptions are dialectologists and language historians, extracting the local words and looking at their semantics in the context of the life and culture of the region [5, Bodrova O.A.; 6, Vologda Text in Russian Culture…; 7, Maslova M.N.]. Such studies significantly expand the understanding of the diversity of life in many parts of the country, and encourage a more diversified study of the works of scientists who travelled across the vast territories of Russia. Their books contain extensive material, interesting for

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linguo-cognitive and linguo-culturological studies and for modeling the regional picture of the world.

Theoretical basis

The study of regional uniqueness has noticeably intensified in recent years. On the basis of a variety of both material and spiritual sources, their specific features are determined, principles for identifying regional identity are proposed, and generalizing models are developed [8, Andryushchenko I.A.; 2, Dubina L.V.; 9, Pisachkin V.A.; 10, Biktimirova Yu.V.; 11, Galimova E.Sh., Loshakov A.G.; 12, Shrenk A.I.]. At the same time, many theoretical problems remain debatable in science. Thus, for example, the questions about the status of the regional language picture of the world, about the ways of its modeling, about the correlation with other components of the general language picture of the world (GLP), including the dialectal GLP, are discussed. Scientists are unanimous in saying that the regional GLP is a fragment of the national one. However, the scope and content of the concept itself does not coincide in different works. It is argued, for example, that "the regional linguistic picture of the world is a fragment of the GLP dialect, which is a union of PDS (private dialect systems)" [13, Klimkova L.A., p. 13; see also: 14, Zamyatin D.N.]. The reason for this is that GLPs reflect the specific features of the regions. However, it is obvious that the concepts of dialectal and regional GLPs are identified. The cited author notices this and suggests that within the national GLP, "the regional GLP has a broader character" [Ibid.]. Meanwhile, it remains unknown: at what expense is the content expanded?

The concept of regional GLP began to be filled with new meanings in connection with the active study of the characteristics of urban speech in different regions. It turned out that despite considerable commonality, each region reveals its own specifics. There are many works that describe separate locally coloured linguistic units, primarily at the phonetic or lexical level [15, Gramatchikova N.B; 16, Morozova O.E.; 17, Popov R.V.; 18, Khlybova S.V.]. It seems promising to turn to larger units — texts that are recognized as relevant to certain regions and thus allow one to identify important and relevant features of them. The long tradition of literary studies of images of different parts of the country, created by writers, enriched with the concepts of "supertext" ("hypertext"), is currently continuing. Scientists are trying to understand the ways of creating "an integral geopoetic image that reflects not only and not so much the individual author's perception of the area, but a collective, generalized, revealing the most important, determining in its spatial picture" [19, Simashko T.V., p. 7; see also: 20, Schmitt-Egner P.; 21, Morozova N.S.; 22; Noeva, S.E.; 23, Northern Text…]. At the same time, the results of the search for meaning significantly depend on the corpus of the studied texts, so it is natural that the criteria for their selection are discussed. G.V. Sudakov believes that such texts should show "pulsation of strong points of cultural memory in relation to historically and culturally significant territory" [4, Sudakov G.V., p. 120].

Consequently, such texts, brought together in a single thematic space (Northern, Siberian, Vologda texts, etc.), reveal the artistic reflection of the national picture of the world.

They also address the issue of formation of actual concepts, it is considered that "this transfers the interest of linguoconceptology and regional linguistics from the research of traditional cultural concepts to the study of concept variants in the specificity of their dynamic existence" [25, Orlova O.V., p. 4]. However, it is more likely that this may not be a complete "translation", but a special emphasis in the study Clarification of the semantics of cultural prototypes as a matrix of actual concepts (an example of the author: gold, coal as a matrix — oil as an actual concept), output of media-concepts in other spheres including artistic one demonstrate dynamic aspect as an important component in modeling regional GLP [26, Babenko I.V.; 27, Golovneva E.V.; 25, Orlova O.V., etc.].

Thus, if we use the criteria for limiting the material and at the same time set the vector of analysis, then we can identify individual fragments of the regional picture of the world. Carrying out research on the basis of language and texts, it is possible to talk about a fragment of the regional GLP. However, all the diversity of the features of a particular region as a cultural, social and natural space requires the efforts of scientists from different branches of knowledge. At the same time, it seems that the success of such studies largely depends on the unified theoretical foundations adopted by scientists.

In this regard, such an interdisciplinary scientific direction as humanitarian geography, which has been actively recently asserted, is of special interest, [28, Tuan Yi-Fu; 29, Terkulov V.I.]. In general terms, it is defined as a field of knowledge, which "studies different ways of representation and interpretation of terrestrial spaces in the human activity, including mental activity" [28, Tuan Yi-Fu, p. 26]. V.N. Streletskiy believes that "the core of the integration of humanities and geography disciplines" [29, Terkulov V.I., p. 95] is cultural geography. According to the publications, a lot is still in the formation stage: methodological foundations are being clarified, various approaches are being developed, and the terminological apparatus is being formed. At the same time, there is a noticeable increase in the number of works, where ideas of this direction are developed on a specific material [30, Erofeeva E.V.; 31, Kalutskov V.N.; 32, Bell D.S.A.; CHG [1]; etc.].

The study undertaken by us is based on the material of texts written by scientists of various specialties and public figures during their travels in the North (or based on their results). These books represent the life of different localities (often the same ones) in the vast northern space observed in the 18th–19th centuries. The texts differ insignificantly in terms of observation time; records are made approximately every 10–15 years. This makes it possible not only to model the regional GLP in the form of certain historical fragments, but also to trace their dynamics.

[1] Cultural and Human Geography, vol. 1, no. 1, 2012. URL:http://gumgeo.ru/index.php/gumgeo/article/view/28 (accessed 25 February 2020).

Material and research methods

Some of the studied texts are multi-volume editions, sometimes their content goes beyond the Russian North. In general, the content of the texts covers a historically heterogeneous period, differs in specific tasks set by the authors, attention to different aspects of life, and sometimes even in the choice of material. This requires the establishment of separate stages of research and the identification of techniques and methods of analysis at each stage.

The initial and important step is the development of criteria for selecting sources, the main of which are the following: the commonality of the real chronotope, the pragmatic content of the text, the presence of the author-subject as an eyewitness of the described lands.

Texts grouped in accordance with the mentioned criteria are subjected to cognitive-discursive analysis. In the course of the analysis, contexts are identified and named in each text on the basis of their semantic dominance. Fragments of different texts with the same name are considered as a single discursive space.

The identified and named discourses are studied using elements of contextual, typological and interpretative methods. Besides, at this stage, cognitive-discursive analysis is accompanied by a comparative analysis in order to identify similarities in the representation of world objects and the author's personal perception of the features of the described region.

The results obtained during the analysis of the discursive spaces of the same name can be presented in the form of particular conceptual models, each of which is taken into account in modeling a particular fragment of the regional linguistic picture of the world.

Research results

The systematization of travel texts is based on the time, spent by scientists in the North, and not the year of publication, since for various reasons manuscripts may have been published much later than they were written. For example, P.I. Chelishchev travelled from May to December 1791, but his book “Travels in the North of Russia” was published only in 1886, and this is not a single case.

Some of the works under study include texts written by other authors. Thus, after the death of I.I. Lepekhin, the fourth volume of the book “Daily notes of a journey <...> through various provinces of the Russian state” was edited by a member of his expedition N.Ya. Ozeretskovskiy, who included his notes on the White Sea in this volume. In the same volume, he places the description of Novaya Zemlya, provided by F.I. Fomin and V.V. Krestinin. There are similar phenomena in other works, for example, F.P. Litke, highly appreciating the records of his navigator Belyaev, includes his Journal in the chapter “The White Sea Expedition” [2]. The heterogeneity of the

[2] Litke F.P. Chetyrekhkratnoe puteshestvie v Severnyy Ledovityy okean na voennom brige «Novaya Zemlya» [Four trips to the Arctic Ocean on the military brig "Novaya Zemlya"]. Moscow; Leningrad, Geografgiz Publ., 1948, 334 p. URL http://az.lib.ru/l/litke_f_p/ text_0040. shtml (accessed 25 February 2020).

texts is also due to the fact that many of the books contain archival documents (or extracts from them), historical or statistical references, and stories of local residents.

The structure and content of the studied works is complicated by the fact that the authors often retell or quote the texts of scientists who have visited the same places, and do not always provide them with references. Studying ethnographic sources, O.A. Bodrova writes that the rules of citation are developed at the turn of the 19th–20th centuries. [33, Burykin A.A., p. 292]. However, references are numerous in the studied works of the first half of the 19th century (F.P. Litke, M.F. Reinecke, A.I. Schrenk, etc.), although the inclusion of other people's texts without any reservations is often observed, which requires textual verification.

Thus, texts, arranged in chronological order, make it possible to detect duplicated fragments (often literally), digress from them, and compare the amount of information reported by each of the authors. This makes it possible to identify the features of the sites described by the travellers and to determine what historical, cultural, social, and naturalistic information was provided by each author compared to the others.

The boundaries of the geographical space, represented in the works under study, are not identical. Thus, P.I. Chelishchev travelled from St. Petersburg to the White Sea, along the Dvina to Arkhangelsk and further to the Vologda and Novgorod governorates. The route of A.I. Shrenk ran from St. Petersburg to Arkhangelsk, and then to Mezen, from it to the Ural Range and back. Hydrograph M.F. Reinecke explores the White and Barents Seas and describes their coasts. F.P. Litke studied the eastern part of the Barents Sea, the White Sea, went on an expedition to Novaya Zemlya, examined the features of coastal areas, and also provided information about the life and activities of their inhabitants. The content of these sources, as well as ones not mentioned here, provides a selection of contexts that reveal the realities of the area visited by the travellers over the years.

The most reliable reference point for combining the contexts into a single discursive space can be natural geographical objects: the sea or parts of it, rivers, ridges, mountains, the directions of travel in the world, which are named by the travellers. The above said does not exclude the fact that such landmarks cannot be considered names of settlements, but in the period under study they are few in number and located at a considerable distance from each other. The space between them was not described and was only approximately measured. Their description and characterization of individual geographical features becomes an important task for understanding the characteristics of the Northern Territory and the living conditions of people. This task is consistently performed by travellers. It is worth noting that they often come to the same settlement from different directions, depending on the built (or established) route.

For example, A.I. Schrenk first arrived in the city of Mezen in May 1837 from Arkhangelsk, describing soils, rocks, vegetation, birds, people’s activities, etc. But on May 11, on the way to Mezen, the previously ice-free river turned out to be blocked “an impenetrable mass of ice, which

completely blocked our path" [34, Streletskiy V.N., p. 90]. This forced him to change the route slightly and made it possible to include new geographical objects in the description and to tell about the path he managed to get to the place. The second time he arrived there was on October 6, 1837, from Pechora after exploring the Bolshezemelskaya Tundra. Therefore, the Mezen area is described from the other side, from the north-east. Moreover, the swamps of Malozemelskaya Tundra forced the travellers to go not by a straight line, but by a detour, which further enlarged the observation from the north. S.V. Maksimov reached this town in the middle of November 1856, "already covered with deep snow" [35, Maksimov S.V., p. 21], and described the nearby localities, the villages of Semzha and Dolgoshchelye, the Mezenskiy and Kaninskiy coasts of the White Sea, deadly sea crafts, communicated with the Old Believers, talked about the Samoyeds who arrived in Mezen, etc.

Thus, the systematization of contexts based on real geographical objects allows us to consider them as a single cognitive-discursive space, a specific historical discourse, individual fragments of which are dated not just by the year, but by the month and date, even often by the hour of the observed events.

All travellers strive to tell about different aspects of life in the surveyed area, so the discourses established are thematically diverse and multilayered, although they are limited by those realities that may come to the attention of the authors. A comparison of the texts of different authors shows that there are objects that are described by all or almost all authors. At the same time, there are objects that are highlighted in few books. The repetition of the same geographical, social or cultural features in different texts can be regarded as a semantic dominant feature. The thematic and semantic homogeneity of such contexts allows us to identify key concepts and, on this basis, to name the semantic dominant. Often events become such names, for example, *ice on rivers, ice on the sea, blizzards in the North, sea fishing of coastal residents*, etc., but the names of semantic dominants can also be the names of individual geographical objects: *swamps, forests, tundra, birds*, etc. or significant settlements — *Pustozersk, Pinega, Onega*, etc.

The contexts describing objects occurring in a small number of texts can also be presented as semantic dominants, no less significant for the characterization of the region. This is explained by the fact that the scarcity of texts does not mean a small number of contexts, as the reference to certain objects can be dictated by the professional interests of the author. For example, A.I. Schrenk's book contains a significant number of contexts describing rocks, soils and their characteristic vegetation. He made these records and collects herbarium throughout his journey. Therefore, the descriptions he provided are complementary to the information on the terrains, provided by other authors.

Actually, in any semantic dominant, all contexts are meaningfully complementary. A comparative analysis of contexts united by the names of a semantic dominant makes it possible to

identify the main parameters of the conceptualization and categorization of objects, to present them in the form of particular models that reflect regional features.

However, the texts under analysis are not dry reports; on the contrary, they are stylistically remarkable for their authors' personalities. The way they express the direct characteristics of the objects, the way they reflect their different sides, the way they adapt and use local words with semantic differences from literary ones and the structure of the texts help to determine the parameters for the construction of private models.

At the same time, the author often needs a detailed description of entire situations in order to create a picture that is rare for residents of other regions. In such cases, the author aims to describe his own impressions through assessments, metaphors, comparisons. This is done not for giving "artisticness" to the image, but to convey the peculiarities of the observed phenomena.

Let us use examples from the book by F. Litke to show how he describes ice on the White Sea. The author uses figurative expressions to describe the ice as a whole: *"ice fields", "ridge of ice floes", "ice islands", "solid ice chain", "impassable ice", "ice giants"*. He compares the ice with *"a ship under sail", "through the darkness, like ghosts"*. The rapid change in its appearance is described by words that allow seeing the ice in different states: *"scattered ice", "thick ice", "small ice floes", "large and frequent ice", "solid ice", "drifting, rather rare ice", "dense ice"*. Ice is a constant threat: *"several other ships <…> were covered with ice <…> and perished there with all the people"; ice "knocked out the stand from under the reserve anchor"; ice limits "the horizon with high, stacked ice mountains, one on top of the other, beyond which nothing was already visible"*. Sailors, escaping, are trying to maneuver, *"go into the icy bay"*. The author adds sound characteristics to the visual ones: the ice, colliding, creates *"noise similar to breakers"; "Dead silence was interrupted only by the crashing of waves against the ice, the distant roar of collapsing ice floes"* [3] .

Therefore, the examples quoted from the book by one author only, far from being complete, show that the introduction of "semantic dominant" concept enables systematisation of homogenous material and setting parameters, which are used to characterise the object, reflecting regional specificity.

Conclusion

The studied travel texts have significant historical value, covering natural, climatic, social, cultural information of one of the largest regions of the country. However, it is not just the volume of information that is important for us, which has been repeatedly referred to by researchers in different fields. Of interest are the texts themselves, their structural organization, ways of linguistic expression of personal impressions of eyewitnesses of those distant times and events, their as-

[3] Litke F.P. Chetyrekhkratnoe puteshestvie v Severnyy Ledovityy okean na voennom brige «Novaya Zemlya» [Four trips to the Arctic Ocean on the military brig "Novaya Zemlya"]. Moscow; Leningrad, Geografgiz Publ., 1948, p. 105, 123-130. URL http://az.lib.ru/l/litke_f_p/ text_0040. shtml (accessed 25 February 2020).

sessment of the place of the Russian North in the context of the history and life of the country. It opens up the possibility of modeling a regional linguistic picture of the world, relying not only on separate groups of words that appeared due to the need to reflect the realities of the region, but also on texts that reveal past events and unique natural phenomena in their completeness, visibility and versatility.

The methodology of analysis of texts with diverse content presented in the work allows us to approach them differentially, to systematize them in such a way as to produce quite homogeneous discourses in terms of content, which would make it possible to detect the main parameters of conceptualization and categorization of objects of the world, reflecting the most significant aspects life of the region.

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