

MIGRATION OF THE RUSSIAN ARCTIC POPULATION: MODELS, ROUTES, RESULTS

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Population migration continues to be the main factor affecting the population dynamics in the Russian Arctic. The article discusses the theoretical provisions that reveal the essence of population migration, presents the main migration theories that explain the mobility of the population in the Arctic conditions. The object of the study is 75 urban and municipal districts of the Russian Arctic. The research focuses on the population migration and its impact on the population of the Russian Arctic. The authors propose a method for studying migration processes by analyzing municipal statistics and directions of movement based on social network data. The method reveals the main migration flows and patterns of population movement in the Arctic regions in 2012–2019. Based on the identified trends, the authors forecast migration dynamics and its impact on the population. Spatial analysis shows that current migration processes in the Arctic are the result of a complex combination of natural, historical, social and economic causes. Using data of the project “The virtual population of Russia”, the authors identify the main routes of population movement in the Arctic regions. The research reveals that residents of urban districts most often move to Moscow and St. Petersburg, and the ones of urban districts – to regional centers. The analysis shows that medium and large cities are of particular importance in migration processes. They are intermediate links of migration routes from the Arctic territories to federal and regional capitals located outside the Arctic. The authors describe three models of migration processes, depending on the age and sex composition of the migrating population and the stages of territory development.

Keywords: migration, population, models, migration routes, municipalities, Russian Arctic.

Introduction

The Decree of the Presidium of the Central Executive Committee of the Soviet Union “Declaring the lands and islands located in the Arctic Ocean to be the territory of the Soviet Union” may be considered as the birth of the Russian Arctic¹. The Arctic received its new development in 2014 after the issuance of the Decree of the President of the Russian Federation “On the Land Territories of the Arctic Zone of the Russian Federation”². In the following years, the Arctic borders expanded

twice³. In 2020, the territories covered by the state support for entrepreneurship were added to the Arctic⁴.

Interest in studying the Russian Arctic is caused by a number of reasons. These are huge reserves of natural resources, perspectives to develop transport and touristic routes. In such fields as extraction of natural gas, non-ferrous metals manufacturing and reindeer herding, almost all of the country’s economic activity is concentrated in the Arctic. The share of the gross regional product in the Arctic is steadily increasing: from 5.0% in 2014 to 6.2% in 2018⁵.

¹ Decree of the Presidium of the Central Executive Committee of the Soviet Union “Declaring the lands and islands located in the Arctic Ocean to be the territory of the Soviet Union” dated on April 15, 1926.

² Decree of the President of the Russian Federation “On the Land Territories of the Arctic Zone of the Russian Federation” dated on May 2, 2014 No. 296 (edit. on March 5, 2020).

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³ Decrees of the President of the Russian Federation dated on June 27, 2017 No. 287 and dated on May 13 2019 No. 220.

⁴ Federal Law “About the State support for entrepreneurial activities in the Arctic zone of the Russian Federation” dated on July 13, 2020 No. 193-FL.

⁵ According to the Federal State Statistics Service (Rosstat) data (Available at: https://rosstat.gov.ru/free_doc/new_site/region_stat/calendar2-2020.htm).

Today, the Russian Arctic occupies 5.3 million km², or makes 31% of the country's surface area. At the beginning of 2020 (taking into account economic support areas) it had 2,618,700 inhabitants or 1.8% of the country's population), including 2,269,000 inhabitants (86.6%) living in the cities and urban villages and 349,700 people in rural areas (13.4%). Three constituent entities have the population of more than 500,000 people: the Murmansk Region – 741,400; the Arkhangelsk Region – 711,700; the Yamalo-Nenets Autonomous Area – 544,400 people.

From 2012 to 2020 population of the Russian Arctic decreased from 2,736,400 to 2,618,700 people, or by 117,700 people (migration losses amounted to 172,600 and natural increase – 54,900 people), including the urban population – from 2,366,400 to 2,269,000 or 97,400 people. Out of nine Arctic constituent entities in Russia, seven experienced decline in population, while in two (the Nenets and Yamalo-Nenets Autonomous Areas) it increased. Urban population is located in 52 urban-type settlements and 45 towns, including 6 large towns, 4 medium-sized towns and 35 small towns. The average population size of cities is 203.9, in medium 53.0, in towns 18.8 and in urban-type settlements 3.4 thousand people.

The “new settlement of the Arctic” [1, pp. 55, 60] will require considerable human resources and developed labor potential, which today does not correspond to the set tasks due to migration outflow. In this connection, the study of population migration in the Russian Arctic is of both practical and scientific interest and is of high relevance. The originality of this study lies in the following that municipalities analyze migratory flows in the Arctic municipalities according to types and directions, sex and age.

The article considers the main approaches to the study of migration processes in the Arctic. The authors present an analysis methodology of migration of population at municipal level using modern data sources. The text contains an analysis dynamics and structure of migration processes in the Russian Arctic within the period of 2012–2019. The authors studied main migration routes of population.

The study focuses on 75 urban areas (UA) and municipal districts (MD) located in nine Russian Arctic constituent entities. The focus is on migration of population and its impact on the population of the Russian Arctic.

Population migration: the concept and study approaches

One of the first definitions for migration was given by the German-English scholar E. Ravenstein as permanent or temporary change of a place of residence, «a continuous process», due to interaction of four major groups of factors: operating in the migrant's place of origin (country); acting during the migration phase; acting in the place of the migrant's entry (country); personal factors, which are primarily de-

fined as the system of preferences of the individual, the combination of the demographic characteristics, etc. He has formulated 11 migration laws, including the following: short-range migration is dominant, women are more active in internal migration, men are more active in international migration, families rarely migrate outside their country, cities are growing because of migration, and economic reasons for migration are determinants [2]. The UN Multilingual Demographic Dictionary, published in 1958, outlines that migration is one of the most important aspects of population mobility in demographic terms [3, c. 102].

It should be emphasized that definitions, stages, factors and causes of migration in XX century are well represented in the works by L. L. Rybakovsky and S. V. Ryazantsev [4, p. 132–146; 5, p. 18–31]. In recent years, there have been studies of migration in the Russian Arctic. They consider socio-economic factors of population mobility [6], provide assessment of the intensity of movements [7], and determine impact of migration on the demographic development of Arctic territories [8].

A view on modern migration theories through the prism of fundamental works was considered by V. Pische [9]. An explanation of migration and a brief overview of selected theories can be found in the work by J. Bijak [10]. M. S. Blinova studies sociological theories of population migration in some details in her monograph. It notes that the key variables affecting migration flows are wage and unemployment levels, expected income and employability, material and cultural ties, size of migration networks and diasporas, number of organizations promoting migration [11, p. 155–156]. Theoretical directions in explanation of international migration of population have been made by V. Ya. Iontsev. He notes that the used approaches make the central place in the study of population migration. Having analyzed more than 400 foreign and 300 domestic works, V. Ya. Iontsev suggests classification of 17 basic scientific approaches to the study of population migration, containing 45 scientific directions, theories and concepts, of which 15 fall within economic approach, 5 – within sociological, 4 – within migratory, 3 – within demographic, and 2 – within historical, typological and political, and by one (1) falls within the remaining nine approaches [12, p. 86].

With regard to the Arctic as a whole and the Russian Arctic in particular, we have systematized the original approaches to the study of demographic problems and settlement of the territories [13]. Specific approaches to the study of migration in the Arctic are described, which are based primarily on the consideration of migration through the prism of the characteristics of the northern territories, including [14]: cold discomfort, peripheral area, resource availability and ethnicity. Discomfort of natural conditions, as well as climate changes and the environmental situation, can make a

significant impact on life quality of population and, in particular, on the livelihoods of indigenous peoples in the Arctic [15]. Peripheral area also affects migration attractiveness. It is reflected in the remoteness and accessibility of the Arctic settlements, which affect all aspects of life [16]. Resource availability is manifested through the impact on migration processes of [17] the stages of exploitation of natural resources in the Arctic [18]. Finally, the intensity of migration may depend on the ethnic composition of the territory's population [19; 20].

A key characteristic of Arctic migration is cyclicity [21]. Wherein long resource cycles are combined with seasonal labour market fluctuations as well as with specific shift migrations. Equally important are the historical and socio-psychological aspects of spatial development. Population of the Russian Arctic in XX century faced both forced migration and the state encouragement to develop the northern territories [22]. Modern migration patterns in the Arctic societies have been influenced by market transformations and changes in the attitude of the state and society towards "the conquerors of the North" [23], as well as the shift in value orientation towards the consumer society [24].

In general, it can be concluded that for the northern and Arctic territories, migration has played and will play a decisive role in development of permanent population and the labour potential. In order to manage migration of population one should apply sociological methods more widely alongside statistics [25].

Research methodology

The adoption of the federal law "About the State support for entrepreneurial activities in the Arctic zone of the Russian Federation" has made it difficult to define the boundaries of the Russian Arctic since the law supplements the list of nine new Arctic urban areas (UA) and municipal districts (MD) located in four Russian regions⁶. No corresponding changes were made to the decree of the President of the Russian Federation "On the Land Territories of the Arctic Zone of the Russian Federation" as of September 2020. The question arises whether new territories should be taken into account in calculating the area of the Russian Arctic and demographic indicators. The authors considered it possible, ahead of the curve, to include new administrative and territorial units in the calculation of all indicators.

We have chosen the time interval 2012–2019. First, comparable data are available for this period, as the treatment of migrants has not changed significantly

since 2011⁷. Second, it was not until 2012 that municipal statistics on migration were published. The main source of statistical information is "the Municipal Indicators Database"⁸ by Rosstat, which contains data on migratory movements of population by municipalities, by type of migration (within the region, between regions and internationally), by sex and by five-year age groups.

The main shortcoming of the database is its incompleteness and fragmentation [27]. Thereby, many indicators are missing for five closed administrative entities in the Murmansk Region that perform defense functions. Moreover, materials on migration of municipalities of Chukot AA have been submitted only since 2017. Therefore, when analyzing migration by region, they were supplemented with data from Rosstat bulletins "Population Size and Migration of the Russian Federation". Another shortcoming is lack of data on inter-municipal migration. The so-called «chess table» – a table of the number of moves between the territories of departure and arrival, in Russia is officially published only according to the constituent entities and the federal districts. Indirect data from the digital environment were used in order to fill in this gap and identify travel routes in the Russian Arctic at the municipal level.

Project "Virtual population of Russia"⁹ being implemented with the support of the Russian Geographical Society contains data on migration movements of population, obtained by processing 88 million accounts of users of the most popular social media in Russia VK.com. Data for January–March 2015 contain information on current and last place of residence of users by urban areas and municipal districts [28]. The sampling is neither territorially representative nor age-sensitive. However, it tends to favour the social groups most likely to migrate (young and educated people) [29], which allows the regularity of spatial redistribution of human resources.

Data from the Arctic entities of the Federation were reviewed over time, and from the municipalities were averaged over the entire period to reduce the impact of distortions due to unlikely events and low population size. Special attention was paid to the analysis of migration in medium-sized and large towns, where the composition of the migratory population by sex and age was studied. Algorithms for

⁶ The Russian Arctic joined: in the Republic of Karelia – Kostomuksha UA, Kalevalsky MD and Segezhsy MD; in the Komi Republic – Inta UA, Usinsk UA and Ust-Tsilmsky MD; in Arkhangelsk Region – Leshukonsky MD and Pinezhsky MD; in the Krasnoyarsk Territory – the northern part of the Evenkiysky MD (10 out of 23 rural localities).

⁷ Whereas previously only migrants who had registered at their place of permanent residence for more than a year were taken into account, migrants registered at their place of residence for a period of nine months or more were now subject to registration. According to O. S. Chudinovskikh, this adjustment has increased the quality of accounting of certain population groups (for example, students), but has also led to an increase in «virtual» migration, especially international migration [26].

⁸ The Municipal Indicators Database. Rosstat. Available at: <https://rosstat.gov.ru/dbscripts/munst/>.

⁹ Virtual population of Russia. Available at: <http://webcensus.ru/>.

Table 1. Migration balance of the Russian Arctic population, 2012–2019, persons

Territory	2012	2013	2014	2015	2016	2017	2018	2019	Total
The Russian Arctic	–24,625	–35,946	–23,312	–26,774	–17,260	–17,691	–15,101	–11,904	–172,613
Republic of Karelia	–1,802	–1,602	–1,341	–1,077	–997	–1,373	–1,201	–533	–9,926
Komi Republic	–5,940	–5,437	–3,847	–3,362	–2,664	–4,341	–3,636	–3,489	–32,716
Republic of Sakha (Yakutiya)	–2,111	–2,232	–1,195	–791	–491	–700	–780	–369	–8 669
Krasnoyarsk Territory	–2,370	–4,026	–3,284	–1,623	–2,103	–924	–526	–946	–15,802
Arkhangelsk Region without Nenets AA	–3,064	–4,142	–2,431	–3,077	–2,335	–3,545	–2,666	–1,017	–22,277
Murmansk Region	–7,925	–10,017	–4,998	–4,384	–4,343	–3,503	–4,402	–4,863	–44,435
Nenets AA	50	–12	6	101	–320	–231	–392	77	–721
Chukot AA	–336	–354	–154	–589	–516	–656	237	554	–1,814
Yamal-Nenets AA	–1,127	–8,124	–6,068	–11,972	–3,491	–2,418	–1,735	–1,318	–36,253

Source: Data from the bulletins “Population Size and Migration of the Russian Federation” and “Municipal Indicators Database” of Rosstat.

processing and visualizing data in the form of background cards were implemented in the programming language Julia 1.4 with the use of DataFrames.jl, LightGraphs.jl and VegaLite.jl packages.

Dynamics and efficiency of migration processes

Within the period of 2012–2019, because of migration, the population of the Russian Arctic has decreased by 172.6 thousand people, on average by 21.6 thousand people per year that makes more than 0.8% of the total population of the Russian Arctic. However, within the period of 2016–2019 the decline was 44% lower than in the period of 2012–2015. This may be related both to a decrease in the absolute population and to a reduction (exhaustion) of the migration potential of the Arctic territories.

Among the Arctic regions, in absolute terms, the highest population decline was recorded in the Murmansk Region (average 5,500 people per year) and Yamal-Nenets AA (4,500 people per year). In the latter, due to the active exploitation of oil and gas deposits, there is a high variation in the indicator: from –12,000 in 2015 to –1,300 in 2019. The lowest decrease was in the sparsely populated Nenets and Chukot Autonomous Areas, where in some years there was a surplus of migration (table 1).

The migration intensity rate allows comparing the migration mobility according to different rank and re-

gion size. For the Russian Arctic as a whole, migratory outflows halved within the period of 2012–2019. The largest number of people left the Arctic territories from the Republics of Komi and Sakha (Yakutia). The average migration rate was –24.4 and –15.7 people per 1,000 inhabitants, respectively. For the Arctic territory of the Komi Republic, this can be explained by the fact that the cities of Vorkuta and Inta are at the end of the cycle of natural resource development. In Inta, all coal mines have already been closed, in Vorkuta – their number has decreased many times in relation to the first decades of development. The low migratory attractiveness of the Arctic part of Yakutia is due to the predominance of rural areas whose inhabitants aspire to move to Yakutsk and other cities outside the Russian Arctic (table 2).

In the Russian Arctic, interregional migration is of the predominating importance in demographic dynamics that makes 86.3% of population decline and 60.7% of migration circulation. Internal migration makes 13.7% of the decline and 29.9% of migration circulation. International migration has registered the positive growth, with a 9.4% share in migration circulation for the period of 2012–2019 (table 3). This can be explained by the fact that if foreign companies use their technology and local people to develop the Arctic, we have a slightly different situation. In an effort to reduce costs, extractive companies tend to attract foreign suppliers of machinery and equipment and hire foreign labour [30, p. 28].

Table 2. Migration rate of the Russian Arctic population per 1,000 people, 2012–2019

Territory	2012	2013	2014	2015	2016	2017	2018	2019
The Russian Arctic	–9.0	–13.3	–8.7	–10.0	–6.5	–6.7	–5.7	–4.5
Republic of Karelia	–14.3	–12.9	–11.0	–8.9	–8.4	–11.7	–10.4	–4.7
Komi Republic	–32.7	–30.8	–22.3	–19.9	–16.0	–26.6	–22.9	–22.4
Republic of Sakha (Yakutiya)	–29.3	–31.8	–17.3	–11.5	–7.2	–10.2	–11.5	–5.5
Krasnoyarsk Territory	–9.9	–17.0	–13.9	–6.9	–8.9	–3.9	–2.2	–4.0
Arkhangelsk Region without Nenets AA	–4.4	–6.0	–3.5	–4.5	–3.4	–5.2	–4.0	–1.5
Murmansk Region	–10.1	–12.9	–6.5	–5.7	–5.7	–4.6	–5.9	–6.5
Nenets AA	1.2	–0.3	0.1	2.3	–7.3	–5.3	–8.9	1.8
Chukot AA	–6.6	–7.0	–3.0	–11.7	–10.3	–13.2	4.8	11.1
Yamal-Nenets AA	–2.1	–15.0	–11.2	–22.3	–6.5	–4.5	–3.2	–2.4

Source: Data from the bulletins “Population Size and Migration of the Russian Federation” and “Municipal Indicators Database” of Rosstat.

Table 3. Structure of migratory flows in the Russian Arctic according to types, 2012–2019, persons

Type of migration	2012	2013	2014	2015	2016	2017	2018	2019	In total
Growth (decline), in total:	–24,625	–35,946	–23,312	–26,774	–17,260	–17,691	–15,101	–11,904	–172,613
within the region	–4,057	–5,619	–3,678	–3,195	–3,186	–3,395	–3,221	–2,186	–28,537
between the regions	–26,922	–35,669	–26,433	–24,766	–18,535	–17,637	–13,792	–15,682	–179,436
international	6,354	5,342	6,799	1,187	4,461	3,341	1,912	5,964	35,360
Arrival, in total:	127,290	129,418	135,676	130,925	133,687	133,910	137,488	127,692	1,056,086
within the region	40,235	40,611	40,386	40,603	41,575	41,935	42,799	39,782	327,926
between the regions	71,467	71,762	75,464	73,751	78,241	79,218	81,528	71,799	603,230
international	15,588	17,045	19,826	16,571	13,871	12,757	13,161	16,111	124,930
Departure, in total:	151,915	165,364	158,988	157,699	150,947	151,601	152,589	139,596	1,228,699
within the region	44,292	46,230	44,064	43,798	44,761	45,330	46,020	41,968	356,463
between the regions	98,389	107,431	101,897	98,517	96,776	96,855	95,320	87,481	782,666
international	9,234	11,703	13,027	15,384	9,410	9,416	11,249	10,147	89,570
Circulation, in total:	279,205	294,782	294,664	288,624	284,634	285,511	290,077	267,288	2,284,785
within the region	84,527	86,841	84,450	84,401	86,336	87,265	88,819	81,750	684,389
between the regions	169,856	179,193	177,361	172,268	175,017	176,073	176,848	159,280	1,385,896
international	24,822	28,748	32,853	31,955	23,281	22,173	24,410	26,258	214,500

Source: Data from the bulletins “Population Size and Migration of the Russian Federation” and “Municipal Indicators Database” of Rosstat.

High spatial differentiation of migration indicators is typical for the Russian Arctic. Out of 70 UA and MD, where migration statistics are available, only in nine ones migration growth within the period of 2012–2019 was positive, in 7 UA (Salekhard, Gubkinsky, Anadyr, Egvekinot, Kostomukshsky, Naryan-Mar, Novaya Zemlya) and in 2 MD (Anadyrsky and Bilibinsky) almost half of them is located in the Chukot AA. In absolute terms, the two administrative centers with the highest annual average migration growth are Salekhard (284) and Naryan-Mar (152). The highest decrease is in Murmansk (–3,013), Vorkuta (–2,471) and Noyabrsk (–1,320) (fig. 1).

Net migration is positive inside the regions in 10 UA and MD out of 70. In terms of intraregional growth, Arkhangelsk (2,126 people), Severodvinsk (526) and Murmansk (392) have a high proportion of students: 5.9%, 2.4% and 4.1% respectively. The positive net migration between the regions is only in six UA and MD. These are UA Salekhard, Egvekinot and Novaya Zemlya, as well as Anadyrsky, Anabarsky and Olenyoksky districts. The highest interregional decline is in Vorkuta (–30.8‰), Pevek (–23.0‰) and Inta (–22.5‰). In absolute numbers, the largest departure urban areas are Murmansk (3,947), Vorkuta (2,528) and Arkhangelsk (2,500). In majority of municipal districts (65), there is the migration growth due to overseas arrivals. The most attractive urban areas in terms of international migration are Norilsk (annual average growth of 714), Murmansk (543), Noyabrsk (397), the least attractive municipal districts are Tazovsky (–24) and Belomorsky (–3).

The question arises: what is the reason for this high spatial differentiation of migration in the Russian Arctic? In order to answer this question, let us consider the influence of various factors on migration of the Arctic population.

The maps clearly show that there is no high correlation between migration growth (decrease) and remoteness of settlements and natural climatic conditions. In all geographical areas, migration rates are mosaic. However, there is still some correlation between favorable environmental conditions and migration rates. In order to identify it, we will use zoning of the territories of Russia on natural conditions for life of people proposed by the team of authors from the Institute of Geography of the Russian Academy of Sciences [31]. It is based on 18 indicators, taking into account a variety of factors: cold, radiation, astronomical (longitude of day), freezing, heat, wind, humidity, atmospheric pressure, altitude, wetlands and natural phenomena. The territories of the Russian Arctic are included in four zones of natural conditions (table 4).

The largest outflow occurred from the territories of an absolutely unfavorable zone, which includes cities such as Vorkuta and Norilsk. According to the medical-geographical indicators, the optimal length of residence of the expatriate population is estimated at 1–2 years. The decrease in this zone is 2.5 times higher

than in the conditionally unfavourable zone (Arkhangelsk and Severodvinsk). Although the latter is the best in the Russian Arctic in terms of natural and climatic conditions, here too “there is a high probability of natural stress and more investment is needed to maintain normal life” [31, p. 115]. While the link between intraregional and interregional migration and natural environments is positive, it is negative for international migration. The highest increases are found in the least favorable territories. They also have a higher migratory of population mobility.

In addition to natural and climatic conditions, migration in the Arctic is influenced by the stage of development of natural resources, as can be seen in the cases of Vorkuta and Inta. Economic specialization makes the other factor. In territories that specialize in manufacturing or have diversified labour markets, outflows are lower than in mining, social and infrastructural [32, p. 7].

In the North and the Arctic, migration indicators correlate with material and quality of life indicators [23]. However, if income influences migratory mobility with little change in the net balance, i.e., it triggers temporary migration, high quality of life (measured by average level of education and life expectancy) can make a territory more attractive and reduce outflows. However, no single factor or indicator can account for the nature of migratory movements in the Arctic. In order to understand their nature and long-term implications, it is necessary to consider in detail the routes and directions of migration.

Migration routes in the Russian Arctic

Data of the project “Virtual population of Russia” allow to analyze migration preferences. For every 75 urban areas and municipal districts of the Russian Arctic we will trace the most popular destination. Residents of 23 municipalities (31%) move most frequently to Moscow and Saint Petersburg. These are predominantly relatively large urban areas with resources and capacity to move to federal centers. Whereas Saint Petersburg is attractive to the European Arctic residents and Moscow to the Asian residents. Exceptions are Usinsk and Novaya Zemlya (preferred Moscow) in the European part of the Russian Arctic, and Norilsk (Saint Petersburg) in Asia (fig. 2).

For 52 mainly rural municipal districts, the most common migration route was their regional administrative center. In the Yamal-Nenets Autonomous Area, the districts were divided between two centers – Salekhard and Tyumen, with the latter dominating. Only five out of nine regional centers are located in the Russian Arctic (Arkhangelsk, Murmansk, Salekhard, Naryan Mar and Anadyr). Thus, big cities and regional centers serve as migration hubs linking the federal centers to the Arctic areas. Let us look at this in greater detail.

At the beginning of 2020, there were two large (over 250,000 inhabitants), four big (from 100 to

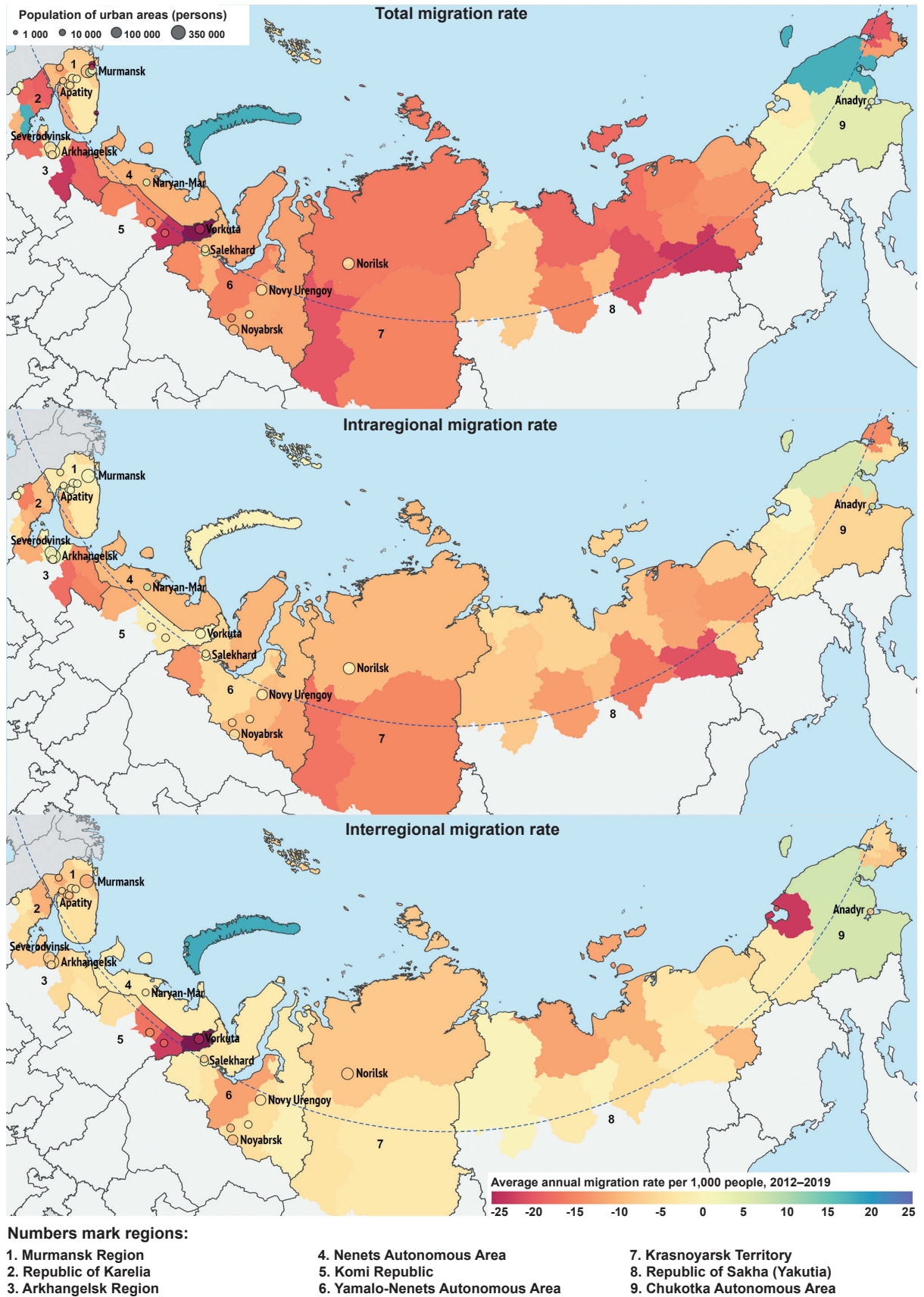


Fig. 1. Average annual migration increase (decrease) of the population in the Russian Arctic urban areas (UA) and municipal districts (MD) by type of migration, 2012–2019 (Chukot Autonomous Area – 2017–2019)

Table 4. Differentiation of migration rates by natural zones for life of people

Natural zone	Population at the beginning of 2020, people	Rate of migration increase (decrease) per 1,000 persons, 2012–2019				Migratory movements of population per 1,000 persons, 2012–2019
		In total	In the region	Between the regions	International	
Absolutely unfavorable	425,890	–11.4	–3.1	–11.0	2.7	120.3
Very unfavorable	1,189,929	–9.0	–2.6	–8.7	2.4	126.0
Unfavorable	240,490	–8.3	–2.1	–7.5	1.3	87.9
Conditionally unfavorable	762,405	–4.6	1.8	–7.0	0.5	62.7

Source: “Municipal Indicators Database” of Rosstat. The migration rates were calculated without data from closed administrative and territorial entities.

250,000 inhabitants) and four medium-sized (from 50 to 100,000 inhabitants) cities in the Russian Arctic. 1,475,300 inhabitants live in the cities that make 56.3 % of population of the Russian Arctic. Migration flows associated with these cities are central to the demographic dynamics of the Russian Arctic (table 5).

Medium, big and large cities have relatively high rates of increase due to internal migration – they attract people from the neighbouring territories. Cities in Arkhangelsk and Murmansk regions with relatively favorable natural and climatic conditions, where higher education institutions are located, even have

a positive indicator of intraregional migration growth. All cities (except Salekhard) have negative migration balances with other regions. Medium, big and large cities are experiencing positive migration gains in international exchanges.

Three migration models specific to the Arctic cities can be identified. The first model is found in the most climate- and transport-friendly cities of the European North of Russia: Arkhangelsk, Murmansk, Severodvinsk, Apatity, and the capital city of Salekhard. The peak of migration is in the age group of 15–29 years. These are mainly school leavers in nearby areas, students

Table 5. Migration rate of growth (decline) in large, big and medium-sized urban areas of the Russian Arctic per 1,000 persons, 2012–2019

Urban okrug	Population at the beginning of the year, persons		Migration rate of growth (decline) per 1000 persons, 2012–2019			
	2012	2020	total	inside the region	between the regions	international
Arkhangelsk	355,623	354,103	–0.3	5.9	–7.0	0.7
Murmansk	305,034	287,847	–10.1	1.3	–13.2	1.8
Severodvinsk	193,135	182,970	–5.0	2.8	–8.4	0.6
Norilsk	178,139	182,496	–5.5	–0.6	–8.9	4.0
Novy Urengoy	112,192	118,033	–4.5	–2.2	–5.1	2.9
Noyabrsk	109,236	106,911	–12.3	–5.3	–10.7	3.7
Vorkuta	91,400	73,123	–30.1	–0.8	–30.8	1.5
Severomorsk	67,663	63,870	No data			
Apatity	59,239	54,670	–5.8	2.2	–9.2	1.2
Salekhard	44,633	51,263	6.1	–0.2	2.7	3.5

Source: “Municipal Indicators Database”

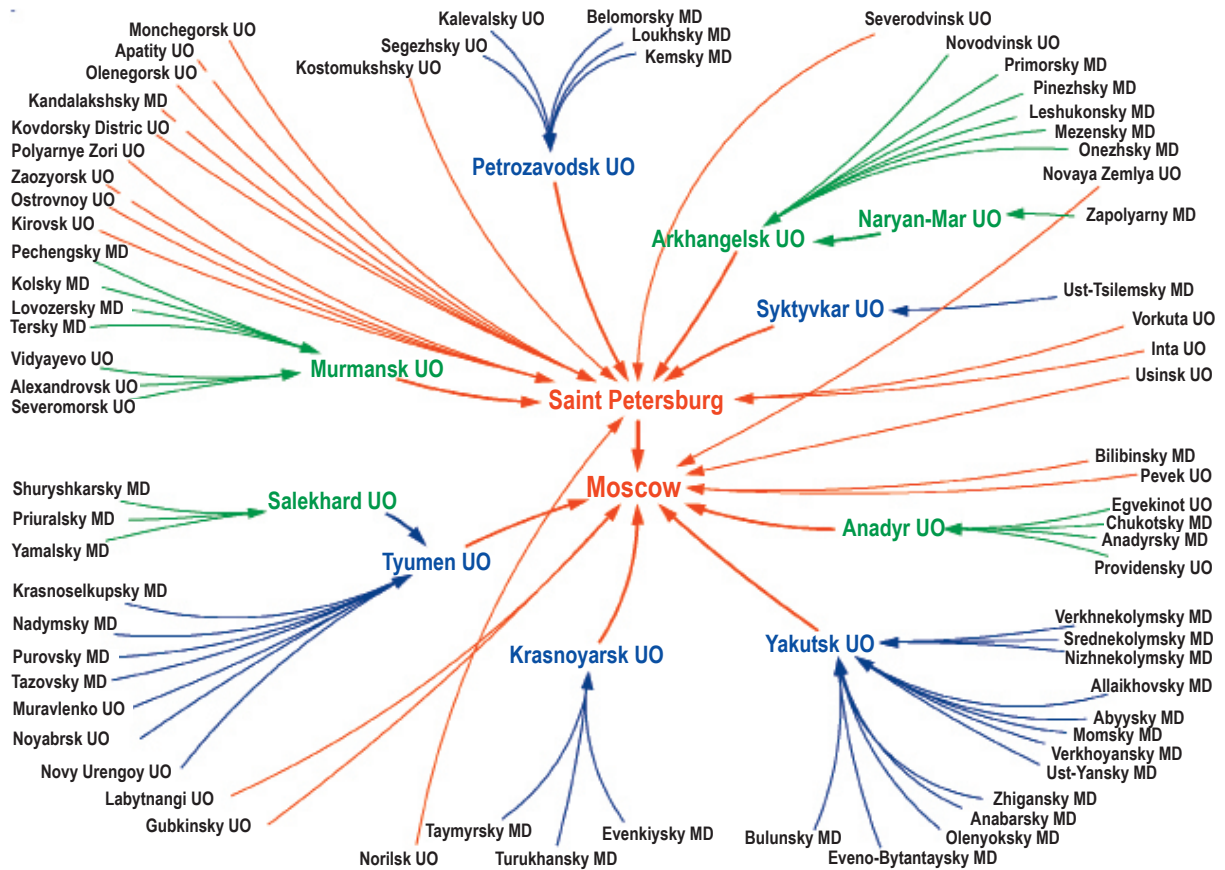


Fig. 2. Main routes of inter-municipal migration in the Russian Arctic, 2015. Green arrows mark flows within the Arctic, blue – to cities outside the Arctic, red – to Moscow and St. Petersburg. Compiled according to the project “The virtual population of Russia”

and university graduates. Migration mobility among girls slightly exceeds that of lads. Arrivals and departures have one apparent maximum. The second model is typical to resource cities in the early stages of development with the big demand in labour resources. Novy Urengoy is a good example, where male migration mobility is 1.5 times higher than female migration and the number of migrants is almost evenly distributed over all working ages. The third model, which is typical to resource cities in the late stages of development (Vorkuta, Norilsk), differs in that there are two almost identical elimination peaks – at the ages of 20–34 and 50–64. The majority of adult population in these cities tends not to a short shift team, but is leaving on reaching retirement age (fig. 3).

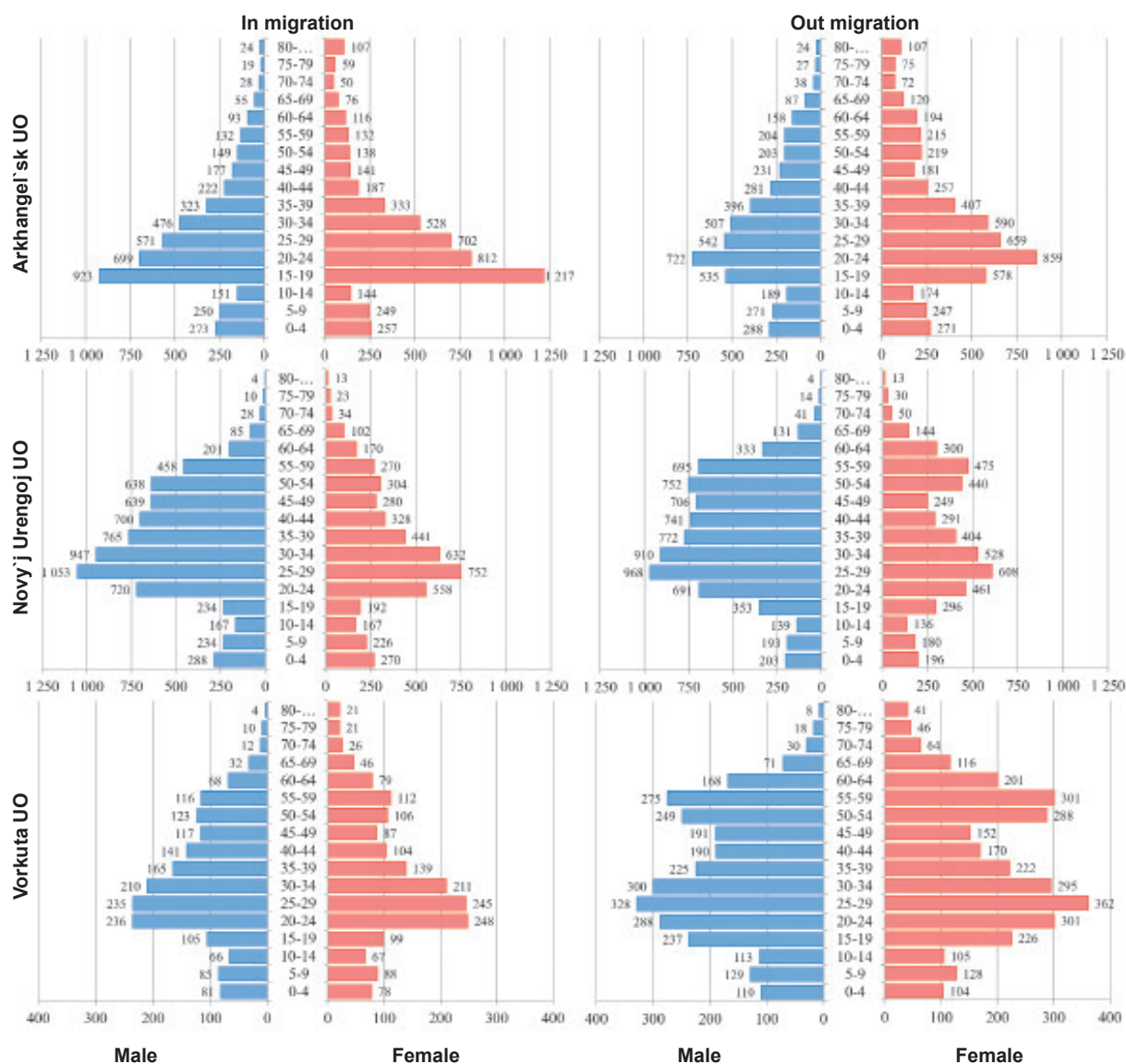
According to the demographic forecasts [20; 33] over the next decades, the Russian Arctic will continue losing population at an attenuating rate as a result of interregional migration. The exception may be the autonomous areas, which will remain attractive because of oil and gas fields' exploration and the North Sea Route development. However, these regions are also likely to experience future population outflows because of the decline in the resource cycle observed in the north of the Komi Republic [34]. In the western part of Arctic, by contrast, a stable population can be

expected over time. This will be facilitated by the exhaustion of the migration potential of the least attractive areas and by the numerous Arctic development programmes.

Conclusion

An analysis of migration processes in the Russian Arctic, by municipal areas, once again confirmed the decisive role of interregional migration in population dynamics. Internal migration redistributes population within the region without changing its total size and influences the pattern of settlement, reducing population of settlements located in climate-prone areas to locations with better living conditions. For example, inhabitants of polar Vorkuta tend to choose Syktyvkar as the place of residence.

Analysis of social media data reveals migration preferences of Russian Arctic residents, Moscow and Saint Petersburg are the most popular destinations for inhabitants of 75 urban areas and municipal districts, 31%. Whereas, Saint Petersburg is attractive for the European Arctic residents, and Moscow for the Asian ones. The exception is “European” Usinsk and Novaya Zemlya, where preference is given to Moscow, as well as “Asian” Norilsk, whose inhabitants more often leave for Saint Petersburg. People in



the vast majority of rural territories tend to move to the regional capitals.

Spatial analysis has shown that current migration in the Arctic is the result of a complex combination of natural-climatic, historical, social and economic causes. It has been shown that medium, big and large cities act as intermediate links of migration routes from the Arctic territories to the federal and regional capitals outside the Arctic: Moscow, Saint Petersburg, Krasnoyarsk, Tyumen, Petrozavodsk, Syktyvkar, and Yakutsk.

Three gender and age models of migration have been identified based on both the migration history and the current socio-economic situation. The first model promotes long-term sustainable urban development through the youth concentration. The second model allows resource cities to grow dynamically,

which may eventually lead to imbalances in population composition. The third model (the “compression model”) fulfils an important social function, allowing cities to weed out population that is redundant at a later stage of development, as well as reducing the burden on the social infrastructure of the Arctic territories due to movement of the older generation outside the Arctic. Use of the listed models can be an effective tool for development of predictive scenarios for the Russian Arctic development.

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