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## Планировочные и пространственные решения по комплексному развитию территории агломерации Кавказских Минеральных Вод с учетом исторических предпосылок развития

Наталья Алексеевна Фоменко<sup>1\*</sup>, Александр Дмитриевич Коновалов<sup>2</sup>

<sup>1,2</sup> Северо-Кавказский федеральный университет, Пятигорский институт (филиал), г. Пятигорск, Россия

<sup>1</sup> [nafomenko@ncfu.ru](mailto:nafomenko@ncfu.ru)

<sup>2</sup> [valorobinskaya@yandex.ru](mailto:valorobinskaya@yandex.ru)

\* Автор, ответственный за переписку: Наталья Алексеевна Фоменко, [nafomenko@ncfu.ru](mailto:nafomenko@ncfu.ru)

**Аннотация.** Экономическая эффективность развития региона неразрывно связана с формированием агломераций на его территории. Этот процесс базируется на социально-экономической политике Российской Федерации, которая согласуется с рыночными принципами и учитывает специфику функционирования агломераций. Управление агломерациями осуществляется на уровне регионов. В России между центром и субъектами сложились новые взаимоотношения, которые определили особое положение и роль регионов-агломераций. Процесс формирования агломераций переживает новый этап развития, приобретая новую пространственную форму. Это обусловлено необходимостью исследования не только содержания региона-агломерации, но и методов управления этими территориальными образованиями. В данной статье анализируются и исследуются возможности комплексного планировочного решения, которое учитывает исторические особенности агломерации Кавказских Минеральных Вод. Уделяется внимание как преимуществам, так и недостаткам в разработке пространственных концепций. Особое внимание уделяется проблемам, связанным с развитием улично-дорожной сети и недостаточным уровнем организации объездных путей вокруг городов. Это, в свою очередь, приводит к увеличению транзитного движения через города-курорты, что создает дополнительные сложности для туристического бизнеса и требует поиска новых решений.

**Ключевые слова:** агломерация, экономическая эффективность развития региона, города-курорты, Кавказские Минеральные Воды (КМВ), экономические факторы, социологические факторы

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Discussion article

## Planning and spatial solutions for the integrated development of the territory of the Caucasian Mineral Waters agglomeration based on the specific historical background

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**Natalia A. Fomenko<sup>1\*</sup>, Alexander D. Konovalov<sup>2</sup>**

<sup>1,2</sup> North-Caucasus Federal University, Pyatigorsk Institute (branch), Pyatigorsk, Russia

<sup>1</sup> nafomenko@ncfu.ru

<sup>2</sup> valorobinskaya@yandex.ru

\* **Corresponding author:** Natalia A. Fomenko, [nafomenko@ncfu.ru](mailto:nafomenko@ncfu.ru)

**Abstract.** *The economic efficiency of a region's development is inextricably linked with the formation of agglomerations on its territory. This process is based on the socio-economic policy of the Russian Federation, which is consistent with market principles and takes into account the specifics of agglomerations. Agglomerations are managed at the regional level. In Russia, new relationships have developed between the center and the subjects, which have determined the special position and role of agglomeration regions. The process of agglomeration formation is experiencing a new stage of development, acquiring a new spatial form. This is due to the need to study not only the content of the agglomeration region, but also the methods of managing these territorial entities. This article analyzes and explores the possibilities of an integrated planning solution that takes into account the historical features of the Caucasian Mineral Waters agglomeration. Attention is paid to both the advantages and disadvantages in the development of spatial concepts. Particular attention is paid to the problems associated with the development of the street and road network and the insufficient level of organization of bypass routes around cities. This, in turn, leads to an increase in transit traffic through resort cities, which creates additional difficulties for the tourism business and requires the search for new solutions.*

**Keywords:** agglomeration, economic efficiency of regional development, resort towns, Caucasian Mineral Waters (CMS), economic factors, sociological factors

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**Introduction.** The economic efficiency of regional development is inextricably linked with the process of formation of territorial agglomerations based on the socio-economic policy of the Russian Federation, corresponding to market laws, focused on the specifics of implementation in agglomerations and management of agglomerations at the regional level. In the regions of the Russian Federation, fundamentally new relations have been created between the center and the subjects, which has determined the special role and place of agglomeration regions. The process of agglomeration formation is experiencing a new qualitative leap, acquiring a new form of spatial expression, which is directly related to the need to study not only the content of the agglomeration region itself, but also the methods of managing these territorial entities.

An agglomeration is a developed and complex system of spatial and economic integration, consisting of compactly located and functionally connected cities and territories adjacent to them, which are united by stable labor, cultural and industrial ties, and a common social and technical infrastructure.

As Bavina K.V. notes in her research, "...in practice, when defining an agglomeration, an urbanized area is considered in which the central city – the core and the suburban area are located. The boundaries of the agglomeration, as a rule, are expanding. The solution to the issues of developing urban agglomerations based on the existing potential, as well as taking into account the needs of the city and adjacent settlements will ensure sustainable development of territories, rational use of their resources, maintaining ecological balance in the city and the surrounding area ..." [1, 2].

**Materials and research methods.** We consider the choice of the basic scenario of the Caucasian Mineral Waters agglomeration based on the planning structure. The implementation of decisions on the selected option will allow achieving the set goals, the primary of which is the formation of a unified strategy for the development of the resort region. The Caucasian Mineral

Waters agglomeration is based on the results of a deep analysis of a number of factors covering the prerequisites, key challenges and promising development vectors.

There is currently a growing interest in the ecology of urban development, especially in resort towns such as the Caucasian Mineral Waters (KMV). The region has natural resources but faces problems with noise pollution, which particularly affects towns with little industrial activity, such as Pyatigorsk.

**Research results and their discussion.** The study of historical development is of great importance for understanding the patterns of the process of agglomeration formation.

An analysis of the historical evolution of resort towns allows us to understand the naturalness of the process of agglomeration development,

The Caucasian Mineral Waters agglomeration is the largest complex in the North Caucasian Federal District, developing on the basis of resort towns such as Georgievsk (1777), Pyatigorsk (1780) and Kislovodsk (1803). The history of the agglomeration is divided into seven stages:

- ✓ **Origin** (before 1777)
- ✓ **Formation** (1777-1830)
- ✓ **Stagnation** (1830-1895)
- ✓ **Development** (1895-1941)
- ✓ **The Great Patriotic War** (1941-1945)
- ✓ **New development** (1945-1992)
- ✓ **Modern times** (1992 to present)

Each stage has its own characteristics. At the "Emergence" stage, agriculture, cattle breeding, trade routes and mineral water research developed. At the "Formation" stage, the Russian resort was formed, trade and cities developed, etc.

In 1803, Alexander I signed a rescript **"On the recognition of the state significance of the Caucasian Mineral Waters and the need for their development"** (Fig. 1). From this time, the formation of the Caucasian Mineral Waters as a Russian resort began. In the history of the development of the Caucasian Mineral Waters (CMW), several key stages can be distinguished.

Since 1811, the organization of barter trade begins, which becomes a transitional form to commodity-money relations. At the beginning of the 19th century, the improvement of resorts, design and construction of roads begins. The architectural appearance of the resorts is formed in the traditions of European architecture by the efforts of the Bernadazzi brothers, who created master plans for five places.

The period from 1830 to 1895 is characterized by the inclusion of the territory into the Russian Empire, the beginning of the formation of the agglomeration, the granting of resort status to the territory (1803), the creation of the first plans and the formation of the architectural appearance of the resorts.

From the late 1840s to the mid-1850s, the development of resorts was unfavorable. In the middle of the century, resorts had military significance, and 15% of visitors were private individuals. In 1847, mineral water was bottled, and in 1852, omnibus service was established.

In the middle of the 19th century, markets and fairs were organized in Pyatigorsk, trade developed and industrial enterprises appeared. In other resorts, gardening, horticulture and livestock farming developed.

Agglomeration ties are strengthened, in 1863 the Russian Balneological Community was created, and in 1920 - the Balneological Institute. In 1875, the railway was built to the Mineralnye Vody station, and in 1897 - to Beshtau-Zheleznovodsk, increasing the number of visitors and cargo turnover. 1878 is the historical period of the emergence of the city of Mineralnye Vody in The stage of development is characterized by a number of features, among which the following can be distinguished: a gradual increase in the population of resorts; the formation of agricultural production; the development of trade, including the emergence of markets and fairs; the emergence



of industrial production; the beginning of bottling mineral waters; improvement of balneological science; development of transport infrastructure.



**Figure 1 – Agglomeration of resort towns of the Caucasian Mineral Waters (historical factor)**

Historical development of cities in the region took place without taking into account modern transport congestion, so it is important to analyze noise loads and develop measures to restore a favorable environment. The results of the experiment showed the need to measure noise and develop measures to regulate it. The development of information material on the assessment of the noise impact of transport on the environmental safety of the city is an urgent task for improving the environmental situation and reducing negative consequences for the population [5,6].

Over the past few years, we have studied various environmental aspects of the functioning of urban economy in the resort towns of the Caucasian Mineral Waters [3,4].

The main prerequisites for the development of the Caucasian Mineral Waters agglomeration based on the SWOT analysis are economic factors of development. Positive aspects. The Caucasian Mineral Waters agglomeration has a number of advantages that make it a strategically important center in the structure of the southern regions, due to the following features: the central location provides convenient access to key transport highways connecting the North Caucasus with other regions of Russia, which makes the Agglomeration an important hub for the

development of transport infrastructure and logistics; the presence of the Mineralnye Vody International Airport contributes to the development of the Agglomeration as a center of health resort tourism and a large wholesale trade center in the south of Russia, opening up broad prospects for the development of the consumer market and attracting investment. Contributes to the formation of a center of global significance for the development of various types of tourism. The tourist and recreational significance of the region is due to its balneological resources; mineral water reserves of more than 130 mineral springs, more than 30 types of therapeutic mud and favorable natural and climatic conditions for health.

The resort town of Pyatigorsk is rich in all types of mineral waters of the region, where complex treatment of diseases is carried out. The combination of carbon dioxide, hydrogen sulphide, radon springs and mud of Lake Tambukan, favorable climate and natural landscape makes the city the most multi-profile health resort in Russia.

The mineral waters of Yessentuki are ideal for treating patients with digestive diseases, making the city one of the best world resorts of this profile. The city sanatoriums of Zheleznovodsk specialize in the treatment of diseases of the digestive organs, kidneys and urinary tract. Carbonated mineral waters and the climate of the midlands of Kislovodsk make this resort a unique place for the treatment of cardiovascular diseases, as well as respiratory diseases.

The Caucasian Mineral Waters region has potential for developing various types of tourism, such as children's, cultural and educational, ecological, event, ethnographic and rural. There is a tendency for domestic tourism to grow. With an increase in the rate of introduction of new accommodation facilities and tourist sites, including new types of tourism for the Caucasian Mineral Waters, it is possible to increase the domestic tourist flow to the territory of the Agglomeration by 1.5-2.5 times in 2030-2040. The Agglomeration has favorable conditions for the development of agricultural production in the Predgorny District and the Georgievsky Urban District. Various industries are represented here, including food, production and processing of agricultural products, as well as other manufacturing industries, pharmaceuticals, biomedicine and balneology.

The main branch of specialization - health resort services - will retain its importance. Transport and logistics activities and trade, agriculture and food industry, scientific and educational complex, as well as communication services and other branches of the service sector will develop. State financial support (availability of the RP for the Russian Federation dated 11.09.2021 No. 2540-R) The Government of the Russian Federation approved a list of measures for the integrated development of resort towns in the Caucasian Mineral Waters region until 2030. This list includes measures for the reconstruction, improvement and creation of new inter-municipal (agglomeration) facilities of engineering, transport, tourism infrastructure

The negative aspects of the demographic situation in the Caucasian Mineral Waters region include a number of problems that require attention and solutions.

First of all, it is worth noting the aging of the population, which leads to an increase in the demographic burden on the working population and the budget due to social payments and pensions. In addition, there is a natural and migration decline in the population, especially in recent decades.

Of particular concern is the increase in mortality, especially in 2020–2021, due to the negative impact of the COVID-19 pandemic.

Another important aspect is the lack of well-maintained water bodies such as rivers, canals, lakes, ponds and waterfalls, which hinders the development of tourism.

To compensate for the lack of a sea and large fresh water bodies in the territory of the Caucasian Mineral Waters, it is necessary to improve existing surface water bodies, create artificial reservoirs and build open and closed water parks.

In addition, there is insufficient monitoring of anthropogenic impact on the environment, which also requires research in this area.

Anthropogenic impact on the environment associated with development causes pollution of mineral waters, which leads to degradation of their chemical and gas composition and the impossibility of further use. Problems with sewerage and wastewater treatment in populated areas and the lack of stormwater treatment in the Caucasian Mineral Waters region lead to pollution of surface waters. The growth of the population of the Agglomeration requires systematic monitoring of anthropogenic impact, especially in resort towns. The deterioration of the resort, transport and engineering infrastructure, the discrepancy between the hospitality infrastructure and modern quality standards and the expectations of consumers of the tourist destination require the improvement of urban electric transport and transport infrastructure of the Caucasian Mineral Waters. Radical changes in the social infrastructure and the health resort complex associated with the state of utilities require changes in the development of gas networks, water supply, sewerage and storm systems.

The formation of the Agglomeration is influenced by sociological factors.

To analyze the strengths and weaknesses in the development of social infrastructure, as well as opportunities and risks, we conducted a SWOT analysis, taking into account the influence of the internal and external environment.

**Strengths:** high therapeutic potential of the resorts of the Caucasian Mineral Waters with unique treatment programs and diagnostic capabilities. State support in the development of engineering and transport infrastructure, carried out within the framework of the Order of the Government of the Russian Federation of September 11, 2021 No. 2540-r. The interest of investors in the development of the region, especially the health resort complex and tourism infrastructure.

**Weaknesses:** insufficient number of kindergartens and schools, infrastructure does not meet modern requirements, weak material and technical base, high depreciation of buildings, territorial accessibility exceeds standards. Low quality of personnel training, leading to population outflow and shortage of specialists. Concentration of agglomeration facilities in Pyatigorsk, Kislovodsk and Yessentuki. Dilapidated social infrastructure, inadequate material and technical base, underdeveloped service infrastructure of the entertainment industry. Low efficiency and elaboration of investment projects (in Stavropol Krai, this figure is only 5% in 2023). Difficulty in harmonious development of the region due to the lack of completed work on updating the boundaries of mountain sanitary protection zones; deterioration in the quality of underground mineral and surface waters, including a shortage of resources in Lake Tambukan; active development of the territory combined with insufficient monitoring of exogenous dynamics processes can lead to the activation of natural processes, which will lead to higher costs of any type of construction; the Argo solid municipal waste landfill and waste sorting station (Mineralovodsky urban district) are located within the sixth subzone of the aerodrome territory of the Mineralnye Vody airport, which creates a hazard for aircraft flights due to a large concentration of birds; the absence of an established seventh subzone of the aerodrome territory (noise impact zone) of the Mineralnye Vody international airport may result in incorrect functional zoning of the territory and placement of vulnerable objects (residential buildings, medical, educational, social and recreational facilities) without the implementation of special protective measures; there is a risk associated with the placement of cattle burial grounds within the second zone of mountain sanitary protection in the resort town of Yessentuki.

Poor quality urban environment according to the methodology for forming the urban environment quality index, approved by the order of the Government of the Russian Federation of March 23, 2019 No. 510-r. the assessment of cities includes 6 main criteria (Fig. 2).

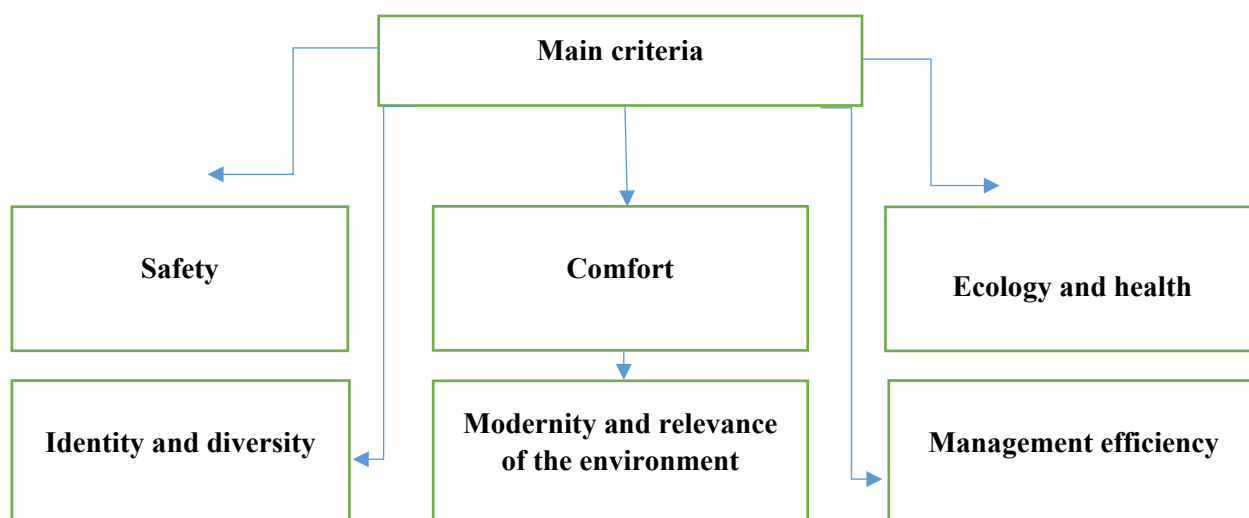


Figure 2 – Evaluation criteria for cities

The cities of the Caucasian Mineral Waters Agglomeration have an average quality index of approximately 200 points out of 360 possible, characterizing them as a favorable urban environment. Many cities of the Caucasian Mineral Waters have problems with the chaotic arrangement of trade and warehouse zones, inconsistency of development in historical centers, lack of public spaces and inconvenient pedestrian routes and bike paths. The assessment of the state of the urban environment shows significant differences: Kislovodsk has the highest level, Georgievsk and Yessentuki have a low level of the environment. The level of the environment in Pyatigorsk, Zheleznovodsk and Lermontov is average, but the size of the cities is not taken into account. With the increase in the number of tourists and excursions, there will be an urgent need to create high-quality zones for the mass use of urban space, which entails the transformation and development of the system of such public areas and infrastructure facilities.

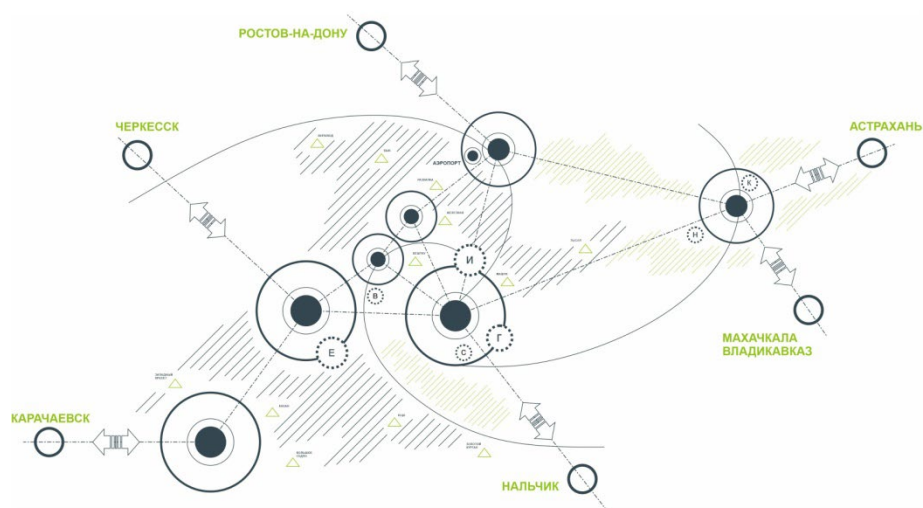
In the system of regional connections the Kavkazsko-Mineralnye Vody transport hub has significant potential for development. The current state of the transport infrastructure is characterized by a number of problems: a low share of public transport in the city's rush hour traffic (0.5%), a high share of passenger transport (90.5%). The share of public transport in passenger transportation on the city street network is 15-20%, the remaining 85-80% is carried by cars, mainly for individual use. High potential for demand for pedestrian and bicycle travel for work and recreational purposes, lack of a coherent network of pedestrian routes and bike paths, fragmentary arrangement of park areas with elements of bicycle infrastructure. The agglomeration of Kavkazskie Mineralnye Vody is polycentric. The share of trips to neighboring cities is 2-40% compared to the share of internal travel. Clear dominance of the transport load during peak periods of a weekday compared to weekends, lack of hubs with a high level of load on an average weekend day. Seasonal growth in correspondence volumes is 5–22%.

Currently, there are problems with the development of the street and road network that require solutions. One of the main problems is the insufficient formation of bypasses of cities, which leads to transit traffic through Zheleznovodsk, Inozemtsevo, Pyatigorsk, Yessentuki and Mineralnye Vody, creating difficulties for the population and tourists. The organization of transport communications does not correspond to its functional purpose, and frequent junctions of intra-quarter driveways and servicing of trade facilities from the main roadway impede traffic. Sidewalks are equipped fragmentarily, there are no access pockets for public transport, bike paths and bike lanes. In Pyatigorsk and Yessentuki, the level of duplicate connections is low.



Problems in the development of public transport include insufficient width and arrangement of carriageways and pedestrian paths, fragmentary arrangement of stopping points without boarding/disembarkation areas and waiting pavilions, outdated rolling stock of small capacity with low ceilings and cramped interiors. The combination of tram tracks and carriageways leads to unsafe movement without designated priorities. Fragmentary arrangement of stopping points and narrow platforms make it difficult to board cars. High wear and tear of rolling stock and insufficient development of the material and technical base of urban electric transport. The remoteness of railway stopping points from each other creates problems for the population. Wear and tear and lack of utility networks lead to high losses and leaks of water, low reliability and resource inefficiency of the water supply system.

Taking into account the strengths and weaknesses in developing planning and spatial solutions for the agglomeration of the Caucasian Mineral Waters, the morphometric method of analyzing development is used. An urban planning morphotype is an evolutionarily formed planning organization of urban development. Morphometric analysis is carried out in relation to the built-up areas of the Kavminvody agglomeration in order to determine the main morphotypes of development. For each of the main morphotypes, approaches to determining territorial reserves for development have been determined. The subject of the study is the block planning structure. The main criteria for assessing the planning structure include the size of the block, the historical period of its formation, the functional purpose, the typology and number of storeys of buildings and structures. In addition, the nature of the building line, the placement of buildings on the relief, the density of development and the built-up surface are assessed. Built-up areas make up a small part of the space of the Kavminvody agglomeration and occupy about 5% of its gross territory. A significantly larger part of the territory is formed by rural landscapes of agricultural and natural purposes. The built-up areas of the Agglomeration, in turn, are divided into high-density urban environments and low-density low-rise suburbs (suburban areas). High-density development has formed only in urban and village centers.



**Figure 3 – Model of the agglomeration of the Caucasian Mineral Waters**

The planning structure of the Agglomeration is based on low-rise suburbia. Based on the analysis of the block structure according to the main evaluation criteria, nine most typical morphotypes were identified: - three morphotypes of low-rise mixed development: the historical period before 1902, the 20th century and the modern period (late 20th – 21st centuries); - three morphotypes of mixed multi-story and mid-rise development: block planning of the 20th century, complex microdistrict development of the 20th century and modern multi-story development; - three morphotypes of specialized development: individual residential, industrial and commercial development, health resort development (Fig. 3).



The Kavminvod urban agglomeration was classified as a territory with a developed regulatory framework, reflected in three fundamental documents defining the socio-economic development of the Stavropol Territory. Within the framework of the territorial planning scheme of the Stavropol Territory, developed for the territory of the Caucasian Mineral Waters (CMW), a comprehensive assessment of this resort region was carried out in 2016. The analysis considered the economic and geographical position of the CMW, natural conditions and resources, labor and demographic potential, as well as the state of social and industrial infrastructure and the environmental situation. The presented document describes a model of spatial organization and planning framework, as well as the features of the agglomeration development of the territory. This document was developed for the period up to 2040. The Strategy for the Socio-Economic Development of the Stavropol Territory until 2035, published in 2018, pays special attention to the role of agglomerations as growth points that unite the most promising sectors of the economy.

The Kavminvodskaya urban agglomeration, also known as Mineralovodskaya, is considered the second most important territory in the region after the Stavropol agglomeration. It has enormous potential for the successful development of the region.

The document outlines the main directions of spatial development of the Kavminvody agglomeration, taking into account its tourism and recreational specialization. The "Scheme of territorial planning of Stavropol Krai until 2020" contains the "Concept of development of the agglomeration of the Caucasian Mineral Waters". This concept describes approaches to defining the boundaries of the agglomeration, its general characteristics, structural features and demographic trends. It also defines modern trends and development prospects. In 2016, a draft Federal Law "On the resort region "Specially protected ecological and resort region of the Caucasian Mineral Waters" was developed [10].

As Belozеров V.S., Shchitova N.A., Sopnev N.V., Podolkin M.O. note in their research: "... Of particular interest, from the point of view of agglomeration development, are documents on territorial planning at the municipal level (Table 1)... " [9].

**Table 1 – Diagnostic analysis of municipal-level territorial planning documents as management tools for the development of the Kavminvodskaya agglomeration**

<b>Territory</b>	<b>Master plan</b>	<b>Strategy of socio-economic development</b>	<b>Territorial planning scheme</b>	<b>Note</b>
Pyatigorsk	General plan, 2009, updated in 2017, 2021. It is noted that Pyatigorsk is the largest city in the Kavminvodskaya eco-resort agglomeration	Strategy for socio-economic development until 2035. The main directions of spatial development of Pyatigorsk within the framework of the Caucasian Mineral Waters agglomeration have been defined	Not being developed	Belozеров, V.S., Shchitova N.A., Sopnev N.V., Regulatory and documentary support for the sustainable development of urban agglomerations in the Russian Federation // InterCarto. InterGIS. 2021. Vol. 27. No. 1. Pp. 17-28. doi: 10.35595/24149179-2021-1-27-17-28
Kislovodsk	General plan, 2013. Kislovodsk is part of the Kavkazsko-Mineralovodskay	The strategy of socio - economic development until 2035 emphasizes the importance of Kislovodsk	Not being developed	Belozеров, V.S., Shchitova N.A., Sopnev N.V., Regulatory and documentary support for the

	a agglomeration; the development of urban functions of Kislovodsk within the agglomeration is noted. General plan, 2021. Describes the functioning of the urban district of Kislovodsk as one of the main centers of the polycentric agglomeration of the Caucasian Mineral Waters. A full description of the city and its functions is given.	as one of the centers of the agglomeration		sustainable development of urban agglomerations in the Russian Federation // InterCarto. InterGIS. 2021. Vol. 27. No. 1. Pp. 17-28. doi: 10.35595/24149179-2021-1-27-17-28
Essentuki	General plan, 2012. Agglomeration issues are practically not touched upon. General plan, 2018. Yessentuki stands out as the center of the Kavkazsko-Mineralovodskaya agglomeration and its important role in its composition is noted.	Strategy for socio-economic development until 2035. The main directions of spatial development within the agglomeration of the Caucasian Mineral Waters region have been defined	Not being developed	Belozеров, V.S., Shchitova N.A., Sopnev N.V., Regulatory and documentary support for the sustainable development of urban agglomerations in the Russian Federation // InterCarto. InterGIS. 2021. Vol. 27. No. 1. Pp. 17-28. doi: 10.35595/24149179-2021-1-27-17-28
Zheleznovodsk	General Plan, 2013 It is noted that the city is located in the KVM settlement system. Draft General Plan, 2021 Zheleznovodsk is part of the Kavminvodskaia agglomerated settlement system	Strategy of socio-economic development until 2035. The main directions of spatial development of Zheleznovodsk as part of the agglomeration of Caucasian Mineral Waters are described	Not being developed	Belozеров, V.S., Shchitova N.A., Sopnev N.V., Regulatory and documentary support for the sustainable development of urban agglomerations in the Russian Federation // InterCarto. InterGIS. 2021. Vol. 27. No. 1. Pp. 17-28. doi: 10.35595/24149179-2021-1-27-17-28

Lermontov	General plan, 2012, updated 2017. The city is located in the center of a large agglomeration - Caucasian Mineral Waters	Strategy of socio - economic development until 2035. The main directions of spatial development of the city of Lermontov as part of the agglomeration of the Caucasian Mineral Waters are described. The need for development of inter-municipal cooperation is noted.	Not being developed	Belozеров, V.S., Shchitova N.A., Sopnev N.V., Regulatory and documentary support for the sustainable development of urban agglomerations in the Russian Federation // InterCarto. InterGIS. 2021. Vol. 27. No. 1. Pp. 17-28. doi: 10.35595/24149179-2021-1-27-17-28
Mineralovodsky urban district	General plan of the city, 2017. Describes the composition of the KMV agglomeration, its core cities. Mineralovodsky urban district stands out as one of the second-order centers of the KMV polycentric agglomeration	General plan of the city, 2017. Describes the composition of the KMV agglomeration, its core cities. Mineralovodsky urban district stands out as one of the second-order centers of the KMV polycentric agglomeration	Not being developed	Belozеров, V.S., Shchitova N.A., Sopnev N.V., Regulatory and documentary support for the sustainable development of urban agglomerations in the Russian Federation // InterCarto. InterGIS. 2021. Vol. 27. No. 1. Pp. 17-28. doi: 10.35595/24149179-2021-1-27-17-28
Georgievsky urban district	General plan, 2020. Provides a full description and role of the urban district in the KMV agglomeration. Georgievsk is considered as a pole of the rural-urban agglomeration	Strategy of socio-economic development until 2035 Georgievsk is considered as a system-forming agro-industrial and production center of the agglomeration	Not being developed	Belozеров, V.S., Shchitova N.A., Sopnev N.V., Regulatory and documentary support for the sustainable development of urban agglomerations in the Russian Federation // InterCarto. InterGIS. 2021. Vol. 27. No. 1. Pp. 17-28. doi: 10.35595/24149179-2021-1-27-17-28

Source: [9]

"...An analysis of documents on strategic and territorial planning of cities and rural municipalities included in the Kavminvorskaya agglomeration showed that agglomeration terminology is used quite widely. Almost all documents, one way or another, mention the agglomeration, but the development of settlements or territories is not always linked to the

development of the agglomeration. The agglomeration issues are most fully and in detail reflected in the documents of the city of Kislovodsk, Georgievsk and Mineralnye Vody urban districts, which cannot be said about Pyatigorsk. Kislovodsk is considered one of the main centers of the agglomeration, Georgievsk and Mineralnye Vody are treated as second-order centers..." [9].

Despite the diversity and inconsistency of the proposed solutions. Planning and spatial solutions in the Caucasian Mineral Waters are being formed and are gaining momentum; one of the promising ones is the master plan developed by the Moscow General Plan Institute, the basis of which is the list of orders N2540-R, including 69 measures aimed at large-scale and comprehensive development: from updating the boundaries of mountain sanitary protection zones to infrastructure support for investment sites, marketing companies and training new personnel in the HoReCa sector [8].

**Conclusion.** The article analyzes and explores the possibilities of a comprehensive planning solution based on the historical prerequisites of the agglomeration of the Caucasian Mineral Waters, strengths and weaknesses in the development of spatial solutions, touches upon problems associated with the development of the street and road network, insufficient formation of bypasses of cities, which increases transit traffic through resort cities, which creates difficulties for the tourism business and requires new solutions.

#### ЛИТЕРАТУРА

1. Бавина К. В. Агломерация Кавказские Минеральные Воды: развитие и управление // Социально-гуманитарные знания. 2017. С. 335–345.
2. Коваленко А. А. Стратегические характеристики социально-экономического развития агломерации Кавказские Минеральные Воды // Бизнес в законе. 2012. № 6. С. 349–351.
3. Азаров В. Н., Сидякин П. А., Лопатина Т. Н. Техногенное загрязнение атмосферного воздуха и его влияние на социально-экологическое благополучие городов-курортов Кавказских Минеральных Вод // Социология города. 2014. № 1. С. 28–37.
4. Лебедева С. А., Сидякин П. А., Сапожкова Н. В. Обзор влияния шумового воздействия на социально-пространственную систему города // Международное научное издание Современные фундаментальные и прикладные исследования. 2013. № 4 (11). С. 46–50.
5. Сидякин П. А., Щитов Д. В., Фоменко Н. А. О радиационно-экологической обстановке в урбанизированных территориях городов-курортов Кавказских Минеральных Вод // Инженерный вестник Дона. 2015. Т. 33. № 1-1. С. 16.
6. Санитарно-эпидемиологические требования к содержанию территорий городских и сельских поселений, к водным объектам, питьевой воде и питьевому водоснабжению, атмосферному воздуху, почвам, жилым помещениям, эксплуатации производственных, общественных помещений, организации и проведению санитарно-противоэпидемических (профилактических) мероприятий. СанПиН 2.1.3684-21. М.: Минюст РФ, 2021.
7. Градостроительный кодекс Российской Федерации от 29.12.2004 N 190-ФЗ (ред. от 04.08.2023) (с изм. и доп., вступ. в силу с 01.09.2023).
8. Комплексный план развития городов-курортов региона Кавказские Минеральные Воды <https://genplanmos.ru/project/master-plan-agglomeracii-kavkazskih-mineralnyy-vod/> (дата обращения 24.09.2024)
9. Белозеров В. С., Щитова Н. А., Сопнев Н. В. Нормативно-документальное обеспечение устойчивого развития городских агломераций в РФ // ИнтерКарто. ИнтерГИС. 2021. Т. 27. № 1. С. 17–28. <https://doi.org/10.35595/2414-9179-2021-1-27-17-28>
10. Проект N 319322-3 Федерального закона «О курортном регионе «Особо охраняемый эколого-курортный регион Кавказские Минеральные Воды». [Электронный ресурс]. URL: <https://sozd.duma.gov.ru/bill/319322-3> (дата обращения: 26.01.2024).
11. Стратегия социально-экономического развития Ставропольского края до 2035 г.; Утверждена законом Ставропольского края «О Стратегии социально-экономического развития Ставропольского края до 2035 года» от 27 декабря 2019 г. N 110-кз [Электронный ресурс]. URL: <https://docs.cntd.ru/document/561692832> (дата обращения: 22.09.2024).

#### REFERENCES

1. Bavina KV. Agglomeration of Caucasian Mineral Waters: development and management. Sotsial'no-gumanitarnye znaniya = Social and humanitarian knowledge. 2017;335-345.



2. Kovalenko AA. Strategic characteristics of the socio-economic development of the agglomeration of Caucasian Mineral Waters. *Biznes v zakone = Business in law*. 2012;(6):349-351.
3. Azarov VN, Sidyakin PA, Lopatina TN. Technogenic pollution of the atmosphere air and its influence on social and ecological wellbeing of the resort towns of the Caucasian Spas. *Sotsiologiya goroda = Sociology of City*. 2014;(1):28-37.
4. Lebedeva SA, Sidyakin PA, Sapozhkova NV. Review of the impact of noise on the socio-spatial system of the city. *Mezhdunarodnoe nauchnoe izdanie Sovremennye fundamental'nye i prikladnye issledovaniya = International scientific publication Modern fundamental and applied research*. 2013;4(11):46-50.
5. Sidyakin PA, Shchitov DV, Fomenko NA. On the radiation and ecological situation in urbanized areas of the resort towns of the Caucasian Mineral Waters. *Inzhenernyi vestnik Dona = Engineering Journal of Don*. 2015;33(1-1):16.
6. Sanitary and epidemiological requirements for the maintenance of the territories of urban and rural settlements, water bodies, drinking water and drinking water supply, atmospheric air, soils, residential premises, operation of industrial and public premises, organization and implementation of sanitary and anti-epidemic (preventive) measures. SanPiN 2.1.3684-21. M.: Ministry of Justice of the Russian Federation, 2021.
7. Urban Development Code of the Russian Federation of 29.12.2004 N 190-FZ (as amended on 04.08.2023) (as amended and supplemented, entered into force on 01.09.2023).
8. Kompleksnyi plan razvitiya gorodov-kurortov regiona Kavkazskie Mineral'nye Vody [Electronic resource]. <https://genplanmos.ru/project/master-plan-aglomeracii-kavkazskih-mineralnyy-vod/> (data obrashcheniya 24.09.2024)
9. Belozarov VS, Shchitova NA, Sopnev NV. Regulatory and documentary standards of the sustainable development of urban agglomerations in the russian federation. *InteRKarto. InteRGIS*. 2021;27(1):17-28. <https://doi.org/10.35595/2414-9179-2021-1-27-17-28>
10. Project No. 319322-3 of the Federal Law "On the resort region "Specially protected ecological and resort region of the Caucasian Mineral Waters". [Electronic resource]. Available from: <https://sozd.duma.gov.ru/bill/319322-3> [Accessed 26 January 2024].
11. Strategy for the socio-economic development of Stavropol Krai until 2035; Approved by the Law of Stavropol Krai "On the Strategy for the socio-economic development of Stavropol Krai until 2035" dated December 27, 2019 N 110-kz [Electronic resource]. Available from: <https://docs.cntd.ru/document/561692832> [Accessed 22 September 2024].

#### ИНФОРМАЦИЯ ОБ АВТОРАХ

**Наталья Алексеевна Фоменко** – старший преподаватель кафедры строительства, Пятигорский институт (филиал), Северо-Кавказский федеральный университет, [nafomenko@ncfu.ru](mailto:nafomenko@ncfu.ru)  
**Александр Дмитриевич Коновалов** – бакалавр 1 курса кафедры строительства, Пятигорский институт (филиал), Северо-Кавказский федеральный университет, [valorobinskaya@yandex.ru](mailto:valorobinskaya@yandex.ru)

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#### INFORMATION ABOUT THE AUTHORS

**Natalia A. Fomenko** – Senior Lecturer at the Department of Construction, Pyatigorsk Institute (branch), North-Caucasus Federal University, [nafomenko@ncfu.ru](mailto:nafomenko@ncfu.ru)

**Alexander D. Konovalov** – 1st year Bachelor of Construction Department, Pyatigorsk Institute (branch), North-Caucasus Federal University, [valorobinskaya@yandex.ru](mailto:valorobinskaya@yandex.ru)

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