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RESEARCH OF TRANSPORT ECOLOGICAL SYSTEM OF TASHKENT CITY INFRASTRUCTURE: PROBLEMS, REQUIREMENTS AND SOLUTIONS

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Annotation
This scientific article discusses the analysis and research of the problem, requirements, as well as the main factors influencing to improve their ecological infrastructure of modern cities. As an example, the ecological situation in Tashkent, the capital of Uzbekistan, was studied. Based on the analysis, conclusions and recommendations for organizing and improving the ecological infrastructure of cities were developed.

Keywords: urban infrastructure, city ecology, environmental requirements, biotic city, ecopolis, green city, environmental infrastructure, modern city rating, environmental performance, smart environment, environmental standards.

The decision of the Council of People's Deputies of the city of Tashkent dated 16.09.2022 "On approval of the master plan for greening of the city of Tashkent" was adopted.

The document approved the Master Plan for the greening of the city of Tashkent in 2023-2027, according to which it is envisaged to plant about 7 million seasonal flowers, no less than 75 thousand tree seedlings and bushes every year.

According to the master plan, the following tasks are defined:

- to increase the level of greenness of the capital to 30% by 2024;
- entrusting the Department of Ecology and Environmental Protection and district governments with monitoring the installation of dust and gas trapping devices with an efficiency of not less than 95% at the stationary sources of atmospheric air pollution of enterprises belonging to categories I and II in terms of environmental impact;
- taking measures for current repair and renewal of irrigation networks in the streets of city and district centers;
- determination of measures to protect trees from harmful insects;
- In 2022-2024, beautification of the shores of the canals passing through the city, strengthening of the banks of the canals, greening and establishment of parks.

INTRODUCTION

In recent years, in the field of urban development of the Republic of Uzbekistan, consistent work has been carried out in the field of environmental protection, effective and rational use of natural resources, improvement of sanitary, hygienic and ecological conditions.

One of the most important areas of public attention today is the modernization of the infrastructure of large cities, compliance with international requirements, improvement of the transport infrastructure, solving problems related to the environmental conditions of the transport infrastructure (waste gas, noise, electromagnetic and vibration).

This, in turn, increases the demand for scientific and innovative innovations related to conducting theoretical and practical research in this field, introducing international requirements and norms, taking into account the experiences of advanced foreign countries.

Urban ecology changes, of course, depends on people's natural and ecological thinking, their understanding of medical and social fields, and their worldviews.

Urban ecology develops measures to prevent the negative factors of the transport system, which are related to and directly affect the urban environment and the life and health of its inhabitants.

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Deterioration of ecological and hygienic indicators in densely populated cities poses a great danger to city dwellers. Therefore, providing people with clean water, clean air, and prevention of epidemics such as noise and waste gas in densely populated large cities is important and is considered one of the urgent problems waiting to be solved.

RESEARCH METHODS AND MATERIALS

The purpose of the research is to study and analyze modern requirements and procedures related to ecological, sanitary-hygienic conditions and problems in the development of the infrastructure of new modern cities in the republic.

It is to create optimal solutions by comparing the current situation in this field with ISO standard requirements and the experiences of developed countries and existing infrastructure in foreign countries.

As a result of the conducted researches and studies, development of suggestions and recommendations regarding the development of ecological infrastructure of modern cities in the republic and provision of optimal ecological conditions.

The tasks of scientific research are as follows:

- analysis of scientific, practical works and researches on the development of ecological infrastructure of modern cities;
- to study the prospects of introducing modern requirements and procedures related to the problems of the ecological situation in the formation of the ecological infrastructure of the modern city;
- analysis of international requirements and experiences of developed countries related to the standardization system in the formation of motor transport infrastructure in modern cities;
- is to prepare generalized conclusions and recommendations based on research results, international requirements in this field and the experiences of developed countries.

The object of scientific research is the systems of urban ecology, urban ecological infrastructure, problems of urban ecological infrastructure and methods related to their solution.

Based on the results of the research, the evaluation of normative and technical documents in the field of ecological infrastructure development of modern cities will be carried out based on their optimal aspects, international requirements and the experiences of developed countries.

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The main requirements for ecological infrastructure of modern cities are the subject of scientific research. It is a base of standards related to environmental requirements of infrastructure of modern cities, environmental quality and safety indicators of infrastructure, transport, ecological and environmental protection system.

Description of the methodology used in the research, the following methods were used in the process of this scientific research:

The method of analysis is the study of relevant standard, regulatory-technical and regulatory-legal documents in the system of urban ecology.

The method of comparative analysis is to determine optimal solutions by comparing data on the system of development of ecological infrastructure of several existing cities.

Literature review (analysis) on the topic of research The formation of urban ecology dates back to the 20s of the 20th century. The following periodization of the development of this direction can be suggested:

1. 20-50s of the 20th century, establishing connections between social ecology and human ecology with regions, gathering ecological knowledge in urban planning, developing and implementing the concepts of regulating the relationship of human thinking between man and nature;
2. The introduction of the principles of systematic, ecological approaches in urban planning in the 60s of the 20th century. "Optimal city", "Biotechnical city", "City in nature" models were used in the design and construction;
3. Forming the main concepts and methodological approaches of urban ecology in the 70s and 80s of the XX century, developing models and putting them into practice: "City-group residential form", "Ecological city" (Ecopolis), "Scientific and industrial city" (technopolis).
4. In the new socio-economic and regulatory conditions of the 90s of the XX th century, deepening of ecological knowledge in the field of urban planning, formation of requirements for sustainable and non-ospheric development of residential areas and their systems. To strengthen the leading role of the socio-economic and ecological approach in the formation of the urban environment.

Thus, by the beginning of the 21st century, it can be said that the field of urban ecology was formed as a special direction of the science of urban planning, with its own methodology and research principles.

Several generalized approaches and concepts have been formed in urban ecology:

1. "The city as a system of self-organization";
2. "The city as an element of the developing biosphere";
3. "A city consisting of an architectural and natural subsystem" - a single complex-large urban landscape that develops over time;
4. "Dynamics of the urban landscape as a unity of its stability and variability";
5. "The city as an object of cultural ecology", "humanizing the homosphere".

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At the beginning of the 80s of the last century, the Ecopolis program, proposed by a group of experts in ecology and biology, became popular. The concept of **"Ecopolis"** was presented by its authors (D.N. Kavtardze, A.A. Brudniy, V.G. Agavelov):
"Ecopolis" is a small city of the future, where the environmental parameters are set in controlled conditions, and the population is ready for constant changes in both lifestyle and nature. In Ecopolis, there is a constant experiment in the interaction of nature and man.

At the same time, in the early 1980s, the concept of "Biotic city" developed by A.N. Tetior was proposed. According to this concept, "Biotic city" is a place of residence where favorable conditions are created for the existence of all living things: flora, fauna and people.
Some models of urban systems that are convenient for solving urban-ecological problems are proposed. In one of them, urban elements are divided on the basis of "natural environment - artificial environment".

RESULTS OF THE STUDY AND THEIR DISCUSSION

Development of ecological infrastructure of modern cities and provision of ecological condition, analysis of the ecological situation in large cities today, it is necessary to determine the development trend and perspective of this field.
Every step forward in this field is important in improving and optimizing the lifestyle of the population, finding solutions to problems in this field, and developing the country's economy.
Among the growing problems of infrastructure management in cities, especially social, economic, infrastructural, ecological, transport and other problems are becoming more acute, the disproportion between the urban base and social infrastructure is increasing.
Lack of housing for the population, economic-social and utility system placements are observed in any city today.
Nowadays, the convenience and modernity of living in cities, the prosperity of cities in the future is one of the urgent problems. Our goal is to make the living environment more comfortable and comfortable, as well as to optimize it.
The level of well-being of the population is an important indicator of the final effect of environmental factors on people.

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Almost 50% of the country's population lives in big cities, so solving the issue of optimally forming the living environment in these cities is considered one of the most important tasks.

The comfort of living in a modern city is determined by the sum of the following indicators:

Natural environment: geological and hydrogeological structure and relief; microclimate; landscape; soil layer;

Ecological environment: level of soil pollution; level of air pollution; level of water pollution;

Social environment: population density and population structure; provision of service sector facilities; availability of transport.

The degree of improvement of the urban environment:

level of improvement elements;

transport infrastructure;

landscaping and landscaping.

We note the main trends characterizing the development of urban planning theory during the XX th century. It is convenient to divide all concepts into two main categories: urban and de-urban.

The urbanist approach is manifested in the idea of solving the environmental problems of the modern city by concentrating the population, while in the de-urbanist approach, this is done by spreading people to the natural environment.

The methods developed by urban ecology are particularly relevant. At the end of the XX th century, the world community realized the threat to the Planet's ecosystem caused by widespread urban settlements. In the XXI st century, it is possible to try to create a new type of settlement - a city integrated into natural ecosystems - an ecologically clean city.

Urban ecology is a special branch of the science of urban planning, the subject of which is the study of the interaction of urban structures with the natural environment and the development of proposals for its optimization.

The main goal of architectural ecology is to search, research and apply the principles of creating an architectural and landscape environment in which nature and human interests are combined.

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Regional urban ecology is a special branch of science, the subject of which is the study of the laws of interaction of the highest order urban planning systems (systems of settlements, urban agglomerations and higher) with the natural environment.

Among the most important tasks of environmentalization of the living environment, as mentioned above, the problem of achieving an ecological balance between the city and nature stands out.

Urban development is one of the main factors of the active influence of man on the natural environment. It is fair to consider the city as a part of the general ecosystem of the region, the country. The types of interactions in the "city-nature" system depend on the size of the city and its population.

According to some data, the highest level of ecological balance can be achieved with effective measures for waste water treatment, waste, etc., with a population density of no more than 60-1 people per 50 km2 and a forest cover of no more than 20-30%.

Based on the generalization of the European experience in creating sustainable settlements, the criteria for optimal planning of the environment and the construction of buildings of ecological settlements for hot climate conditions were formed:

1. Each element of the environment has its own meaning and its needs should be carefully evaluated in terms of improving the quality of life. This applies to all representatives of the animal world, plants, people, all elements of the human environment, natural and artificial.

2. It is proposed to accept all elements of the human environment, not from the point of view of their compliance with certain standards and concepts, but to accept them as they are and to work with them to improve the general environmental situation;

3. Every environmental problem contains a solution. If there are disadvantages, then they must have advantages. The more problems there are, the more opportunities there are to change the situation. For example, China's "crisis" character has both concepts: danger and opportunity.

Therefore, architects and urban planners should try to turn the problem into opportunities to create greater balance, harmony and sustainability.

4. "Sustainability" is the key to environmental planning and ecological settlements. A sustainable architecture and residential model is developed based on the balance between return and consumption between the land and its inhabitants.

For this, it is necessary to increase the vitality and availability of all the structural elements of the environment.



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The process of transforming a part of an ordinary city into an ecological city is a long process consisting of many interrelated stages, starting with the assessment of the existing situation and the development of the Master Plan and technical-engineering solutions, ending with social issues:

- Master Plan;
- Energy;
- Materials;
- Transportation;
- Water.

On the example of the concept of green infrastructure of the city, the specific features of the implementation of urban planning programs of German cities were analyzed. The main focus was on a comprehensive environmental policy, including the greening of all elements of the city's infrastructure, in particular, the introduction of a clean ecological thinking and lifestyle among the population.

Citing the most prominent works in the scientific literature on research, we can distinguish the following main elements of green infrastructure:

- green construction:
- green transport:
- environmentally friendly waste management:
-creating a special microclimate due to green spaces.

To date, there are four main areas of activity in the field of green infrastructure, which provide an effective organizational framework at the city level:

1) promotion and education of waste management, including waste recycling, biofuel production and garbage sorting in daily practice, and 100% waste treatment, and promotion and education starting from pre-school and school educational institutions;

2) low-carbon mobility, including the promotion of non-motorized or efficient public transport, designed to encourage the abandonment of the use of cars, together with the creation of infrastructure for the use of alternative forms of energy;

3) greening of the city's energy infrastructure, encouraging nature users to expand the use of renewable energy sources, wind farms in the suburban area), introduction of energy-saving technologies and "smart" electrical systems, as well as construction of climate-neutral buildings;

4) different approaches to urban development - first of all, it is methods of reducing and preventing urban sprawl (for example, vertical landscaping, roof landscaping, and other modern innovative ideas) while preserving and expanding green open spaces that compensate for the "Urban Heat Island" effect.).

The basis of the ecological infrastructure system of the studied cities are the following tasks:

- maintaining the ecological balance of the area with the condition of rational use of both natural resources and environmental services;

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- management of natural processes based on accounting and analysis of environmental services;
- ensuring the sustainable development of the city environment and favorable conditions for human living;
- development and active implementation of scientific, educational and educational programs for the purpose of greening the consciousness of urban residents.

International experience shows that green infrastructure requires a comprehensive integration of knowledge and efforts of not only planning architects, but also ecologists, economists, managers and politicians.

To date, important international experiences have been accumulated in the practice of urban planning on the use of green infrastructure and the creation of a healthy urban environment based on it.

The example of environmentally friendly cities shows that living in harmony with nature, minimizing the consumption of finite resources, reducing the amount of waste and waste to the level of natural renewal is not only possible, but also ensures its economic, ecological and social efficiency.

Based on the results of the research and the analysis of the current situation, the possibility **of implementing the concept of green infrastructure in Uzbekistan,** the issue of forming a single concept of ecological infrastructure and, in particular, its implementation in the practice of urban planning, is particularly relevant.

The environmental situation in most industrial cities of Uzbekistan is considered to be quite severe. In this regard, it is especially important to develop the concept of ecological infrastructure and put it into practice in order to achieve the status of "Green City".

The construction of new modern and comfortable buildings, taking into account European trends, will help to introduce the organization of green roofs. For example, a green roof can help reduce the cost of electricity (heating, air conditioning) by 10% or more.

The transport part of the environmental protection program of the city of Tashkent should ensure the following main practical results:

- reducing the negative impact of transport on the ecosystem and environment;
- improving the vital activity of the ecosystem;
- reducing the impact of vehicles on the environment, reducing the number of polluting factors.

The priority of the transport system is its guarantee of safety, environmental friendliness, economic efficiency, and reliability.

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Last year, the amount of air pollutants in Tashkent amounted to 426,000 tons. At the same time, the share of cars was 395,000 tons or more than 90% of emissions.

The total volume of waste gases in Uzbekistan in 2020 was 2,449 million tons, of which 60% is motor transport, which is 3 times more than the standards set in developed and developing countries.

The level of urban air pollution is measured by the Air Pollution Index. Values less than 5 points correspond to a decrease in the pollution level.

In the last 10 years, the level of air pollution has been reduced in all cities of Uzbekistan. The lowest indicators of API - 1.10-2.63 are typical for cities such as Denov, Kokan, Gulistan, Samarkand, Sarosiya. High indicators of API - 4.30-5.30 are observed in Almalik, Angren, Bukhara, this indicator is in the range of 3.20-3.97 in other cities of the republic.

Urban transport is the main mobile source of pollutants, especially nitrogen dioxide, 2.2 mln. More than 550,000 vehicles are registered in Tashkent. About 65% of vehicles registered in the capital run on gasoline and diesel engines, 35% on gas. When working on diesel fuel, 208 kg of harmful substances are released from one ton of fuel, when working on gas, 3 times less.

Motor vehicles emit 200 pollutants into the air, including carbon monoxide, aldehydes, and nitrogen oxides.

Accumulating in the surface layer of the air (the breathing zone of people), these substances react under the influence of ultraviolet rays and become the first products of the formation of new, sometimes toxic compounds, and there are chances of staying in the air for several days.

In recent years, the situation with atmospheric air pollution has remained stable due to the re-profiling or relocation of industrial buildings to the outskirts of the city, the absence of large stationary sources of pollution, as well as measures for the improvement of the area.

According to the city ecology department, 43.6% of the total territory of Tashkent city is under green space. 69 sq. per person. m of green spaces in the city equal to 50 square meters, thousands of seedlings are planted every year.

According to the State Ecology Committee, 36.2% of total waste gases in 2020 will be accounted for by industrial enterprises. Most of the industrial facilities - the main air pollutants - are concentrated in Tashkent region (37.9%).

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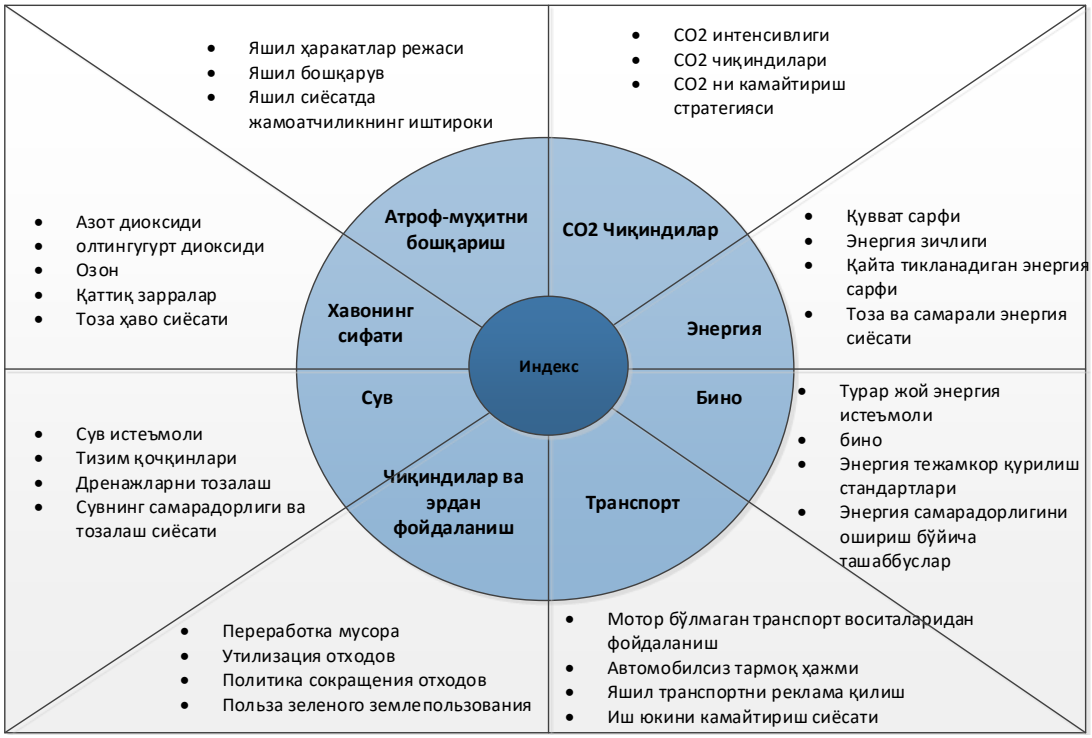
of the Ministry of Construction on anti-dust measures to be observed in construction sites. According to the sanitary standards approved by the Ministry of Health, "All work that generates dust in the production process must be carried out in conditions that exclude or maximally limit the spread and spread of dust."

Environmental indicators in determining the rating of infrastructure of modern cities European smart cities. According to this model, a Smart City is a city with high performance in 6 main characteristics and internal indicators.

Figure 1. 6 main features of the European model of city infrastructure rating

SIMENS GREEN CITY INDEX

The methodology for ranking green cities was developed in cooperation with SIMENS, the analytical department of the British Economist magazine.



2. Picture - Methodology for ranking green cities

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Thus, the measurement of quantitative and qualitative indicators makes it possible to evaluate cities not only according to current environmental indicators, but also according to their intentions to be harmful to the environment.

CONCLUSIONS

Based on the goals and objectives of the scientific research work, the following conclusions were drawn based on the obtained results and analysis:

Creating environmentally friendly conditions in cities is not a simple process. This requires a detailed analysis of the initial situation to form the main problems and the development of an action plan to solve them.

Cities, home to almost half of the world's population, have become, on the one hand, the centers of human achievements, and on the other hand, the places where social inequality and related social problems are most acute. The concentration of industry, transport and utility infrastructure creates extensive environmental problems.

It is important to create conditions for building environmentally friendly housing using new, ecologically effective technologies, taking into account local traditions and natural-climatic conditions.

Currently, in cities, the concept of "Green" infrastructure (expansion of green zones and corridors, renewal of irrigation water supply, improvement of road and road network and infrastructure (including attractive places, playgrounds and sports fields, skate parks, bicycle paths, etc.) and landscaping works are underway.

At the same time, today there are a number of important issues that require immediate solutions, in particular, the development of appropriate technical infrastructure and the regulation of convenient ecological recreation areas.

A study of the implementation of the concept of green infrastructure has shown that an environmentally friendly lifestyle, a green economy and a green city are not utopias, but reality.


The analysis of the activities of ecologically clean cities shows that living in harmony with nature, minimizing the consumption of finite resources, reducing the amount of waste and waste to the level of natural renewal is not only possible, but also brings about its economic, ecological and social efficiency.

The ecological situation in most cities of Uzbekistan is considered to be quite severe, in this regard, the development of the concept of ecological infrastructure and its

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implementation in practice, in particular, in the practice of urban planning, to achieve the status of "Green City", is a current issue and especially relevant.

In order to ensure the ecological infrastructure of modern cities, special attention should be paid to the following:

In the field of atmospheric air pollution:

- production enterprises and vehicles (by type) are the main sources of atmospheric air pollution;
- the increase in the amount of pollutants emitted by motor vehicles into the atmosphere depends on the environmental level of the vehicles, the quality of the used fuel and the proper organization of traffic;
- systematization and improvement of the normative-legal base - adoption of international norms, adaptation to natural conditions, introduction of ecological assessment system, development of ecological certification;
- making investments in environmentally friendly technologies and production, types of raw materials, materials, researching the effects of the level of environmental pollution on public health and environmental objects;
- to strengthen international cooperation among countries on environmental protection and rational use of nature.

In the field of atmospheric air protection:

-reducing the release of pollutants into the atmosphere;
- adoption of "Euro-6" environmental standards of wheeled vehicles and motor fuel;
-reducing intersections of traffic and pedestrian traffic, reducing highway loading levels, optimizing traffic flow structure, traffic speed regime, regulation cycle;
- ensuring the use of devices that capture dust and gases polluting the atmosphere of new production facilities.

In the area of environmental standards:

- ensuring the transition to international standards in the priority areas determining the quality of the environment;
- expanding the application of environmental standards;
- it is necessary to ensure the harmonization of the current standards with the standards of the International Organization for Standardization ISO and the International Electrotechnical Commission IEK.

There are many problems facing the modern urban planning infrastructure related to increasing the quality indicators of the ecological infrastructure of the city, improving the ecological condition, and ensuring the ecological balance.

In this regard, by involving experienced specialists of competent and responsible state management organizations, taking into account the international demand and the best practices of developed countries, in this way, based on the existing conditions and opportunities, to arrive at the optimal solution, to ensure the ecological system and ecological condition of the modern cities of our republic in the future. , serves to protect people's health and create comforts for them, to improve their living conditions.

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BIBLIOGRAPHY - LIST OF USED LITERATURE

1. "On measures for the future implementation of the development strategy in the five priority directions of the development of the Republic of Uzbekistan in 2012-2026" No. PF-5024, 20.01.202y. Tashkent, August 15, 2017. Collection of legal documents of the Republic of Uzbekistan, 2017, No. 33, Article 847.
2. ShNQ 2.07.01-03* "Planning the development and construction of urban and rural settlements" Tashkent, 2009.
3. Asatryan A.G. Strategiya razvitiya innovatsionnoy infrastrukturoi goroda // Transportnoe delo Rossii, №9 - M.: 2009 - S. 25-33
4. Barzilov S., Chernyshev A. Gorod kak social space // Svobodnaya mysl, 2007. #2. S. 3-13.
5. Resin V.I., Popkov Yu.S. Development of large cities and market economic conditions. System podkhod. M.: Editorial URSS, 2007. - 279 p.
6. Smolyar I.M. Gradostroitelstvo kak pravovaya planirovochnaya sistem: Series "Gradostroitelstvo i gorodskoe planirovanie". SPb., 2008. - 378 p.
7. Suslova Yu.Yu. Market infrastructure: theory, methodology, practice: monograph - M.: Kreativnaya ekonomika, 2007. - 176 p.
8. Trofimenko Yu.V., Yakimov M.R. Transport planning: formation of an effective transport system of large cities. - Moscow: Logos, 2013. - S. 17. - 464 p.
9. Tiverovsky V.I. Razvitie gorodskogo transporta zarubejom // Byulleten transportnoy informatsii. - 2006. - No. 5. S.-19 [29].
10. Alperin L. Sovremennyy vzglyad na sistemy kachestva i ix razvitie // Standardy i kachestvo. – 1998. – No. 10; [47].
11. Denisov V.V., Kurbatova A.S., Denisova I.A. and other Urban Ecology: A Study Guide. manual / edit. prof. VV Denisov. - M.-Rostov n / a: ICC "March", 2008.
12. Podgornova H.A. Environmental problems and solutions of motor transport // Young scientist. - 2016. - No. 22.2. - S. 48-50.
13. Tetior, A. N. Ecological infrastructure / A. N. Tetior. - M. : MGUP, 2014. – 370 p.
14. Ecological infrastructure "Zelenyy gorod". Materialy zasedania. Ecological chamber RF. -Electronic. from the text. –The regime is available at: http://ecochamber.ru/news/585-ekologicheskayainfrastructure-zeljonyj-gorod.
15. Kavtardze D. N. Ecology in Malogo Horoda // Ecology in Malogo Horoda. - Pushchino: AN USSR; MGU im. M. V. Lomonosova, 1987. - S. 15.
16. Muminov N.Sh., O'. Bekmirzaev. Ways to solve environmental problems in the development of motor transport infrastructure in modern cities. Scientific and practical magazine "Architecture Construction Design" in the possession of OAK, Tashkent, issue 2, 2020. 5.str.
17. Muminov N.Sh., O'. Bekmirzaev. Analysis of environmental problems in the infrastructure of modern cities. Scientific and practical magazine "Architecture Construction Design" in the possession of OAK, Tashkent, issue 2, 2020. 6 str.
18. Muminov N.Sh., O'. Bekmirzaev. Analysis of environmental problems in the infrastructure of modern cities. Tashkent, Ministry of Construction of the Republic of Uzbekistan. TASI. "Problems and innovative solutions of the development of the architectural environment of the island region". republican on-line scientific-practical conference on the subject. May 20, 2021. 6 str.
19. Internet sites.

Journal Zone Publishing, Ilford, United Kingdom