

# Update of the generalized environmental assessment and inertial forecast for the development of a cluster of urban areas of the Bogorodsky urban district of the Moscow region within the framework of the system "Ecology, environment and public health"

*Stanislav Rodionov*<sup>1,2\*</sup>, *Vladimir Kostesha*<sup>3</sup>, *Anna Suvorova*<sup>4</sup>, *Arina Chesnokova*<sup>5</sup>, *Artem Shevchuk*<sup>3</sup>, *Nadezhda Michurina*<sup>6</sup>, *Antonina Amosova*<sup>7</sup>, and *Oksana Nurova*<sup>6</sup>

<sup>1</sup>Federal State Budgetary Educational Institution of Higher Education National Research Moscow State University of Civil Engineering, Moscow, Russia

<sup>2</sup>Institute of Engineering and Environmental Safety Togliatti State University, Togliatti, Russia

<sup>3</sup>Federal State Budgetary Educational Institution of Higher Education State University of Land Management Moscow, Russia

<sup>4</sup>K.A. Timiryazev Russian State Agrarian University, Moscow, Russia

<sup>5</sup>Western branch of the Russian Academy of National Economy and Public Administration under the President of the Russian Federation, Russia

<sup>6</sup>Togliatti State University, Togliatti, Russia

<sup>7</sup>Samara State Technical University, Samara, Russia

**Abstract.** The article presents an update and a generalized geo-ecological assessment of the Bogorodsky urban district of the Moscow region (the former Noginsky was abolished) at the time of 2021-2022. The indicators of the ecological state of the territories are considered from the standpoint of the realities of the current years. A comparison was made of the geo-ecological situation of the territories of small towns of compact residence in the Noginsk district for 2011-2014 and the current geo-ecological situation of the territory of small towns of the Bogorodsk urban district of the Moscow region (the former Noginsk was abolished) for 2021-2022. Data on the incidence of the population and environmental pollution are analyzed from the standpoint of causal relationships of direct and indirect correlations between diseases of the respiratory, digestive and genitourinary systems. Also, for ecodiagnosics, the dominant concepts of toxicology are used, such as the reaction rate and the response of a particular individual organism to a stimulus. A new municipal specialized subprogram "Ecology and the Environment" for 2023-2027 with the introduction of new indicators aimed at protecting the environment is considered. A look at the scenarios and inertial forecast for the development of environmental sustainability of urbanized territories of small towns in the study area is given.

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\* Corresponding author: [RodionovSS@mgsu.ru](mailto:RodionovSS@mgsu.ru)

## 1 Introduction

Today, one of the most pressing issues is the problem of environmental pollution and the protection of public health from negative environmental changes. The problem is especially acute in large urban agglomerations and adjacent territories, which include the Bogorodsky urban district of the Moscow region. Natural territories and cities of compact residence are confirmed by the influence of both a large agglomeration and their own technogenic flows. The Bogorodsky urban district of the Moscow region includes large cities that are industrial centers. The environmental assessment of the study area shows the imperfection of the environmental management system, which affects the health of the living population. Our inert forecast shows the presence of systemic and structural problems related to both the standardization of regulatory documentation in the field of environmental protection and protection, and the problems of public administration mechanisms and interaction with other executive authorities at the municipal level.

In this work, the decisions that we made and the management system (scenario) we choose are based on the interconnections of indicators of natural (quality of water, air, soil), social (health of the population) and production (volumes of emissions from industrial enterprises, etc.) clusters of urbanized territories of small towns Bogorodsky urban district of the Moscow region.

## 2 Materials and methods

The information base for the analysis was the data on the incidence of the population of the state budgetary health care institution of the Moscow region "Noginsk Central District Hospital". The results of the socio-economic development of the region and the program of the socio-economic region 2020 - 2022 EIA data - preliminary environmental impact assessment materials for the object of the state environmental expertise in 2022 for groups of enterprises of I and II hazard classes. Municipal program of the Bogorodsk urban district "Ecology and the environment" for 2023-2027. Information letters on the state of the environment in the Russian Federation and the Moscow region. Data of the ecological situation MosEcoMonitoring. Results of comprehensive monitoring of the state of the environment from the environmental monitoring posts of the Bogorodsk urban district 2021-2022

## 3 Results and Discussion

The structure of diseases and hospitalization rates of residents of the Noginsk region. Prospects for the development of predictive scenarios of the ecological situation in the study area.

Health care of the Noginsk district and its main link in the provision of primary and specialized medical care to the population is the state budgetary healthcare institution of the Moscow region "Noginsk Central District Hospital".

According to the report of this institution, socially significant diseases were identified [4]:

- Diseases of the cardiovascular system in 12901 people.
- Diabetes mellitus in 868 people. If we compare the data with the previous years 2013-2015, then the current situation in 2021-2022 has changed. Diabetes mellitus was added to diseases of the cardiovascular system, and this disease was reflected in the structure of diseases to diseases of the digestive, respiratory and circulatory organs [7, 8, 11]. Here, if we analyze the municipal program "Ecology and Environment of the Noginsk

Municipal District" for 2017-2021, mainly activities were carried out to clean the coastal strips, work to clear the water protection zones of rivers, and plant trees [2, 6]. A municipal contract has been concluded for the collection and removal of unauthorized piles of garbage.

All this is due to the program for the restoration and environmental rehabilitation of the rivers of the Moscow region "Ecology and the environment of the Moscow region in 2017-2020." [6, 2]. As we can see, environmental protection measures mainly cover the aquatic environment and in no way take into account air and soil pollution. And as we remember from our previous studies [7, 8, 11] in this area, when assessing the technical capacity of the territory, geocological assessment, IDT - the index of demographic tension, which characterize the technogenic impact on the environment, we necessarily studied air basin clusters. This study showed contamination by hazardous substances benzopyrene, nitrogen dioxide, etc.

Let's compare this with the priority tasks in health care for the coming years, where they highlight the achievement of indicators to reduce mortality from diseases of the circulatory system, from neoplasms, from tuberculosis, from traffic accidents, and infant mortality. These tasks correlate with the conclusions presented by us earlier in previous studies for 2013-2015. Also conducting medical examinations and preventive examinations of the adult and children's population. As we distinguished the structure of morbidity by rural and urban population, sex and age structure, this gradation of ours remained relevant.

In the field of ecology, the priority tasks are to continue the work on clearing the water protection zones of the Shalovka and Vassa rivers. At the same time, air pollution (surface atmosphere) and exceeding the maximum permissible concentrations for common pollutants remain unattended. This issue has been largely ignored.

These indicators remain indicators of the assessment of the geocological situation in the region under study.

In addition, we will conclude that the report does not show the ranking of the Bogorodsky urban district by settlements.

According to the results of the socio-economic development of the Noginsk municipal district for 2018 and the tasks for 2019, the birth rate decreased by 4.2%. the number of permanent population as of 01.01.2022 amounted to 208.4 thousand people.

According to the Municipal Program of the Bogorodsk Urban District "Ecology and Environment" [1, 2], the rivers flowing within the boundaries of the Bogorodsk Urban District of the Moscow Region have an increased degree of pollution, one of the sources of river pollution is the discharge of treated wastewater from treatment facilities. What is confirmed by us in the dissertation research and scientific articles [7, 8, 11]. To reduce the level of pollution of rivers, soils, groundwater and improve the quality of life, measures are proposed to reconstruct treatment facilities, improve the quality of wastewater treatment, clean the reservoir bed from contaminated sediments, etc. It is worth noting that these water bodies are owned by the Russian Federation [9] and often the selection and actions of specialized field environmental laboratories are carried out in case of accidents or any emergency or additional measures as part of the provision of control and supervisory functions.

Updating our generalized geo-ecological assessment of the urbanized territories of small towns in the Bogorodsky urban district of the Moscow region within the framework of the "Ecology, Environment and Public Health" system, we see that the degradation of small rivers continues. This is also due to the lack of a unified state policy for the protection and use of water bodies in this basin. The analysis of air, soil, and water pollution in the study areas was carried out by comparing pollution levels with standards - maximum permissible concentrations (MPC) of a substance in the environment of sulfur dioxide, nitrogen dioxide, carbon monoxide, hydrogen sulfide, ammonia, benzopyrene, suspended solids, etc.

(according to data of the ecological situation of MosEcoMonitoring and the results of comprehensive monitoring of the state of the environment from the environmental monitoring posts of the Bogorodsk urban district in 2021-2022 [10, 12]). Also, at the current moment in 2022, we see that for a generalized assessment, the complex API (air pollution index) continues to be used. This index was used by us to assess the situation and in previous scientific studies, as one of the parameters. Ecomonitoring posts that collect data from the results of integrated monitoring are located in the Bogorodsky urban district of the Moscow region in the territories of small towns at the addresses systematized and presented below in Table 1.

**Table 1.** Posts of ecological monitoring of complex observation in the Bogorodsk city district.

Urban / rural settlement	Ecomonitoring post address	Note
Noginsk	Chapaeva street, 3A	-
	Klimova street, 48	-
	st. Amateur, 4	-
	Craft St., 9	the post is under scheduled maintenance
	Aeroclub, 4/1	the post is under scheduled maintenance
Elektrostal	New street, 1	-
	st. Soviet, 3	-
	st. Green, 1	the post is under scheduled maintenance
	Elizavetino village, Central street, 31A	-
	st. Pushkina, 23A School number 11	-
	st. Mira, 5	-
	Yuzhny Ave., 7 Gymnasium No. 21	-
	st. Yalagina, 22A	the post is under scheduled maintenance
	st. Komsomolskaya, 4A	-
	Shchylkovo	st. Pioneer, 38
md. Bogorodsky, building 11		-
md. Schelkovo-3, st. Institutskaya, 5		the post is under scheduled maintenance
Fryanovskoe highway, 68A		the post is under scheduled maintenance
st. Zarechnaya, 6A		the post is under scheduled maintenance
st. Factory, 4		the post is under scheduled maintenance
working settlement Monino, Novinskoe shosse, 20		-
Shchylkovo, microdistrict Zhegalovo	-	

As can be seen from Table 1, some posts are under scheduled maintenance. The district administration is working in this direction in accordance with the Municipal Program of the Bogorodsk urban district "Ecology and Environment" for 2023-2027. We have listed a certain list of activities, the rest can also be found in the Decree "On Approval of the Municipal Program of the Bogorodsk Urban District "Ecology and Environment" for 2019-2023" and the Program for the Socio-Economic Development of the Bogorodsk Urban District [1, 2].

In our generalized assessment, we note that there is a difficulty in taking into account natural factors as a transboundary transfer. In addition, we single out the concept of the norm of reaction and the response of the individual reaction of the body to the stimulus. The reaction rate is the body's response to a stimulus [11]. That is, with a sample of 1000 inhabitants, a certain percentage will show reactions in the form of allergic reactions and others, and a certain percentage will not. The reaction rate is one of the basic concepts of the science of toxicology. Given the above, in this case, many MPC indicators are at the pre-limit permissible values (according to our research and posts, table 1).

Separately, we note that municipal authorities, within the framework of specialized subprograms, also introduce new indicators, such as the number of people participating in activities to form an environmental culture and educate the population in the field of environmental protection. The indicator is calculated by the formula:

$$C_{nas} = C_a + C_s + C_h + C_{\varepsilon} \quad (1)$$

Where,  $C_a$  - number of participants in the forest planting action;  $C_s$  - the number of students who received scholarships for targeted education;  $C_h$  - the number of schoolchildren, winners and prize-winners of rallies, competitions, exhibitions;  $C_{\varepsilon}$  - number of participants in environmental events.

## 4 Conclusion

In general, giving an inertial forecast for the development of environmental assessment and sustainability of urban areas and the entire cluster of the Bogorodsky urban district of the Moscow region within the framework of the "Ecology, Environment and Health of the Population" system, we will identify a number of scenarios without which achieving environmental sustainability is not seen as possible. These scenarios suggest, as a solution to the problems described above, the development of the necessary documentation, the division of a set of measures into subprograms, which will include conducting water quality analyzes on identified depressive and degrading water bodies of small rivers, using the indicators we have introduced with a link to public health with ranking of specific areas compact living, taking into account environmental stress based on medical indicators, and in particular, diseases of the respiratory, digestive and genitourinary systems in various age and sex groups, stimulating response in case of deviation from the specified control parameters for environmental clusters.

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