

# TRENDS IN POPULATION CHANGE AND THE SUSTAINABLE SOCIO-ECONOMIC DEVELOPMENT OF CITIES IN NORTH-WEST RUSSIA

---

**A. A. Anokhin**  
**K. D. Shelest**  
**M. A. Tikhonova**

---

Saint Petersburg State University  
7–9 Universitetskaya emb., Saint Petersburg, Russia, 199034

Received 21 November 2018  
doi: 10.5922/2079-8555-2019-4-3  
© Anokhin A. A., Shelest K. D.,  
Tikhonova M. A., 2019

*The Northwestern Federal District is a Russian macro-region that is a unique example of a model region. It accounts for 10 % of the country's total area and 9.5 % of its population. This article aims to trace the patterns of city distribution across the region, to assess the conditions of differently populated cities and towns, and to identify sustainability trends in their socio-economic development. Population change is a reliable indicator of the competitiveness of a city. As a rule, a growing city performs well economically and has a favourable investment climate and high-paid jobs. The analysis revealed that population change occurred at different rates across the federal district in 2002–2017. A result of uneven socio-economic development, this irregularity became more serious as globalisation and open market advanced. The study links the causes and features of growth-related differences to the administrative status, location, and economic specialisation of northwestern cities. The migration behaviour of the population and the geoeconomic position are shown to be the main indicators of the sustainable development of a city.*

**Keywords:**

cities, urban population, Northwestern Federal District, city classification, population, city sustainability

## **Introduction**

---

When studying the urban population distribution and its dynamics over the past decades, it is necessary to take into account the territorial heterogeneity of

---

**To cite this article:** Anokhin, A. A., Shelest, K. D., Tikhonova, M. A. 2019, Trends in population change and the sustainable socio-economic development of cities in North-West Russia, *Balt. Reg.*, Vol. 11, no 4, p. 36–57.  
doi: 10.5922/2078-8555-2019-4-3.

the socio-economic and demographic processes taking place in the Russian Federation. For analysis at the macroregional level, it is advisable to use a geodemographic typology and economic zoning schemes developed back in the Soviet period for the purposes of spatial planning [1, p. 32–34; 2–4, p. 92–98], although the population and economy of Russia have undergone significant changes since their development more than 30 years ago.

At present, the validity of identifying macro-regions (economic regions), the list of which is given in the All-Russian Classifier of Economic Regions<sup>1</sup> within the former borders, is attracting considerable criticism. Nevertheless, there has been no other generally accepted and substantiated option for zoning the territory of the country proposed. In 2000, the country's territory was quite roughly divided into seven federal districts: Central, Northwestern, Southern, Volga, Ural, Siberian, and Far Eastern. This study considers the Northwestern Federal District (NWFD) as this macro-region occupying almost 10 % of the territory of Russia with about 9.5 % of its population living there is a good example of a model territory.

The current geodemographic situation in Russian cities, including those in the subjects of the RF in the Northwestern Federal District, as well as the polarization of the subjects of Russia, were studied in detail by A.A. Anokhin, G.M. Fedorov, D.V. Zhitin, V.M. Razumovsky, S.S. Lachininsky, A.G. Druzhinin [5–10]. They investigated current trends in the urban population dynamics in Russian cities, including cities of the Leningrad region and coastal cities of the Baltic region, the polarization of the settlement system, and other aspects associated with the demographic processes occurring in the regions of the country.

Geodemographic development trends in the Baltic region at the national and regional levels were described in detail by T. Yu. Kuznetsova [11; 12] who has identified and analyzed the components that determine population dynamics in various administrative-territorial units and factors that have a significant impact on demographic processes. The evolution of the system of urban settlements and the dynamics of natural and socio-economic processes in the Russian Arctic are considered in the study by V.L. Baburin and S.P. Zemtsov [13].

---

<sup>1</sup> *The All-Russian Classifier of Economic Regions*. OK 024–95. Approved by Decree of the State Standard of Russia dated 12/27/1995 No. 640 (as amended on 02/13/2018). URL: [www.consultant.ru/document/cons\\_doc\\_LAW\\_115583/](http://www.consultant.ru/document/cons_doc_LAW_115583/) (access date: 08.15.2018).

The UN report on the world urbanization prospects<sup>2</sup> indicates that although the problem of the outflow of population from large, medium and small cities and the growth of the largest cities are typical for most countries, they are especially relevant for countries of Eastern Europe and low-income countries with significant differences in the conditions and standards of living of the population. International researchers emphasize that the main path of development for cities and rural settlements is the compliance with the principles of sustainability in the economic and social spheres as well as in environmental development [14; 15]. The development of indicators for assessing the sustainability of urban development has been the subject of a large number of international<sup>3</sup> and Russian studies [16].

At present, in many cities across the world, “sustainability is the dominant paradigm of urban development and is a factor in the growth of competitiveness,” while in Russia “there is a transition from a stochastic to strategic implementation of the sustainable development approach while preserving formal imitation moments” [17, p. 95].

Swedish researchers have studied in detail the feasibility of implementing the UN-Habitat Agenda in terms of developing and applying sustainability indicators in cities of different sizes in Sweden and Russia, taking into account citizens’ interest and actual participation in urban development [18].

The studies of Chinese scientists on the increase in the population of the largest cities in China and the opportunities for their sustainable development are of particular interest. The rapid growth and globalization of the domestic economy have dramatically accelerated urbanization in the country leading to significant environmental consequences and challenging its sustainable development. Using a multi-stage model that takes into account the age, gender, education and migration distribution in rural and urban areas, the paper assesses the development of the urbanization process in China until 2030 and addresses the main issues of urban sustainability. The results show that, according to some assumptions, the urban population of China will almost double from 2000 to 2030; labour force will make up a larger share of the total population in urban

---

<sup>2</sup> *World Urbanization Prospects: The 2018 Revision // Population Division of the UN Department of Economic and Social Affairs.* URL: <https://www.un.org/development/desa/publications/2018-revision-of-world-urbanization-prospects.html> (access date: 12.09.2018).

<sup>3</sup> *Indicators for Sustainable Cities.* European Union. 2018. URL: [ec.europa.eu/environment/integration/research/newsalert/pdf/indicators\\_for\\_sustainable\\_cities\\_IR12\\_en.pdf/](http://ec.europa.eu/environment/integration/research/newsalert/pdf/indicators_for_sustainable_cities_IR12_en.pdf/) (access date: 24.08.2018).

areas than in rural areas due to internal migration of young workers, especially in Beijing and Shanghai, which may put pressure on China's industrial structural transition from an agricultural to a service-based economy [19].

In the Baltic region, there is an increase observed in the number of large cities and a decrease in small cities. The growth of large cities in the Baltic States is analyzed mainly in the context of urban development in the post-Soviet space in Central and Eastern Europe. Recently, local researchers, mainly urban geographers and urban planners, have also shown interest in this topic [20; 21]. Generally, the emphasis of the studies is on capital cities and metropolitan regions undergoing major transformations: Vilnius, Riga and Tallinn. Research on modern urban development in the Baltic States allows for further discussions on the growth of large cities to identify the specific causes and consequences of this phenomenon from the standpoint of urban sustainability.

Despite a large number of studies conducted, the identification of negative factors affecting the geodemographic dynamics in Russia's subjects, and ongoing state federal and regional programs, the situation does not change in many cities and regions as they continue to lose population. This indicates the need for further research on the dynamics of the population of Russian cities, factors in their development and key areas for increasing sustainability.

The aim of this article is to identify patterns of distribution of urban settlements across the region and to detect trends in sustainability of their socio-economic development, as well as to assess the condition of cities of different size.

## **Research Methods and Information Basis**

To analyze the evolution of urban settlements in Northwest Russia, the research uses the *method of spatio-temporal analysis* of urban system emergence and development, as well as the methods of comparative, statistical analysis and systematization. A study of the dynamics of urbanization made it possible to identify several stages and the most significant trends in the process that influenced the change in the spatial distribution of cities in Northwest Russia. To determine the role of population migration in ensuring sustainable development of the northwest regions, the Spearman's rank correlation coefficient was calculated.

The study uses the data of the Federal State Statistics Service, its territorial divisions in the Northwestern Federal District, as well as materials from the SGM rating agency, which calculates the sustainable development rating of cities of the Russian Federation<sup>4</sup>.

Statistical research materials for this study are presented mainly in absolute terms allowing to demonstrate the significance of population growth dynamics in St. Petersburg and the Leningrad Region, as well as to identify demographic prerequisites for sustainable urban development.

### **Urban population trends in the Northwestern Federal District**

Currently (in 2019), there are officially 147 cities in the Northwestern Federal District, including:

- 1 city with a population of more than 1 million people;
- 6 major cities (250,000 to 500,000 inhabitants);
- 3 large cities (100,000 to 250,000 inhabitants);
- 13 medium cities (50,000 to 100,000 inhabitants);
- 124 small cities (less than 50,000 inhabitants).

Table 1. presents the distribution of cities by regions of the NWFD and the change in the number and share of the urban population in the total population of the district in 2002—2017<sup>5</sup>.

As follows from the data in Table 1, the Leningrad and Kaliningrad regions hold leading positions in the number of cities (32 and 22, respectively). This is due to historical and geographical reasons, their long-standing development, as well as the influence of St. Petersburg on the territorial development and growth of cities in the Leningrad region and the border position of the Kaliningrad region, an exclave of the Russian Federation. The specific features of the urban settlement structure of the Northwestern Federal District include the presence of a city of federal significance, Saint-Petersburg, which is a subject of the Russian Federation, and the fact that there is only one city in the Nenets Autonomous Okrug. The lowest share of the urban population in the total population is observed in the Leningrad Region (64 %), which is explained by its proximity to St. Petersburg.

---

<sup>4</sup> Sustainable development rating of Russian cities for 2016. SGM Rating Agency, 2017. URL: [www.agencysgm.com/projects/sostavlenie-reytinga-gorodov-rossii-v-oblasti-ustoychivogo-razvitiya/](http://www.agencysgm.com/projects/sostavlenie-reytinga-gorodov-rossii-v-oblasti-ustoychivogo-razvitiya/) (access date: 09.12.2018).

<sup>5</sup> *Population of the Russian Federation by municipalities* as of January 1, 2018: Stat. Sat / Rosstat. — M.: 2018. URL: [www.gks.ru/wps/wcm/connect/rosstat\\_main/rosstat/ru/statistics/publications/catalog/afc8ea004d56a39ab251f2bafc3a6fce](http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/publications/catalog/afc8ea004d56a39ab251f2bafc3a6fce) (access date: 21.11.2018).

Table 1

## Distribution of cities by region of the NWFD and changes in the urban population in the total population of the NWFD in 2002 – 2017

NWFD's subject	Number of cities in 2017	Population in 2002, thousand people	Population in 2017, thousand people	Population change in 2002 – 2017, thousand people	Urban population in 2002, thousand people	Urban population in 2017, thousand people	Urban population change in 2002 – 2017, thousand people	Urban population change in 2002 – 2017, %	Share of urban population in total population in 2002, %	Share of urban population in total population in 2017	Change in the proportion of urban population in total population in 2002 – 2017
Republic of Karelia	13	717	627	- 90	538	503	- 35	- 6.5	75.0	80.2	5.2
Komi Republic	10	1.019	850	- 169	767	663	- 104	- 13.6	75.3	78	2.7
Arhangelsk region	13	1.295	1.122	- 173	973	875	- 98	- 10.1	75.1	78	2.9
Nenets Autonomous Okrug	1	41	44	3	26	32	6	23.1	63.4	72.4	9.0
Vologda Region	15	1.270	1.184	- 86	877	854	- 23	- 2.6	69.1	72.2	3.1
Kaliningrad region	22	955	986	31	742	767	25	3.4	77.7	77.8	0.1
Leningrad region	32	1.671	1.792	121	1.110	1.148	38	3.4	66.4	64	- 2.4
Murmansk region	16	893	757	- 136	824	700	- 124	- 15.0	92.3	92.4	0.1
Novgorod region	10	695	613	- 82	485	434	- 51	- 10.5	69.8	70.8	1.0
Pskov region	14	761	642	- 119	503	454	- 49	- 9.7	66.1	70.7	4.6
St. Petersburg	1	4.669	5.282	613	4.669	5.282	613	13.1	100.0	100	0.0
<i>Total</i>	147	13.986	13.899	- 87	11.514	11.712	198	1.7	82.3	84.3	2.0

Source: calculated by the authors based on data from Rosstat (2002 – 2018).

From 2002 to 2017, the population of the subjects of the RF in the NWFD, with the exception of the Nenets Autonomous Okrug, the Kaliningrad and Leningrad regions as well as St. Petersburg, decreased. A similar trend was observed in the urban population dynamics (Fig. 1).

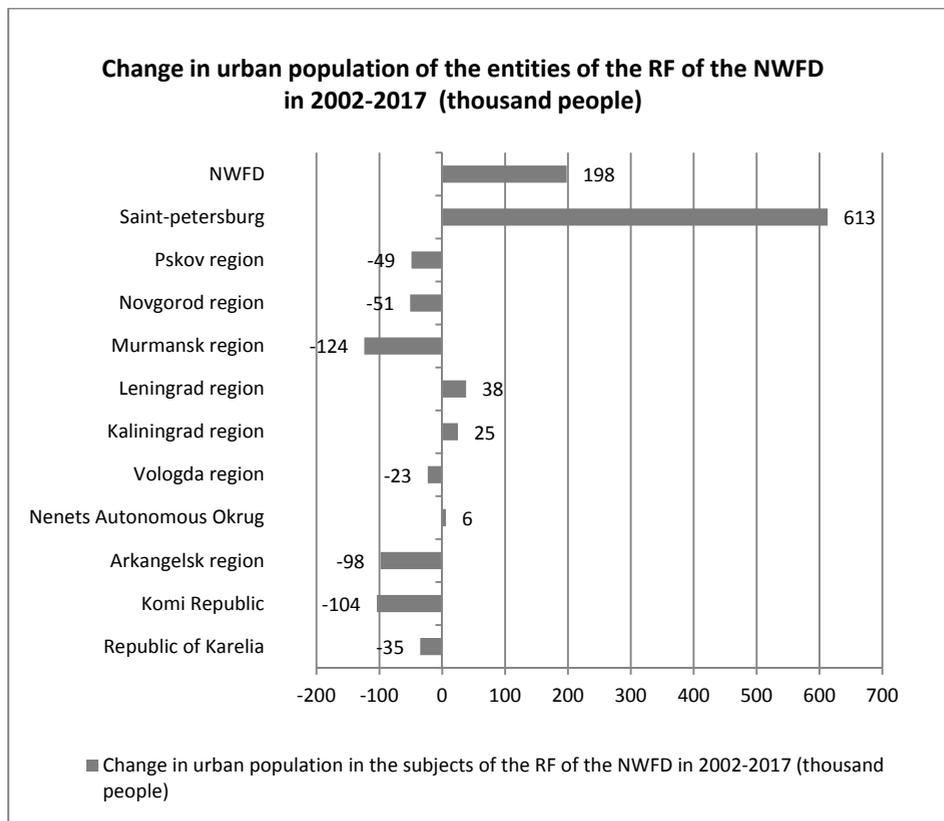


Fig. 1 Changes in the urban population in the subjects of the RF of the NWFD in 2002—2017, thousand people

*Source:* calculated by the authors based on data from Rosstat (2002—2018).

The greatest loss of urban population was observed in the northern subjects of the RF (more than 10 % in 2002—2017), as well as in the Novgorod and Pskov regions.

The study includes the analysis and compilation of classification of the data on the urban population of the NWFD in 2017 presented in Table 2. The most numerous cities (those with a population of less than 50 thousand people) were examined in more detail. They were divided into three separate subgroups (minor, lesser and small). Major and large cities are represented by industrial and administrative centres of the subjects of the RF. They are the major nodes of the settlement system in the northwest.

Table 2

## Classification of the NWF D's cities by population (for 2017)

NW NWF D's subject	Up to 10,000 people ( <i>small</i> )	10,000—20,000 people ( <i>lesser</i> )	20,000—50,000 people ( <i>minor</i> )	50,000—100,000 people ( <i>medium</i> )	100,000—250,000 people ( <i>large</i> )	250,000—500,000 people ( <i>major</i> )
Leningrad region	<i>Total — 5</i> Novaya Ladoga Vysotsk Kamennogorsk Primorsk Lyuban	<i>Total — 9</i> Ivangorod Boksitogorsk Volosovo Syasstroy Svetogorsk Shlisselburg Lodeynoye Pole Podporozhye Priozersk Kudrovo	<i>Total — 10</i> Pikalevo Volkhov Communard Kingisepp Kirovsk Otradnoe Luga Shales Tosno Nikolskoye	<i>Total — 7</i> Vsevolozhsk Sertolovo Vyborg Gatchina Kirishi Tikhvin Sosnovyi Bor	—	—
Vologda region	<i>Total — 8</i> Belozersk Kadnikov Krasavino Kirillov Nikolsk Totma Ustyuzhina Kharovsk	<i>Total — 3</i> Babaev Vytegra Gryazovets	<i>Total — 2</i> Velikiy Ustyug Sokol	—	—	<i>Total — 2</i> Vologda Cherepovets
Novgorod region	<i>Total — 2</i> Soltsy Holm	<i>Total — 5</i> Okulovka Valdai Malaya Vishera Pestovo Chudovo	<i>Total — 1</i> Staraya Russa	<i>Total — 1</i> Borovitchi	<i>Total-1</i> Nizhnyi Novgorod	—
Pskov region	<i>Total — 8</i> Gdov Dno Novorzhev Novosokolniki Porkhov Pustoshka Pytalovo Sebezh	<i>Total — 3</i> Nevel Opochka Pechory	<i>Total — 1</i> Ostrov	<i>Total — 1</i> Velikie Luki	<i>Total — 1</i> Pskov	—

The end of Table 2

NW NWF D's subject	Up to 10,000 people ( <i>small</i> )	10,000—20,000 people ( <i>lesser</i> )	20,000—50,000 people ( <i>minor</i> )	50,000—100,000 people ( <i>medium</i> )	100,000—250,000 people ( <i>large</i> )	250,000—500,000 people ( <i>major</i> )
Kaliningrad region	<i>Total — 10</i> Ladushkin Mamonovo Ozersk Krasnoznamenensk Pravdinsk Slavsk Bagrationovsk Primorsk Nesterov Polessk	<i>Total — 6</i> Gvardeysk Guryevsk Zelenogradsk Pioneer Svetlogorsk Neman	<i>Total — 5</i> Gusev Svetlyi Sovetsk Baltiysk Chernyakhovsk	—	—	<i>Total — 1</i> Kaliningrad
Republic of Karelia	<i>Total — 4</i> Lahdenpohja Olonets Pudozh Suojärvi	<i>Total — 5</i> Kem Medvezhyegorsk Sortavala Belomorsk Pitkäranta	<i>Total — 3</i> Kostomuksha Kondopoga Segezha	—	—	<i>Total — 1</i> Petrozavodsk
Komi Republic	<i>Total — 1</i> Mikun	<i>Total — 2</i> Emva Vuktyl	<i>Total — 4</i> Inta Usinsk Pechora Sosnogorsk	<i>Total — 2</i> Vorkuta Ukhta	<i>Total — 1</i> Syktyvkar	—
Nenets Autonomous Okrug	—	—	<i>Total — 1</i> Naryan-Mar	—	—	—
Arhangelsk region	<i>Total — 3</i> Solvychegodsk Mezen Shenkursk	<i>Total — 2</i> Onega Kargopol	<i>Total — 5</i> Koryazhma Peaceful Novodvinsk Velsk Nyandoma	<i>Total — 1</i> Kotlas	<i>Total — 1</i> Severodvinsk	<i>Total — 1</i> Arkhangelsk
Murmansk region	<i>Total — 3</i> Zaozersk Island Kolas	<i>Total — 6</i> Polarnye Zori Kovdor Polarnyi Gadzhievo Snezhnogorsk Polarnyi	<i>Total — 4</i> Kirovsk Monchegorsk Olenegorsk Kandalaksha	<i>Total — 2</i> Apatity Severomorsk	—	<i>Total — 1</i> Murmansk
<i>Total</i>	44	42	36	14	4	6

Source: compiled on the basis of Rosstat data (2002—2018).

The study of the evolution of urban settlements in Northwest Russia is based on the method of spatio-temporal analysis of emergence and development of the urban system. The analysis of the urbanization dynamics in Northwest Russia allowed distinguishing two stages. By the middle of the 19th century, a core network of “historic cities” had emerged. These were the centres of settlement in the European part of Russia in the pre-industrial period. Early Industrialization period saw the emergence of a new trend to develop new territories by founding mostly primary producing cities.

There are several urbanization trends having considerable influence on the spatial distribution of cities in Northwest Russia.

St. Petersburg as a city of federal significance and the centre of the macroregion dominates in all socio-economic spheres (industry and services, transport, innovation, financial and credit, and scientific and cultural ones).

The centres of republics and regions with a population of over 100,000 people play an important role in the district settlement system. The largest regional centre is Kaliningrad with a population of 459,000 people, which is 50 % of the region's population. One of the largest and oldest major nodes in the North is the Arkhangelsk agglomeration accounting for 25 % of the total urban population of the Russian Arctic. The second largest is Murmansk (14 %). Although during the period of booming economic activity it had bypassed Arkhangelsk, with the onset of the crisis of the 1990s, it turned out to be the leader in population and production potential losses. Large cities of the Vologda region (two industrial centres of Vologda and Cherepovets) have a population of more than 300,000 people each. It is also necessary to highlight such cities as Petrozavodsk (277 thousand) and Syktyvkar (243 thousand), the centres of the Republic of Karelia and the Republic of Komi respectively, having great regional significance in the NWFD. The city of Severodvinsk, the expression of the third stage of development of the Russian Arctic, concentrates about 8 % of its urban population.

The next group is urban settlements with a population of 50,000 to 100,000 people. The largest cities are also located in the north. They are characterized by the most considerable decline in population in the post-Soviet period. These are primarily single-industry towns with prevailing mining and metallurgical specialization (Vorkuta — coal, Ukhta — oil and gas production, Apatity — apatites and nepheline ore) [22].

The most numerous group of urban settlements is cities with a population of 10,000—20,000 people. This group includes historic settlements in the North of Russia, for example, Kem, Anadyr, Kola, Belomorsk, as well as industrial

settlements (Polyarnye Zori — nuclear power plants, Kovdor — iron ore production, Urengoy — natural gas production). In the Murmansk region, most of them are closed administrative-territorial entities (ZATOs). These are the entities with local governments as well as military and other facilities located on their territory. They have a special regime established for the secure functioning and protection of state secrets, including special living conditions for citizens. The Ministry of Defense's ZATOs include naval submarine bases in the Murmansk region: Zaozersk (10 thousand), ZATO Aleksandrovsk, consisting of three cities: the city of Gadzhievo (12.9 thousand), the city of Polarnyi (17.5 thousand), the city of Snezhnogorsk (12.7 thousand). The largest ZATO in the Murmansk region is Severomorsk (51.2 thousand), where the base of surface ships of the Northern Fleet is located. The smallest is the city of Ostrovnoy (1,876 people) rapidly losing its population over the past decade. It has decreased eightfold since 1996. This is the location of the Gremikha Naval base of the Northern Fleet, and one of the smallest cities in Russia.

Ostrovnoy is a part of the group of urban settlements with the smallest population. Formally, these are cities, although they have more than halved in size to have less than 10,000 inhabitants. The bulk is single-company settlements and regional centres with difficult accessibility. This is the largest group in Northwest Russia, the majority of these cities are in the Kaliningrad (10), Vologda (8) and Pskov (8) regions. These are majorly the most vulnerable cities in terms of socio-economic sustainability. However, there are also dynamically developing cities with large port complexes, for example, Primorsk and Vysotsk in the Leningrad region.

The studies of the factors and conditions of economic differentiation of urban settlements and the research on their correlation with the distribution of productive forces allowed to develop a structural-functional typology of urban and rural settlements of the Northwestern Economic Region [23]. This work analyses urban settlements of the Leningrad, Novgorod and Pskov regions.

The spatial heterogeneity of the regions of Northwest Russia is the result of the formation of a vast peripheral area with stable stagnation of its population and production. The city of St. Petersburg acts as an external factor in this case. Being the largest socio-economic as well as scientific and technical centre in the northwest, it has a steady impact on the development of cities in the suburban areas of the Leningrad region forming the modern boundaries of the St. Petersburg metropolitan area. Moreover, the city indirectly affects the manufacturing industry in the urban settlements of the Novgorod and Pskov regions, as it is the largest sales market in the northwest.

Internal factors enhancing the polarized development of the regions of the NWFD include weakly diversified economies of the Novgorod and Pskov regions, heavy concentration of industrial production in the regional centres, low-quality basic, core, research and technological infrastructure, as well as insufficiently developed engineering, social and transport infrastructure in peripheral areas, concentration of skilled labour in large cities and a decrease in the share of economically active population in peripheral territories, the single-industry structure of the economy and weak organizational and economic relations of most of the regional centres of the Novgorod and Pskov regions.

In order to study the factors and conditions of economic differentiation of urban settlements and to determine their correlation with the distribution of productive forces, the authors developed a structural and functional typology of urban settlements of the Leningrad, Kaliningrad, Novgorod, Pskov regions, as well as regional and republican centres of the NWFD. It is presented in Table 3 along with indicators of population dynamics for 2002–2017.

The economically powerful city of St. Petersburg has stimulated the development of territories with high investment and industrial potential, developed transport infrastructure and sufficient labour resources in the suburbs of its agglomeration, in the areas with developing port facilities and in those situated close to international transport corridors (Kingisepp, Primorsk, Vyborg, Vysotsk), as well as in old industrial areas (Kirishi, Tikhvin, Volkhov).

The Novgorod and Pskov regions are characterized by a high concentration of industrial production in regional centres (Novgorod, Pskov, Velikiye Luki). The key “growth points” of the second order are diversified industrial hubs (Borovichi, Staraya Russa, Chudovo) and cities with developed economic specialization (Malaya Vishera, Pestovo, Valdai, Okulovka, Ostrov, Nevel, Porkhov, Dno).

In the Novgorod region, the territorial differentiation of economic development seems more dispersed. The key territories with sufficient potential for economic growth and balanced development of the region as a whole include the regional centre Veliky Novgorod, as well as industrial hubs with advanced engineering (Staraya Russa), woodworking industry (Chudovo, Malaya Vishera) and the production of refractories and building materials (Borovichi). In the Pskov region, prosperous areas include Pskov, Velikiye Luki, Ostrov and other centres of diversified economic activities, specializing in the manufacturing of engineering products.

Table 3

**Structural and functional typology of the NWF cities and their population dynamics in 2002 – 2017**

Structural-functional type	Cities	Population, thousand people (2002)	Population, thousand people (2017)	Population change,%
City of federal significance	Saint-Petersburg	4,661.2	5,281.6	+ 13.3
Centres of regions/ of subjects of the RF that are multifunctional industrial hubs with sectoral specialization	Arkhangelsk	356.0	351.5	– 1.3
	Velikiy Novgorod	216.8	222.6	+ 2.6
	Vologda	293.0	313.0	+ 6.8
	Kaliningrad	430.0	467.3	+ 8.7
	Murmansk	336.1	298.1	– 11.3
	Naryan-Mar	18.6	24.6	+ 32.5
	Pskov	202.8	209.8	+ 3.5
Centres of administrative districts that are multifunctional industrial hubs with industrial and economic functions	Petrozavodsk	266.1	278.5	+ 4.6
	Syktvykar	230.0	244.6	+ 6.3
	Gatchina	88.4	95.2	+ 7.6
	Vyborg	79.2	78.4	– 0.9
	Vsevolozhsk	45.3	70.3	+ 55.1
	Borovichi	57.7	50.9	– 11.9
	Kirishi	55.6	51.9	– 6.6
Centres of administrative districts that are cities with a diversified economic structure with industrial and economic functions	Tosno	38.7	37.9	– 2.1
	Staraya Russa	35.5	29.0	– 18.3
	Chernyakhovsk	44.3	36.4	– 17.8
	Sosnobyi Bor	66.1	68.0	+ 2.9
	Tikhvin	63.3	57.9	– 8.6
	Kingisepp	50.3	47.3	– 5.9
	Volkhov	46.6	45.2	– 3.0
	Luga	40.4	35.8	– 11.5
	Kirovsk	24.4	25.9	+ 6.6
	Chudovo	17.4	14.7	– 15.5
	Baltiysk	33.3	33.2	– 0.2
	Gusev	28.5	28.3	– 0.7
	Sovetsk	43.2	36.4	– 17.8
Pionerskiy	11.8	11.3	– 3.9	
Svetlyi	21.7	22.1	+ 1.8	
Slantsy	37.4	32.8	– 12.1	
Ostrov	25.1	20.6	– 18.0	
Lodeynoe Pole	22.8	19.7	– 13.8	
Centres of administrative districts that are local centres with economic and recreational functions	Priozersk	20.5	18.6	– 9.2
	Podporozhye	20.3	17.7	– 13.0
	Boksitogorsk	18.1	15.4	– 15.0
	Pestovo	16.0	15.5	– 3.3
	Valdai	18.7	14.4	– 23.1
	Nevel	18.5	15.1	– 18.4
	Volosovo	11.6	12.1	+ 4.2
	Malaya Vishera	14.2	11.0	– 22.3
	Okulovka	14.5	10.5	– 27.6
	Porkhov	12.3	8.9	– 27.2
	Dno	10.0	7.8	– 21.8
	Gvardeysk	14.6	13.2	– 9.5
	Zelenogradsk	12.5	15.5	+ 23.8
	Neman	12.7	10.9	– 14.0
Svetlogorsk	10.9	13.0	+ 19.0	

*The end of Table 3*

Structural-functional type	Cities	Population, thousand people (2002)	Population, thousand people (2017)	Population change, %
Centres of administrative districts that are cities with process manufacturing being the biggest industry	Opochka	14.0	10.3	− 26.2
	Pechora	13.0	10.0	− 23.1
	Soltsy	11.2	9.0	− 20.1
	Guryevsk	10.9	16.3	+ 49.5
	Pravdinsk	4.5	4.2	− 6.9
Centres of administrative districts that are single industry cities with administrative economic the functions	Novosokolniki	9.7	7.4	− 24.4
	Sebezh	7.1	5.4	− 23.6
	Gdov	5.2	3.5	− 31.5
	Novorzhev	4.1	3.3	− 20.1
	Holm	4.3	3.4	− 20.3
	Pytalovo	6.8	5.3	− 21.6
	Pustoshka	5.5	4.0	− 25.9
	Bagratiyovsk	7.2	6.4	− 11.2
	Krasnoznamensk			
	Nesterov	3.7	3.2	− 13.7
	Ozersk	5.0	4.0	− 19.0
	Polessk	5.8	4.1	− 29.2
Slavsk	7.7	7.0	− 8.3	
		5.1	4.1	− 19.8
Local industrial centres and single-industry cities	Sertolovo	38.4	51.3	+ 33.5
	Otradnoe	21.6	25.3	+ 17.5
	Pikalevo	23.3	20.4	− 12.9
	Nikolskoye	17.3	21.9	+ 26.5
	Communard	17.2	21.9	+ 28.0
	Svetogorsk	15.7	15.7	+ 0.1
	Syasstroy	14.0	13.0	− 6.9
	Ivangorod	11.2	10.5	− 5.9
	Novaya Ladoga	9.9	8.4	− 15.2
	Kamennogorsk	6.0	6.7	+ 10.0
	Shlisselburg	12.4	14.7	+ 19.0
	Lyuban	4.6	4.6	− 0.1
	Primorsk (Leningrad region)	5.3	5.7	+ 7.6
	Vysotsk	1.6	1.1	− 33.0
	Ladushkin	3.8	4.0	+ 5.5
	Mamonovo	7.4	8.0	+ 9.0
	Primorsk (Kaliningrad region)	2.1	1.9	− 8.8

Source: calculated on the basis of Rosstat data (2002—2018).

In the Kaliningrad region, cities with a population of less than 50,000 include administrative centres specializing in mechanical engineering, fish processing and food industry, ship repair and those performing port functions (Baltiysk, Svetly). In addition to industrial functions, a number of cities perform recreational functions. These are resort cities (Svetlogorsk, Zelenogradsk).

The main indicator of urban sustainability in the NWFD is the migration behaviour of the population and geo-economic development. Tracing the general results of population migration by the subjects of the district in 2016 and 2017 (Table 4.), one can note the significant migration increase in the Kaliningrad region (9.9 thousand and 9.8 thousand, respectively), the Leningrad Region (21.6 and 30.8 thousand) and St. Petersburg (44.7 and 64.5 thousand)<sup>6</sup>.

Table 4

**General population migration by subjects of the NWFD for 2016–2017**

NWFD entity	Net migration, people		Internal migration, people		International migration, people	
	2016	2017	2016	2017	2016	2017
Republic of Karelia	- 1.008	- 1.916	- 1.247	- 1.584	239	- 332
Komi Republic	- 6.932	- 9.470	- 7.618	- 8.977	686	- 493
Arhangelsk region	- 6.266	- 8.045	- 7.245	- 8.410	979	365
Nenets Autonomous Okrug	- 320	- 231	- 393	- 279	73	48
Vologda Region	- 1.742	- 3.660	- 2.373	- 3.432	631	- 228
Kaliningrad region	9.926	9.839	3.670	4.635	6.256	5.204
Leningrad region	21.659	30.859	17.536	23.463	4.123	7.396
Murmansk region	- 4.343	- 3.503	- 5.149	- 4.383	806	880
Novgorod region	362	- 1,871	- 1.240	- 1.842	1.602	- 29
Pskov region	177	- 548	- 1162	- 1.375	1.339	827
St. Petersburg	44.709	64.546	43.758	46.977	951	17.569
<i>Total</i>	56.222	76.231	38.537	45.072	17.685	31.159

Source: Rosstat database (2016–2017).

<sup>6</sup> The number and migration of the population of the Russian Federation in 2016 // Rosstat database. URL: [www.gks.ru/bgd/regl/b17\\_107/Main.htm](http://www.gks.ru/bgd/regl/b17_107/Main.htm) (access date: 10.15.2018); The number and migration of the population of the Russian Federation in 2017 // Rosstat database. URL: [www.gks.ru/bgd/regl/b18\\_107/Main.htm](http://www.gks.ru/bgd/regl/b18_107/Main.htm) (access date: 08.17.2018).

These regions leading in terms of inward internal migration show positive dynamics, while in the other regions internal migration results in population losses. In 2016, the Novgorod and Pskov regions showed insignificant positive dynamics stemming from considerable migrant quotas for the citizens of other countries, including refugees from Ukraine who, after receiving a residence permit and citizenship of the Russian Federation, move to St. Petersburg. In 2017, there was an internal outflow resulting in negative migration balance in both regions. The other regions of the NWFD saw a significant internal outflow by far exceeding the size of positive international migration both in 2016 and 2017. Such dynamics is the reason behind the change in the urban population in the NWFD cities at the regional level.

### **Sustainability of socio-economic development of the cities of the Northwestern Federal District**

---

The sustainability of the socio-economic development of a modern city is a current challenge that requires the engagement of all its residents and management in order to ensure a high quality of the urban environment, life, as well as the balance between urban and natural environment. Sustainable development of the city should satisfy the needs of its residents [24]. It was at the end of the 20th century that the cities of the world started moving towards sustainability. The UN has created certain institutions to assist this process (HABITAT — UN Centre for Urban Settlements, UEF — Urban Environment Forum, UNEP — UN Environment Program, etc.) [25].

With the development and adoption of sustainable urban development programs, there are hopes for achieving long-term sustainable development of urban settlements. Their difference from any known programs is that they are built around the central idea of ensuring sustainability. This allows for the comprehensive understanding of sustainable development and for prompt counteraction against any negative trends in the evolution of the city.

Urban sustainability requires minimizing the consumption of space and resources, optimizing the urban form to facilitate urban flows, protect both the ecosystem and human health, ensure equal access to resources and services, and maintain the cultural and social diversity and integrity of the urban environment. “The most remarkable thing about cities is that, even with urban sprawl, they take up merely 3 % of the earth’s land surface, but accommodate more than half the world’s population. Cities have lower per capita costs of providing clean water, sanitation, electricity, waste collection, and telecommunications, and offer better access to education, jobs, health care, and social services.” [26, p. 2].

As a rule, socio-economic programs for urban development consider social, economic, industrial, energy, agricultural, tax, transport and other problems separately and in isolation from environmental factors. The current international trend is the increase in strategies and programs for sustainable development, approved and recommended by the UN Rio-92 Conference for governments and peoples of all countries. In 1995, the Russian Federation also approved the Concept of Russia's Transition to Sustainable Development. Such sustainability strategies and programs are the most advanced documents in which for the first time all policies in social, economic, environmental and other spheres are put together. It is the task of any government to facilitate the drafting of sustainable development legislation based on sound economic, social and environmental principles.

In 1994, the participants of the European Conference on Sustainable Cities and Towns (Aalborg, Denmark) adopted the Charter of European Cities & Towns Towards Sustainability. It set forth the following aspects of sustainable socio-economic development of cities:

- Sustainable development as a creative, local, balance-seeking process at the city level;
- Urban economy towards sustainability;
- Social equality for urban sustainability;
- Sustainable land-use planning;
- Sustainable urban mobility patterns;
- Involvement of local government as a necessary precondition for the transition to sustainability, etc.

In 2015, the UN Member States adopted the 2030 Agenda for Sustainable Development outlining 17 goals and 169 targets for sustainable development. Goal No. 11 is ensuring the inclusiveness, security, resilience and environmental sustainability of cities and settlements. One of its targets is “by 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency.”<sup>7</sup>

Many European Commission legal documents and reports, as well as UN international programs, speak of the need for sustainable urban development and the formation of a “sustainable urbanization policy.”<sup>8</sup> Urban sustainability requires an active, focused local strategy that must be both realistic and effective<sup>9</sup>.

---

<sup>7</sup> *Transforming our world: the 2030 Agenda for Sustainable Development*. Resolution adopted by the General Assembly on 25 September 2015. URL: [undocs.org/en/A/RES/70/1](https://undocs.org/en/A/RES/70/1) (access date: 14.10.2018).

<sup>8</sup> *Sustainable urbanization policy brief: Proliferation of urban centres, their impact on the world 's environment and the potential role of the GEF*. Report to the 5th GEF Assembly, México May 2014. URL: [http://www.thegef.org/sites/default/files/publications/Sustainable-Urbanization-Policy-Brief\\_2.pdf](http://www.thegef.org/sites/default/files/publications/Sustainable-Urbanization-Policy-Brief_2.pdf) (access date: 17.10.2018).

<sup>9</sup> *Promoting sustainable urban development in Europe: Achievements and opportunities* // European Commission, 2009. URL: [https://ec.europa.eu/regional\\_policy/sources/docgener/presenta/urban2009/urban2009\\_en.pdf](https://ec.europa.eu/regional_policy/sources/docgener/presenta/urban2009/urban2009_en.pdf) (access date: 14.10.2018 ).

According to Russian researchers, “the main obstacles to the implementation of the principles of sustainable development in Russian cities include the difficulty in perceiving the topic of sustainable development, lack of experience and expertise, and low qualifications of personnel in municipalities, as well as short-term planning horizons” [28, p. 80].

On the way to sustainable development, a city must make the following strategic choice:

- 1) Avoid industrial production and develop creative technologies;
- 2) Diversify the existing industrial cluster;
- 3) Create a new industrial cluster that meets the current needs of the economy [29, p. 298].

These strategies are not in opposition, but it is important to choose the key strategy based on the city’s competitive advantages. In 2018, the Ministry of Economic Development of the Russian Federation developed a new system for assessing Russian cities, the urban development index. It was to become a unified tool for identifying problems and priorities in the development of all types of cities. The index is needed for a spatial development strategy, in which the largest cities are considered as centres of social and economic growth [30; 31].

The choice of sustainability indicators is also of great importance, as they can be included in strategies and state programs for the development of the subjects of the RF, as well as municipal strategies and programs.

Given the vast territory of the NWF and the low population density in comparison with Western Europe, as well as the imperfect transport routes, cities have always been key elements linking agricultural zones and industrial centres, ensuring the development of the regional economy and the preservation of cultural and historical heritage. To maintain this role in an open market economy and ongoing globalization processes, each city regardless of its category needs to create a comfortable and attractive living environment. The main indicator of the attractiveness of the city is the migration behaviour of the population. The simplest calculation done using the Spearman’s rank correlation coefficient ( $r_s$ ) on the data on the regional centre’s sustainability (according to the annual sustainability rating of cities of the Russian Federation<sup>10</sup>) and the migration growth rate per 1,000 people in the subject of the RF<sup>11</sup> indicates a fairly high degree of correlation ( $r_s = 0.6$ ) (Table 5).

---

<sup>10</sup> *Sustainable cities rating of the Russian Federation for 2016* // SGM Rating Agency, 2017. URL: [www.agencysgm.com/projects/sostavlenie-reytinga-gorodov-rossii-v-oblasti-ustoychivogo-razvitiya/](http://www.agencysgm.com/projects/sostavlenie-reytinga-gorodov-rossii-v-oblasti-ustoychivogo-razvitiya/) (access date: 09.12.2018).

<sup>11</sup> *Regions of Russia. Socio-economic indicators. 2017: stat. Sat / Rosstat. M., 2017.*

Table 5

**Rating of the regional centres of the subjects of the RF according to the sustainability index and migration growth rate per 1,000 people**

NWFD's region	Rating of the regional centre according to the sustainability index in 2016	Migration growth rate per 1,000 people in 2016	Rating of the subject according to migration increase per 1,000 people in 2016
Kaliningrad region	1 (Kaliningrad)	101	1
Vologda region	2 (Vologda)	- 15	4
Novgorod region	3 (Velikiy Novgorod)	6	2
Komi Republic	4 (Syktyvkar)	- 81	8
Murmansk region	5 (Murmansk)	- 57	7
Republic of Karelia	6 (Petrozavodsk)	- 16	5
Pskov region	7 (Pskov)	3	3
Arhangelsk region	8 (Arkhangelsk)	- 56	6

*Source:* compiled according to the Federal State Statistics Service (2016—2017) and the rating agency SGM (2017).

However, in the rating of sustainable urban development compiled by the rating agency SGM, the data were analyzed only for the cities with a population of more than 100,000 people. As follows from the data given in Table 3, the situation in this category of cities in the NWFD is the most favourable. The main outflow of the population is observed in medium and small cities, which are the biggest contributors to the negative values of the migration growth coefficient of most subjects of the NWFD of Russia.

## **Conclusion**

The Northwestern Federal District is one of the highly urbanized regions of Russia. The reason behind it is the long-standing development of the area and the emergence of cities, primarily St. Petersburg that has evolved into a large agglomeration and exerts a versatile influence on the socio-economic development of not only the suburban areas but also more remote territories. The trend towards an increase in the urbanization of the region remains at present, although the share of the urban population in the total population is growing insignificantly. At the same time, differences in the dynamics of the population of regions and republics, as well as urban settlements, are likely to intensify. The northern regions (with the exception of the Nenets Autonomous Region) and the old industrial regions (Novgorod and Pskov) lose their populations. This decrease is a result of natural decline. The factor is especially pronounced in the southern regions with the large share of the older population and growing outward domestic migration of working-age population. The population in the Kaliningrad and Leningrad regions is increasing. At the same time, a peculiar situation has developed in the Leningrad Region where, unlike in other northwest regions, in 2002—2017, the

share of the urban population has decreased from 66.4 % to 64 %. The reason for this phenomenon is that not only urban settlements, but also rural settlements in the suburbanized zone of St. Petersburg are attractive to migrants. A similar situation, although in a milder form, has developed in the Kaliningrad region.

Of particular note is St. Petersburg, as in 2002 – 2017 its population increased by 613,000 people. After the decline of the 1990s, the city managed not only to restore the previous population but also to increase it. It is important to note the intensification of the agglomeration ties of the city.

As for the centres of the regions, the subjects of the RF, only Arkhangelsk and Murmansk, both located in the Arctic zone, saw a decline in population. A unique situation for this group developed in Naryan-Mar, where the population increased by 32.5 %, which in absolute terms is an increase of 6,000 people.

Significant differences in population dynamics are demonstrated by cities that have a lower administrative status or do not have one. The highest dynamics were shown by Vsevolozhsk, Sertolovo, Kommunar, Nikolskoye, Otradnoye and Shlisselburg. All of them are part of the St. Petersburg agglomeration. Their growth rates range from 17 % to 55 %. The similar dynamics is shown by the cities of the Kaliningrad region: Guryevsk, Zelenogradsk and Svetlogorsk. The rest of the cities, as follows from the above study, demonstrate either small population growth or negative dynamics. The latter clearly prevails.

Data on the dynamics of the urban population allow us to draw the following conclusions: polarization is increasing in the south-north direction, the Arctic territories are losing their population, and however, there is further concentration within the agglomeration of St. Petersburg and in the exclave of the Kaliningrad region. The population dynamics clearly captures the nature of sustainable development of the cities of the Northwest Federal District.

*The study was supported by the RFBR grant No. 17-02-00069\17-OGON dated: 04/20/2017.*

## References

1. Anokhin, A.A. 1970, About the regional study of the demographic situation, *Materials of V Congress of the GS of USSR*, Leningrad, p. 32 – 34 (in Russ.).
2. Fedorov, G.M. 1984, *Geodemograficheskaya obstanovka* [Geodemographic situation], Leningrad, (in Russ.).
3. Fedorov, G.M. 1985, *Geodemograficheskayatiptologiya* [Geodemographic typology], Leningrad, (in Russ.).
4. Anokhin, A.A., Fiodorov, G.M. 1981, Differences in the social-demographic situation in the mesoregions of the USSR, *Vestnik Leningradskogo universiteta. Seriya 7. Geologiya, geografiya* [Bulletin of the Leningrad University. Series 7. Geology, geography], no. 12, p. 92 – 98 (in Russ.).
5. Anokhin, A.A., Zhitin, D.V. 2017, *Geografiya naseleniya s osnovami demografii* [Geography of the population with the basics of demography], Moscow, 279 p. (in Russ.).
6. Anokhin, A.A., Zhitin, D.V., Krasnov, A.I., Lachininskiy, S.S. 2014, Current trends in the population dynamics of Russian cities, *Vestnik Sankt-Peterburgskogouniversiteta. Seriya 7. Geologiya. Geografiya* [Bulletin of the St. Petersburg State University. Series 7. Geology, geography], no. 4, p. 167 – 179 (in Russ.).

7. Gitin, D.V., Shendrik A.V., 2017, Dynamics of the population of the cities of the Leningrad region: the impact of the crisis of 2014—2016, *Izvestiya Russkogo geogra-ficheskogo obshchestva* [News of the Russian Geographical Society], Vol. 149, no. 6, p. 24—43 (in Russ.).
8. Fedorov, G.M., Razumovsky, V.M., Kuznetsova, T.Y., Gumenyuk, L.G. 2017, Location and population dynamics of coastal cities in the Baltic, *Izvestiya Russkogo geogra-ficheskogo obshchestva* [News of the Russian Geographical Society], Vol. 146, no. 6, p. 14—24 (in Russ.).
9. Anokhin, A.A., Fedorov, G.M. 2017, The correlation of the processes of polariza-tion and alignment of the level of social and economic development in the subjects of Russian Federation, *Vestnik Sankt-Peterburgskogo universiteta. Seriya 7. Geologiya. Geografiya* [Bulletin of the St. Petersburg State University. Earth Sciences], Vol. 62, no. 4, p. 327—342 (in Russ.).
10. Druzhinin, A.G., Lachininskiy, S.S., Krasnov, A.I., Sorokin, I.S. 2016, Polariza-tion of the settlement system in the seaside zone of the Leningrad Region in 1989—2015, *Izvestiya vysshih uchebnyh zavedenij. Severo-Kavkazskij region. Ser.: Estestvennye nauki* [Proceedings of higher educational institutions. North Caucasus region. Natural scienc-es], Vol. 191, no. 3, p. 58—65 (in Russ.).
11. Kuznetsova, T.Y. 2009, *Geodemograficheskaya obstanovka v stranah Baltijskogo makroregiona: problem i perspektivy* [Geodemographic situation in the Baltic macrore-gion countries: problems and prospects], Kaliningrad (in Russ.).
12. Kuznetsova, T.Y. 2018, Population change in the neighbouring regions of Russia and the european union countries, *Balt. Reg.*, Vol. 10, no. 3, p. 41—57. Doi: <https://doi.org/10.5922/2079-8555-2018-3-3>.
13. Baburin, V.L., Zemtsov, S.P. 2015, Evolution of the system of urban settlements and the dynamics of natural and socio-economic processes in the Russian Arctic, *Regional'nye issledovaniya* [Regional Studies], Vol. 50, no. 4, p. 76—83 (in Russ.).
14. Bridge, G., Watson, S. 2011, *The New Blackwell Companion to the City*, Wiley-Blackwell.
15. Berg, P.G. 2004, Sustainability resources in Swedish townscape neighbourhoods Results from the model project Hågaby and comparisons with three common residen-tial areas, *Landscape and Urban Planning*, Vol. 68, no. 1, p. 29—52. Doi: [https://doi.org/10.1016/S0169-2046\(03\)00117-8](https://doi.org/10.1016/S0169-2046(03)00117-8).
16. Dolgih, E.I., Erlich, V.A., Kuznetsova, P.O. 2018, Rating of sustainable develop-ment of cities in Russia, *Demoskop Weekly*, no. 765—766, available at: <http://demoscope.ru/weekly/2017/0765/barom01.php> (accessed 12.09.2018).
17. Solovyova, I.A. 2016, Strategizing of large cities based on the model of sustaina-ble development: global trends and Russian specifics, *Voprosy ehkonomiki i prava* [Ques-tions of economics and law], no. 4, p. 93—96 (in Russ.).
18. Granvik, M., Berg, P.G., Berglund, U. 2008, Implementation of the Habitat-agen-da — Residents' interest and actions in citizen-participation processes — A comparison of residential areas in Sweden and Russia, *European Journal of Spatial Development*, no. 29.
19. Cao, G.Y., Chen, G., Pang, L.H. et al. 2012, Urban grow thin China: past, prospect and its impact, *Population and Environment*, Vol. 33, no. 137, p. 137—160.
20. Cirtautas, M. 2013, Urban Sprawl of Major Cities in the Baltic States, *Architec-ture and Urban Planning*, Vol. 7, p. 72—79.
21. Tammaru, T., Leetmaa, K., Silm, S., Ahas, R. 2009, Temporal and Spatial Dynam-ics of the New Residential Areas around Tallinn, *European Planning Studies*, Vol. 17, no. 3, p. 423—439.

22. Baklanov, P. Ya., Moshkov, A. V. 2015, Spatial differentiation of the structure of the economy of the regions of the Arctic zone of Russia, *Ekonomika regiona* [Economy of Region], no. 1, p. 53–63 (in Russ.).

23. Sobolev, A. V. 2015, Structural and Functional Characteristics of the Spatial Development of Rural and Urban Areas in the Northwestern Economic District, *Balt. Reg.*, no. 1, p. 108–119. Doi: <https://doi.org/10.5922/2079-8555-2015-1-9> (in Russ.).

24. Shelest, K. D. 2015, Forming the idea of sustainable urban settlements in historical perspective. In: *IstoricheskayageografiyaRossii: retrospektiva I sovremennost' kompleksnyhregional'nyhissledovaniy* [The historical geography of Russia: a retrospective and the present of complex regional studies], Materials of the international conference, 18–21 May, St. Petersburg (in Russ.).

25. Tetior, A. N. 1999, *Ustojchivoe razvitie goroda* [Sustainable city development], Moscow (in Russ.).

26. Wu, J. 2010, Urban sustainability: an inevitable goal of landscape research, *Landscape Ecology*, Vol. 25, no. 1, p. 1–4. Doi: <https://doi.org/10.1007/s10980-009-9444-7>.

27. Spiekermann, K, Wegener, M. 2003, Modelling Urban Sustainability, *International Journal of Urban Sciences*, Vol. 7, no. 1, p. 47–64. Doi: <https://10.1080/12265934.2003.9693522>.

28. Bychkov, A. 2016, Sustainable development of regions and cities of Russia, *Strategiya* [Strategy], Vol. 24, no. 3, p. 78–83 (in Russ.).

29. Nikonorov, S. M., Papenov, K. V. 2016, Strategies for sustainable urban development in Russia, *Ekonomika ustojchivogo razvitiya* [Economics of Sustainable Development], Vol. 27, no. 3, p. 296–300 (in Russ.).

30. Bogomolova, I. V., Mashentsova, L. S., Sazonov, S. P. 2014, Sustainable development of large cities from the standpoint of assessing the competitiveness of the territory, *Fundamental'nye issledovaniya* [Basic research], no. 3, p. 2506–2510 (in Russ.).

31. Adamchuk, O. 2018, Ministry of Economic Development proposes to assess the strengths and weaknesses of cities, *Vedomosti*, available at: <https://www.vedomosti.ru/economics/articles/2018/08/13/777962-otsenit-storoni-gorodov> (accessed 18.10.2018) (in Russ.).

## **The authors**

**Prof. Anatoly A. Anokhin**, Head of the Department of Economic and Social Geography, Saint Petersburg State University, Russia.

E-mail: [a.anokhin@spbu.ru](mailto:a.anokhin@spbu.ru)

ORCID: <https://orcid.org/0000-0002-4850-5388>

**Dr Ksenia D. Shelest**, Associate Professor, Department of Economic and Social Geography, Saint Petersburg State University, Russia.

E-mail: [k.shelest@spbu.ru](mailto:k.shelest@spbu.ru)

ORCID: <https://orcid.org/0000-0002-0957-5615>

**Marina A. Tikhonova**, PhD student, Department of Economic and Social Geography, Saint Petersburg State University, Russia.

---