Development of Riverine Landscape Spaces in the City Structure

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Abstract. The purpose of the article is to identify the principles of design design for the improvement of urban areas, aimed at the quality of life of the citizen, the study of an integrated approach to the creation of open urban spaces of increased comfort. The emphasis is placed on the principle of balancing the artificial and natural environment. The identification of the recreational potential of coastal areas was carried out on the example of the city of Togliatti, which has a special role in coastal areas located along the Volga River and reservoirs. The result of the study was an experimental design of recreational space on the original landscape territory. The possibility of developing riverine territories not as presentation embankments is shown. The goal of the project is to leave the natural landscape as much as possible, while making access to the river quite convenient, and staying near the water comfortable due to technical facilities. But the main thing is to create a design form of the observation deck, which will visually enrich the environment both from the river area and from the city. The organization of riverine territories as a water-green framework of the city, while preserving the existing landscape, contributes to the ecological compensation of the city.

1. Introduction

In recent decades, among the large-scale urban development programs, measures for the qualitative transformation of coastal areas have been developed. Coastal cities are those cities that are somehow connected with nearby lakes, seas, reservoirs, large and small rivers. Coastal areas are particularly valuable areas in the landscape-composition and recreational sense for the life and development of the modern urban environment. The presence of water in human settlements has always been an important urban planning factor – almost always the city was founded in the river valley. With the development of the settlement, the river acquired different meanings for it, but was mainly considered as a transport artery. Until the middle of the 20th century, the riverine territory was not considered a place for organizing a promenade and organizing recreation areas.
This situation led to a functional conflict of the territory, which was expressed in the violation of the ecological balance of the zones adjacent to the river. At the current stage of urban development, a comprehensive reconstruction of these areas is underway. An example of this is such cities as Barcelona, London, Moscow, etc. In many historically developed cities located on the shores of large water areas, urban areas expand not only along the coastal zone, but also in depth (St. Petersburg, Kiev, Moscow, Rostov-on-Don). Consequently, large residential areas are outside the zones of pedestrian accessibility and visual perception of reservoirs.

The article focuses on riverine territories located along large and small rivers and included in the structure of cities located nearby. They belong to the category of open spaces of the city. The system of open urban spaces is a set of interacting undeveloped, water and green areas of the city. They contribute to the improvement of the environment, improve the conditions of mass recreation of the population, improve the appearance of the city, and contribute to the protection of the natural landscape [6, 13, 22].

At present, almost all cities located near the waterway face acute conflict problems, which include changing coastal zones, maintaining ecological balance and closing industrial and port areas that are being reconstructed for social, cultural purposes and for the preservation of coastal landscapes. Water has a positive effect on human health and emotions, so recreation in coastal areas is a very important component of human health [15]. Of particular interest in order to create a harmonious environment for improving the quality of life of citizens is the topic of integrated improvement of coastal areas.

The article reveals the recreational properties of landscape riverine territories and shows their possible development in the city, which is an exception in this pattern. The city of Togliatti stretches along the Volga River for more than 30 km, but it is not visually connected with it and does not have a single city embankment. The result of the study was the project proposals for the development of the embankment of one of the city's districts.

2. Materials and methods

In the history of each city, founded in the immediate vicinity of the river, there is a period associated with purely economic relations with the river, when the riverine territory was built up with warehouse and industrial buildings [8]. Human intervention in natural processes has led to a violation of the natural balance of rivers. Pollution of the air basin, changes in the natural landscape-all this worsens the state of the environment [14]. One of the most pressing areas in urban planning was the issue of reconstruction of coastal areas, the removal of industrial structures. Thus, many cities are at a stage where it is necessary to protect the river from the city. A crucial role is played by the development and landscape organization of the coastal strip, emphasizing the uniqueness and specificity. Functional values and analysis of the architectural features of coastal areas, the classification of urban embankments is well studied in the literature [3].

The structures of river corridors and river networks, as well as their service functions, are studied, and the role of landscape ecology in the restoration of urban rivers is noted [7]. Planning situations, features of functional and spatial organization, the state of the water environment, air basin, landscaping, recreational and aesthetic factors-all this affects the quality of landscaping. The coastal zone of the river within the boundaries of the city limits is a contact strip of urbanized and natural landscapes and is understood as:

- as the basis of the compositional and planning structure of the city;
- as an element of an urban ensemble;
- as a place of recreation for citizens with high seasonality of leisure activities;
- as a localization zone for small architectural forms;
- as a territory that requires special approaches to its improvement and performs a number of environmental functions.

According to Zh. V. Kuzmina, in many historically developed cities on the shores of large water spaces, there is an increase in urban areas. Due to the illiterate urban planning organization of river
areas and hydrotechnical construction, there is a violation of the ecological relationship in the territory adjacent to the river [9].

At the moment, the scientific literature identifies the urban-ecological principles of the development of coastal zones of large cities of the Volga region and considers the factors that affect the landscape and urban planning organization in coastal zones [12]. On the example of Volgograd, their transport and transit function is presented [21]. Environmental issues are also noted in the works of researchers. In particular, the need to correlate the concepts of structural shaping and visual ecology is emphasized [10]. It is believed that open landscape spaces should be multifunctional and take into account all social and age groups [1, 2]. They should also be equipped with special recreation areas for such leisure activities as fishing [16].

The skillful use of water in architectural and landscape solutions increases the compositional qualities of the environment. It is thanks to the use of water as a kind of compositional means that it is often possible to create the most vivid impression of a particular place in the city. The rich range of possibilities of water is associated with the distinction between its visual and acoustic perception in a static or dynamic state. The effectiveness of integrating water bodies into the urban environment largely depends on the landscape interpretation of the coastline. Counting on pedestrians leads to the need for a more diverse and large-scale design. An important component of riverine territories is the terrain, which largely determines the nature of the objects located. In this case, a point-based development is acceptable, which will provide visibility of the urban environment from the waterway.

The aesthetic features of the visual perception of riverine territories from the water area are considered, the angles and models of perception are studied [17, 19]. Water attracts people with the ability to see and hear its movement. The search for means of expression of open spaces in front of the most significant public buildings is characterized by a wide range of landscape solutions using water as a characteristic natural component. The factor of water availability, its contact with the person meets one of the main tasks of landscape design for the humanization of the urban environment. Its methodological potential today becomes an effective tool for creating concepts of humanization of urban areas. A certain contribution to the development of this direction is made by an integrated approach associated with the creation of diversity and ambiguity of the elements of the environment and the formation of different environmental situations.

The design of the urban environment at the present stage actively studies and implements the techniques and methods of forming open urban spaces. He is assigned, relatively speaking, the role of «intermediary» in solving the issues of compliance of the historically established environment of life with the requirements of modern life, covers the level of rapid changes and the details of the organization of the environment.

By means of environmental design, it is possible to preserve the natural environment, solve environmental problems, adapt engineering structures and structures to the existing or projected infrastructure, as well as design various processes of human activity [1]. G. Potaev distinguishes such a type of coastal territories as representative embankments [17].

Landscape territories that are part of the urban structure and are practically unsettled, such as in Togliatti, have not been studied at all. This city is located next to the Volga River, but is not connected with it either visually or in terms of layout and composition [2]. Some landscape areas are used in the summer for beach holidays – there is sand on the shore and nearby pine groves. The recreational and tourist potential of the region is noted in the literature [4, 11, 23]. In modern cities, due to the growth of urbanization, there is an acute shortage of recreational areas. The reduction of urban plantings and the degradation of vegetation both in the city and in the suburbs leads to a deterioration of the ecological situation. The lack of well-maintained recreation areas in Togliatti, and the stylistic neutrality of the urban environment, make us look for additional funds and opportunities to create recreational areas. The simplified geometry of architectural volumes and spaces, gray and white as the main colors of the urban environment indicate a lack of identity [2, 5].

It becomes obvious that the quality of the functional organization of the coastal territories of large cities should meet the main modern requirements: environmental safety, comfort of stay, aesthetic
attractiveness in the conditions of contact of the urbanized environment with the natural landscape [18, 20, 22].

The main methods are the integration of open spaces into the urban environment and their versatility. As a result, a comprehensive system of measures to optimize the riverine landscape areas of the city was proposed. It is based on the methodology of design design, which includes environmental, ecological, and axiological approaches.

3. The results of the study and project proposals

The study shows that urban rivers are important physical elements and important ecological corridors. They not only play an important ecological role, but also provide the foundations for stability, comfort and successful urban development. Riverbeds determine the planning structure of many cities, being not only the central waterways, but also important visual and aesthetic components of the city. As a rule, the natural landscape framework determines both structural and planning solutions, and functional and spatial varieties of the urban environment, such as the valley of the main river around which the settlement was formed, green areas of the natural complex and the valleys of small rivers that unite them, etc.

Of great importance is the problem of forming such open spaces in which the natural basis of the landscape is preserved or only individual inclusions of anthropogenic elements are present. They are of the greatest value from the point of view of the «city-nature» relations, since they are accumulators of ecological balance and represent the natural environment itself. At the present stage, these spaces are the object for designing comfortable urban areas by means of design.

The Russian city of Togliatti is located on the bank of the Volga River at the border of the forest-steppe zones on the opposite side of the Zhiguli Mountains. Tolyatti itself has no access to the river and the river embankment, which is more an exception than the norm for modern urbanism. It belongs to the so-called «new cities», which were formed under the influence of production factors—the construction of hydroelectric power plants and Avtovaz. The basis of the city-planning structure of Togliatti: three districts-Central, Komsomolsky and Avtozavodsky, separated from each other by forests. All of them are quite isolated, separated from each other by woodlands, which are a place of urban recreation for residents. Each district has its own industrial zone. An interesting fact is that already in the first plan of the city, its borders were considered as conditional, with the possibility of their expansion, if such a need arises [5]. Features of the spatial location of Togliatti is a large natural forest frame that stretches along the Volga and separates it from the city. Pine forests surround the city as a whole and each of its districts separately. At the same time, there is no architectural diversity, few architectural monuments, the main part of the buildings are typical buildings that can be found in many cities of Russia.

During the design of open spaces and the study of the initial situation, various approaches and methods were used to create the most optimal design solutions. The embankment of the Komsomolsky district, which has a steep slope, was changed. Due to the peculiarities of the terrain and the threat of washing away of the Komsomolsky district measures were taken to strengthen the bank, but the functional and aesthetic qualities were not improved (Fig. 1). At the moment, paths were paved on this embankment to strengthen the bank, since it began to erode, the ground was reinforced with a grid, a concrete staircase with a railing was made. But the embankment has no connection with the city, neither transport nor pedestrian. Therefore, the task was to spatially connect the embankment and the streets of the city.

From the high bank there is a beautiful view of the Volga, the locks and the Zhiguli Mountains. From the top point, due to the rather steep slope and high altitude, you can see the water and the opposite shore. To enhance the feeling of flight, it was decided to design a multifunctional observation deck with a water outlet.

In the proposed project, the river embankment of the Komsomolsky district of Togliatti is presented as a single recreational space for off-season visits. Since there is usually no exit directly to the water area from the right bank, which is a steep slope, the project solved the problem of ascent and
descent – the most suitable vertical communication in this situation was chosen – elevators. The basis for their installation is the remote covered observation deck, which has become the dominant feature of the entire territory (Fig. 2). The problem of ascent and descent to the river has been solved, in this case – a vertical elevator. The remote viewing platform is partially covered with a roof. There may be vending machines with drinks, cafes and souvenir kiosks, bicycle parking (Fig. 3). There are two staircases under the bridge, and two winding slides for skiing between them.

Figure 1. The initial state of the embankment of the Komsomolsky district of Tolyatti.

Figure 2. The elevator and the observation deck project. Authors: S. Saprykina, N. Barsukova.

The climatic features of Togliatti were taken into account – in summer the heat reaches 40 degrees, in winter-frosts. Protection from the scorching sun rays, wind, and rain was thought out. On the slopes you can place a rocky garden, green alleys with outdoor furniture and necessary equipment, art objects, playgrounds and sports grounds. In addition to comfort, people are attracted by the uniqueness of both individual objects and entire spaces. Creating a unique space solves the problem of monotony and sameness of the coastal spaces of many Russian cities.

The coastal area, located away from industrial enterprises, surrounded by forest on one side and the water area of the reservoir on the other, becomes a multifunctional recreational environment. The visual openness of the embankment space from different viewpoints (from the water, from the opposite bank, from the dam) defines its main idea: the embankment is a unique environment of the city and a recreational space. Create a design form of a remote viewing platform that visually enriches the environment both from the river area and from the city. The aim of the project is to show the possibility of developing riverine territories as recreational areas, and to preserve the natural landscape as much as possible. At the same time, make access to the river quite convenient, and stay near the water comfortable due to technical facilities. Original design forms visually enrich the riverine territories.

4. Conclusions

In the study of the problem of optimization of riverine territories, an integrated approach was applied. In urban open spaces, each characteristic line and shape of the landscape elements plays a leading role in achieving the diversity of the landscape, which is important in conditions of low-impact development. It is believed that only the deep penetration of green and water-park «islands» into the mass of urban development can radically improve its microclimate and create the best conditions for mass recreation.

A fragment of the Togliatti embankment was designed to meet the modern requirements of comfort, functionality and aesthetics. The need to reorganize the riverine spaces, which will turn the
empty territories into a «living», active and dynamic environment that attracts residents and guests of Togliatti is obvious. These can be representative coastal areas, multifunctional pedestrian embankments, linear parks, boat stations, places for swimming and sports, beaches.

One of the directions of riverine territories development is the formation of a logically constructed functional chain of public spaces. They create the most comfortable conditions for people to stay in the open space in accordance with their needs in the natural environment. The organization of riverine territories as a water-green framework of the city, while preserving the existing landscape, contributes to the ecological compensation of the city.

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