

Section 1. Architecture

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THE CHARACTERISTICS OF ARCHITECTURAL AND PROJECT SOLUTIONS FOR THE PRESERVATION OF ECOLOGY AND THE CREATION OF A COMFORTABLE URBAN ENVIRONMENT IN HOT AND DRY CLIMATE CONDITIONS (ON THE EXAMPLE OF THE REPUBLIC OF KARAKALPAKSTAN)

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Abstract

The article is devoted to the study of architectural design solutions aimed at preserving the environment and creating a comfortable urban environment in hot and dry climates. Using the example of the Republic of Karakalpakstan, the author analyzes the influence of climatic factors on the design of residential and public buildings, as well as on the formation of urban infrastructure. Modern approaches to the use of environmentally friendly materials, energy-efficient technologies, and natural resources to ensure the sustainability of the urban environment are considered. Particular attention is paid to issues of landscaping, water conservation, and the creation of shade in public spaces, which helps improve the quality of life in extreme temperatures. **Keywords:** *ecology, urban environment, climate, architectural design solutions, urbanization, waste*

The fact that the ecological problem is complex and has a threateningly increasing relevance is being perceived more and more all over the world. Not hunger and lack of food, as Malthus claimed at the time, and environmental pollution represents a real threat to the development of mankind.

One of the features of the modern stage of social and economic development of Uzbeki-

stan is accelerated urbanization, which has led to the fact that the number of urban residents in the country has exceeded the number of rural residents and continues to grow. The reason for this is both demographic features (high population growth and a large share of children and adolescents in the 90s and at the beginning of the “zero” years), and factors of intensive economic development of the country.

Urbanization by itself is an objective and natural process, reflecting the level of development of society and the development of scientific and technological progress has a prevailing influence on it.

The process of urbanization has a direct impact on the environment. Moreover, these problems are much more acute for large cities. For example, to ensure the water supply of a large city, it is often necessary to deliver water through powerful pipelines over large distances. For the removal and utilization of household and industrial waste, large efforts are required for their collection, transportation and processing (utilization or disposal). In big cities, there are problems with the so-called smog: if in small and medium-sized cities emissions into the atmosphere can be carried by winds of insignificant intensity, then in big cities they have a tendency to accumulate. It is no accident that in such a metropolis as Moscow, where, according to the “wind rose”, the western and south-western winds prevail and emissions into the atmosphere are carried to the eastern and northeastern parts of the city, fashionable areas of residential construction are spread over the western part of the city.

The high cost of land in large cities leads to the fact that often in central areas, areas under green spaces (parks, boulevards) are sharply reduced, which also negatively affects the living conditions of citizens.

In large cities, the number of journeys and their duration per 1 inhabitant is several times higher than in settlements with a small population. Therefore, the urban transport network in large cities is the “Achilles heel”. The complexity of ensuring an effective organization leads to a decrease in local traffic speed, to traffic jams, to additional pollution of the city’s air, and most importantly, it has a destructive effect on all aspects of the activities of citizens.

It should be noted that one of the important factors of increasing the urgency of the urban transport problem is the mass automobileization of the population.

That is why, at present, in many countries, there is an outflow of population from megapolises to small towns and villages. Mainly, citizens-pensioners belong to this category.

Many studies are devoted to the reduction of negative consequences of environ-

mental pollution in cities and the provision of comfortable urban conditions. Thus, Khinkis L. L. (Khinkis L. L., 2023) suggests using the capabilities of IT technologies and forming “smart cities”, which should certainly give a tangible effect.

A number of measures on this problem are envisaged and reflected in (Denisov V. V., 2010). Aksenova L. L. (Aksenova L. L., 2014) for the same purposes outlined the utilization of construction waste to obtain effective green composites.

A number of studies suggest scaling up “green construction” (Is Russia ready for the era of “green construction” 2023). There is quite a wealth of experience in green construction: (Ecological Construction: 2023).

To solve the problem under study, Certification of buildings according to LEED (**Leadership in Energy and Environmental Design** (LEED) is a voluntary certification system for buildings related to green construction, developed in 1998 by the American Green Building Council to evaluate the energy efficiency and environmental friendliness of sustainable development projects) and BREEAM (The Building Environmental Performance Assessment Method is a voluntary green building rating system developed in 1990 by the British organization BRE Global to assess the environmental performance of buildings. Wikipedia) standards is proposed (Certification of Buildings According to LEED 2023).

It is certain that the studies presented will have a positive impact on the preservation of urban ecology and the creation of a favorable urban environment. The solution to emerging environmental problems and tasks in cities located in areas with dry and hot climates, which includes almost the entire territory of Uzbekistan, has its own specifics.

The analysis of the above studies and the study of the practice of architecture and construction in Uzbekistan and, in particular, in the Republic of Karakalpakstan allow us to substantiate and state the necessity of a number of the following measures and recommendations. It should be noted that the territory of the Republic of Karakalpakstan is the epicenter of a global environmental disaster associated with the shallowing and drying up of the Aral Sea. It is here that it is

necessary to treat the environment very carefully and carefully, since additional negative impacts can have a detrimental effect on the environmental situation.

The specified measures may include design and analytical measures during participation in the development and evaluation of investment and construction projects from the standpoint of environmental safety, based on the analysis of production and economic activities of enterprises and organizations engaged in environmental protection, including waste disposal enterprises, as well as the identification of reserves for increasing production efficiency during the development of design documentation for the organization of construction.

Of course, the expansion of the use of production waste and local raw materials for the production of building materials should be considered as a positive technogenic impact of the construction industry on the environment.

Preserving the environment in cities with a sharply continental climate, especially in arid and hot regions, requires taking into account many specific factors.

Here are some of them:

1. Water management: In arid regions, water is scarce. It is important to use efficient irrigation systems, install rainwater harvesting devices and implement wastewater recycling technologies.

2. Green spaces and landscaping: Increasing green areas, creating parks and landscaping city streets can significantly improve air quality, reduce temperatures and increase the attractiveness of the urban environment. Selecting local and drought-resistant plants will contribute to the sustainability of the ecosystem.

3. Energy efficiency: In cities with a sharply continental climate, it is necessary to develop projects that take into account both heat and cold. Modern buildings should be energy efficient, use insulation, solar panels and other environmentally friendly technologies.

4. Waste management: An effective waste disposal and recycling system will help reduce the burden on the environment. This includes sorting, recycling and reducing waste, as well as developing programs to reduce the use of plastic.

5. Climate Adaptation: Climate adaptation strategies are needed to protect cities from extreme temperatures. This may include installing shade structures, covering roofs with white materials to reduce the heat effect, and projects to improve the breathability of urban spaces.

6. Education and Community Engagement:

It is important to inform the population about environmental issues and involve citizens in environmental projects. This may include programs for volunteer assistance, organized greening or cleaning of the territory.

7. Transport Infrastructure: The development of public transport and cycling infrastructure can reduce the number of cars on the streets, improving air quality and reducing noise levels.

8. Air Quality Monitoring and Management: It is important to implement air pollution monitoring systems and develop measures to improve it, including increasing green spaces and monitoring industrial emissions.

These measures can significantly contribute to the preservation of the environment in cities with a sharply continental climate, maintaining a balance between urban development and environmental sustainability.

In addition, the creation of a comfortable urban environment in dry and hot climates with a high level of groundwater (this is the case in the lower reaches of the Amu Darya) requires careful planning and implementation of various infrastructure solutions. Among them:

1. Landscape design:

- Use of drought-resistant plants and trees that require minimal watering. This will help conserve resources and create a pleasant environment;

- Creation of green spaces and gardens on roofs and terraces, which not only improves the climate, but also helps to use rainwater.

2. Water management systems:

- Design of drainage systems to remove excess moisture and prevent flooding. It is important that the drainage is hidden and does not spoil the visual appearance of the city;

- Use of bioponds and reservoirs for natural filtration and storage of rain and groundwater.

3. Pavilions and Shade:

- Creating shaded areas using canopies, arches and pergolas for public spaces. This can significantly reduce temperatures during the summer months;

- Installing water features such as fountains or waterfalls which will also help cool the air.

4. Architectural Solutions:

- Designing buildings using thermally conductive materials and technologies to create natural air flows;

- Installing highly efficient systems for air conditioning and ventilation.

5. Industrial and Transport Infrastructure:

- Designing a transport network to help reduce car use and improve air quality.

- Implementing clean transport and electric vehicles.

6. Social Spaces:

- Design of public spaces such as parks and squares taking into account the comfort and safety of residents.

Such complex measures will allow to a certain extent to create a sustainable and comfortable urban environment, taking into account the peculiarities of the climate and the level of groundwater. The difficulty lies in the fact that these measures are combined with each other and do not create a counter-productive effect when added together. The task of architects is to ensure a “friendly” combination of the above measures in order to achieve their synergy.

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