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Influence of Modern Processes of Life to The Architecture and Environmental Problems of Urbanization-Cities of Kazakhstan

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Abstract. Two directions of research were formed in the theory of architecture: The first is devoted to the issues of architectural design. In the second study the features of the influence of architecture on people. This is a two-way process of human interaction with the environment, it allows you to study in detail in the future, not only the design of an architectural object, but also the state of people interacting with it. On the one hand, a person changes the environment, and on the other reacts to its impact and influence. And this process is an integral part of human life, because the environment affects his emotional state, mental and physiological processes. This underscores the importance of studying the impact of the surrounding urban space on people, regulating the level of comfortable living by analyzing the ecological state of the environment and the quality of buildings being built. Life processes can be formulated as: spiritual, psychological, physiological, mental, bioenergetic, which affect morphogenesis in architecture. When describing an architectural object, we use such criteria as the functionality of the object, the aesthetics of the construction cost, and the modernity of the architectural solution of the building.

Keywords: Urbanization, ecology, architecture, resources, ecology.

1. Introduction

The modern city is a complex socio-economic organism, formulated demographic, diverse economy, and geographical relations with the surrounding economic space and the natural environment. Describing the economic development of the region, it should be noted that every year there is an activation of various sectors of the economy, in particular the construction industry, the development of small and medium-sized businesses. All this leads to an inevitable increase in the negative impact on the environment since all industrial enterprises that place their emissions, discharges, and waste in the natural environment are sources of its man-made pollution. Therefore, the sustainable development of the capital and other cities of Northern Kazakhstan is largely determined not only by the economic potential, the availability of land, human and other resources, but also by the state of the urban ecosystem. Living in a city, especially in industrial areas, it is difficult to talk about a favorable environmental situation. Landfills, chemical waste, automobile exhaust, industrial and industrial pollution of water and air, deforestation, the prohibition of fishing and hunting-all this directly entails environmental problems.



2. Environmental Engineering in Architectural Design

Architectural ecology as the ecological basis of architectural design includes environmental aspects of design, creating a healthy environment inside and around buildings, landscape architecture, improving the environment perceived by the senses, protecting the environment by architectural means, and social and spatial control over the environment and people [1]. Architectural ecology takes into account the ecological features of interaction between architectural objects and nature and the social and environmental needs of residents. Architectural ecology aims to bring people closer to nature, to save them from the monotony of urban space, lack of physical activity, and the correct distribution of the population on the territory. The distribution should be no more than 100 people per 1 ha, in the construction of neighborhoods for 30 thousand People with a ratio of low-rise and multi-storey construction in the ratio of 7: 3. It is necessary to preserve 50% of the urban space for natural areas and green spaces, to isolate the population from transport routes, to create conditions for people to communicate.

As the urban environment continues to be clean, permaculture opportunities are expanding, which significantly improves the appearance of buildings. Architectural and environmental solutions of buildings and engineering structures will be developed in the direction of supporting the animal world, which will improve the quality of the environment provided to people. One of the interesting areas may be the support of biodiversity, including the provision of conditions for small birds and animals in the city [2]. One of the directions of accounting for human ecology is to ensure communication between urban residents through architecture, including communication between neighbors in houses, within blocks, in cozy and well-maintained courtyards. The task of architectural ecology is continuous environmental education and education of urban residents with the help of a beautiful and healthy architectural and landscape environment [3]. Man and society interact with the environment that affects people. In this process, the personalization of the living space is necessary. For the permanent education of residents through architectural and landscape ecology, it is necessary to create a beautiful and healthy, clean, and favorable environment for the senses (vision, hearing, smell, touch). The participation of residents in maintaining such an environment contributes to their interest in it.

3. Environmental Problems of Urbanization of Nur-Sultan and Ways to Solve Them

The city of Nur Sultan is located in an arid zone and is characterized by limited water resources. The city's waterway is the Yessil river, which flows in its southern part. This reservoir is used as the main source of centralized water supply to the population, its flow is formed almost exclusively by meltwater. Within the city, the Yessil river receives two small tributaries-the Sarybulak and Akbulak streams. The main source of drinking water for the city is the reservoir on the Yesil river with a water reserve of 67.2 million m³/year. The capital's reservoir is almost the only source to meet the domestic, drinking, and industrial needs of the city with a water reserve of 67.2 million m³/year (design capacity of 410.9 million m³).

The problems of ensuring environmentally safe and healthy living conditions of the population, rational nature management, and resource conservation are now directly related to the strengthening of man-made impact on the environment. In the context of further development of industries and agriculture, during the period of intensive development of Nur-Sultan and the growth of the capital's population, the need for energy and water resources, transport, housing and communal services is objectively increasing. All this leads to an increase in emissions into the atmosphere, the accumulation of industrial and household waste that must be recycled, disposed of and recycled. Atmospheric air is one of the main and most important components of the environment, a condition that significantly affects the global and regional climate systems. The state of atmospheric air in the city of Nur-Sultan is controlled at 7 stationary posts of RSE Kazhydromet. The state of air pollution was assessed based on the results of the analysis and processing of air samples taken at stationary observation posts. The main quality criteria are the values of maximum permissible concentrations (MPC) of pollutants in the air of populated areas.

In the 1st half of 2018, according to the stationary observation network, the level of air pollution was estimated as increased, it was determined by the values of SI = 4 (increased). The city's air is most polluted with sulfur dioxide. The volume of emissions of pollutants into the atmosphere from stationary

sources amounted to 27.261 thousand tons, in the first half of 2015 - 21.922 thousand tons. The expected total emissions of pollutants in the 1st half of 2016 is 5,339 thousand tons more than in the same period of 2015 or 17% as a percentage. The reason is the increase in the volume of burned fuel at the TPP-2 of Astana-Energo JSC after the introduction of new capacities. As in any region, Nur Sultan has several environmental problems, based on which a register of environmental problems is compiled, which includes procedures for identifying, assessing and updating environmental problems to effectively plan the environment and constantly improve the environmental performance of the city. One of them is the increase in emissions of pollutants into the air from road transport; air pollution in winter from sources of thermal energy and Autonomous heat supply; improvement and cleaning of the Yessil river and its tributaries Akbulak and Sarybulak; lack of alternative sources of thermal energy. The problem of monitoring the environment and the ecology of the urban environment attracts the most attention. Today, this task is the most important and complex and is the subject of modern scientific research.

Atmospheric air is one of the main and most important components of the environment, a condition that significantly affects the global and regional climate systems. The state of atmospheric air in the city of Nur-Sultan is controlled at 7 stationary posts of RSE "Kazhydromet". The state of air pollution was assessed by analyzing and processing air samples taken at stationary observation posts. The main quality criteria are the values of maximum permissible concentrations (MPC) of pollutants in the air of populated areas. To improve the environmental situation in the framework of the action plan, TPP-1 will install environmental equipment, and by the end of 2019 will upgrade four boiler units at TPP-2. Initiated by The Department of natural resources. raids were carried out in the private sector, which resulted in the conclusion that it is unacceptable to use tires, plastics, and tires for heating, in some homes, low-quality coal is used for heating. In this case, an examination is carried out. But the environmental measures taken are not enough, and the situation shows that it is necessary to reconsider approaches to environmental conservation. It is necessary to propose to tighten environmental legislation, as well as to restructure the work of all existing structures in the city.

4. Environmental Problems of Urbanization in Northern Kazakhstan and Ways to Solve Them

An environmental problem is a change in the natural environment as a result of human impact or natural disasters that lead to disruption of the structure and functioning of nature.

In the Kostanay region there are the following environmental problems:

- 1) Lack of a complex of treatment facilities for biological treatment in the city of Kostanay. Sewage treatment facilities are presented in the form of earthen sedimentation tanks, which include three parallel maps measuring 182 x 87 m, fenced with dams that work alternately, the total area of which is 107.6 thousand m². Start of operation-1966. The currently used wastewater treatment technology does not meet modern requirements for wastewater treatment and allows cleaning only partially with mechanical impurities, which is confirmed by the results of chemical analyses in conditions of a constant excess of MPC. With the introduction of treatment facilities, the release of pollutants into the environment will be significantly reduced. Due to the high cost, the issue of construction of a biological wastewater treatment plant in the city of Kostanay was included in the Register of environmental problems, in the List of priority investment projects (programs) for 2007-2010 in the Kostanay region with funding from the Republican budget in the amount of 6300 million tenge.
- 2) Lack of storm sewer with a complex of treatment facilities in the city of Kostanay. Kostanay is located in the watershed of the Tobol river, which has a drinking and drinking purpose [4]. To eliminate water pollution, it is necessary to organize a system of interception, collection, and treatment of polluted stormwater (Fig. 1).
- 3) The absence of a complex for processing solid waste in the city of Kostanay. The absence of a solid waste processing facility in Kostanay leads to an increase in waste generation and contamination of land resources. Following the register of environmental problems in the Kostanay region, it is necessary to attract investment from the national budget for the construction of priority facilities, namely, the introduction of a complex for processing solid household waste with a capacity of 100 thousand tons per year [5].

- 4) Historical orphan pollution-storage of industrial effluents of the former copper-ammonia plant in Kostanay. The drive is located in the water protection zone of the Tobol River. The copper smelter ceased operations in the 80's. Excess MPC for copper is recorded at the location of the drive. There is a threat of pollution of the Tobol River. To eliminate pollution, it is necessary to Finance it from the national budget.
- 5) There are no fixed posts for monitoring air pollution in the cities of Rudny and Zhitikara. The need for monitoring in these cities is due to the increased technological load on the part of mining enterprises. According to the RD, a stationary pollution control point is created at the rate of 1 post per 50 thousand inhabitants. Currently, there are only 2 posts in the region in the city of Kostanay.
- 6) Inefficient operation of treatment facilities in cities due to high wear and tear. It requires reconstruction, modernization, and major repairs of Sosv, which requires a lot of money. State-owned utilities, which are on the balance sheet of the CBS, do not have sufficient financial resources to carry out these works. Sosv was built in the 70s and is on the balance of public utilities, which do not have sufficient financial resources for their repair and modernization. Due to the high wear and tear, the efficiency of Sosv is reduced annually.

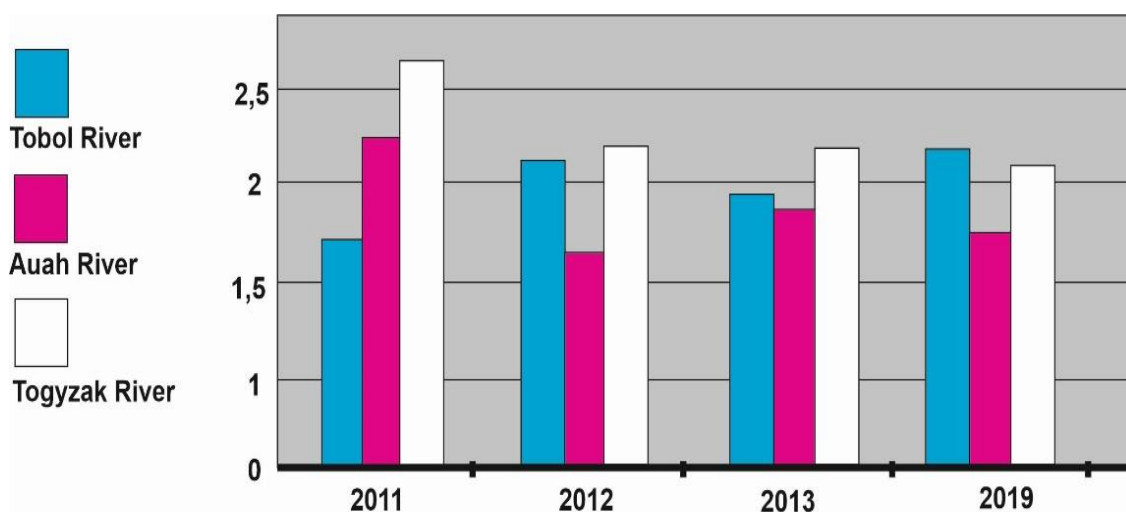


Figure 1. Polluted water index in Kostanay city.

To solve environmental problems, a register of environmental problems of the Kostanay region was developed. To solve the environmental problems of the construction of priority facilities, it is necessary to attract investment from the national and local budgets. The city of Petropavlovsk has a very high index of atmospheric pollution (Table 1). In 2018, 6 266 cases of hydrogen sulfide emissions above the maximum permissible standards were registered in Petropavlovsk. Petropavlovsk was named the dirtiest city in Kazakhstan. The Department of ecology of the North Kazakhstan region maintains a quarterly newsletter - an index of atmospheric pollution, which is affected by either a large number of emissions or an extremely high volume of emissions. According to this indicator, Petropavlovsk is on a par with Temirtau in terms of air pollution.

The source of harmful vapors in Petropavlovsk is the wastewater accumulator, which is located in the city. Residents of the city call this area toadstool because of the strong smell of hydrogen sulfide. There are rotting processes, and it is necessary to clean the bottom sediment. When the ice leaves in the spring, the process of hydrogen sulfide release begins, and observation posts operating in automatic online mode begin to signal this. To date, 11 cases of severe and one case of extremely high air pollution with hydrogen sulfide have been detected in Petropavlovsk. Every year in the city of Temirtau falls almost 300 thousand tons of industrial emissions, in winter there is almost no white snow, people complain that they are suffocating and try to appear less often on the street. The environmental problem

in Temirtau gave rise to other problems: the outflow of the population from the city, the growth of cancer, dissatisfaction with the work of the city administration, and, as a result, social stress. The last reason to raise the topic of urban ecology was the black snow that fell in the city in January 2018.

Table 1. Characteristics of air pollution in the city of Petropavlovsk.

| Impurity | Average hazard of pollution | | Maximum single hazard of pollution | | The number of cases of exceeding the Threshold Limit Values (TLV) | |
|-----------------------------|-----------------------------|--|------------------------------------|--|---|---------|
| | Mg/m ³ | Multiplicity of exceeding the Threshold Limit Values | Mg/m ³ | Multiplicity of exceeding the Threshold Limit Values | ≥ TLV | ≥ 5 TLV |
| Suspended substances | 0.085 | 0.568 | 0.100 | 0.200 | | |
| Suspended particles, PM-2.5 | 0.013 | | 0.513 | | | |
| Suspended particles, PM-10 | 0.012 | | 0.588 | | | |
| Sulfur dioxide | 0.008 | 0.153 | 0.351 | 0.702 | | |
| Sulfates | 0.009 | | 0.010 | 0.001 | | |
| Carbon monoxide | 0.989 | 0.330 | 7.000 | 1.400 | 4 | |
| Nitrogen dioxide | 0.032 | 0.789 | 0.080 | 0.941 | | |
| Nitrogen oxide | 0.001 | 0.014 | 0.066 | 0.165 | | |
| Ozone | 0.057 | 1.896 | 0.108 | 0.675 | - | - |
| Sulphuretted hydrogen | 0.003 | - | 0.074 | 9.275 | 149 | 32 |
| Phenol | 0.002 | 0.489 | 0.003 | 0.300 | | |
| Formaldehyde | 0.004 | 1.368 | 0.007 | 0.200 | | |
| Ammonia | 0.002 | 0.044 | 0.069 | 0.346 | | |
| Methane | 1.252 | | 1.886 | | | |

To improve the environmental situation in the city of Pavlodar, green zones are being actively created. Regular checks are carried out for compliance with environmental legislation. The potential danger is the free economic zone, which is being built near Pavlodar. For the sake of profit, the authorities forbid environmentalists to revoke licenses from enterprises that violate environmental requirements. However, the Department of ecology in Pavlodar is characterized by increased activity. Due to its activity, the Kazakhstan electrolysis plant was not able to work actively, as this could lead to the release of pollutants in increased volumes. At the same time, the company has clear objectives that will help it maintain turnover and allow it to work if the concentration of harmful emissions remains within the normal range. The city and the entire region are characterized by the problem of disposal of mercury-containing lamps. Now special containers are being installed throughout the territory to help solve the problem. The city and the entire region are characterized by the problem of disposal of mercury-containing lamps. Now special containers are being installed throughout the territory to help solve the problem.

5. Principles of Ecological Architecture

The following principles of ecological architecture can be formed in the process of research of ecological problems of urbanization:

- 1) The principle of energy conservation. We are talking about a new design and construction of structures in such a way as to minimize the need for consumption of thermal energy for heating or, conversely, cooling.
- 2) The principle of reducing the volume of new construction. At all times, people used old buildings or just materials from their disassembly to erect new buildings. Thus, the builders of the Abbey of St. Alban in England at one time adapted the bricks from the ruins of the Roman city of Verulanum to work. In the practice of Russian and Scandinavian wooden architecture,

old healthy beams and rafters were often singled out, removed from previous buildings, and assembled in another building. The roof builders of medieval Europe did the same. But in the mid-20th century, a completely different approach seemed to prevail - developers convinced city officials and private investors that it was cheaper and more efficient to break everything down and build from scratch. It is not always cheaper, rarely more efficient, but certainly easier.

- 3) The principle of using renewable energy sources. To save money and be environmentally friendly, green architecture uses solar panels and solar energy storage devices. Also, on the Southside of the building, there is a large area of Windows, which in total gives up to 80% savings on heating and hot water [6].
- 4) The principle of respect for the resident. This is a significant change in the approach to the functioning of the building, when both the Builder and the architect, and the owner see the building is not a living machine, and corporate property, in the maintenance of which each resident plays a huge role. This role cannot be significant in the case of multi-storey standard multi-storey blocks with an unchanged configuration of walls and roofs, where the role of residents is solely to prevent vandalism. But in the reconstruction of old buildings, the role of future residents can be extremely great.
- 5) The principle of respect for place and region. This is a special position of consciousness, most represented by Eastern philosophy, in which merging with the natural environment, an infinite view of it from time immemorial was considered the highest value. In General, European consciousness has long cultivated a different attitude to nature - it was considered exclusively as a resource, as well as an object of purposeful activity of people. The appearance of green architecture gives a hint that humanity has finally begun to think about the harmful effects on nature and is gradually trying to learn to coexist with it in harmony [7].

6. Conclusions

The environmental situation in Kazakhstan is of serious concern to many residents. The growth of mining production has led to the release of huge amounts of toxic waste. The lack of effective cleaning systems in industrial plants contributes to air pollution. Associated gas is burned at oil and gas enterprises, which leads to soot emissions. Road transport runs on low-quality fuel, and the country's water resources are subject to degradation. Currently, the government of Kazakhstan seeks to participate in various environmental organizations, which should help the country to correct the situation in the future. Despite the difficult environmental situation and the almost complete absence of clean cities in the country, Kazakhstan shows that every citizen must fight for the environment. When discussing the problems of the environmental situation in general, we are talking not only about the overall global picture, but also about the actions of one person. Until people receive proper environmental education, these issues will remain without special attention, until everyone understands the importance of maintaining a favorable environmental situation, and it is impossible to avoid the inevitable disaster [8]. Defenders of animals and nature do not give up trying to achieve good results: rallies against deforestation, self-cleaning of forests and rivers from volunteers, as well as the construction of reserves have a positive effect [9]. Issues and problems of ecological construction in the recent past have not been a priority in Kazakhstan. But during the crisis, it became apparent that green buildings consume less expensive resources. Green construction began to develop actively in Kazakhstan with a change of priorities. Green building can not only solve the long-term problems of global climate change, but also change life and the local environment right now to meet the most pressing human needs.

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