The coastal territory of the Yauza River as an urban recreational carcass

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Abstract. The article is devoted to the organization of urban recreational spaces that allow solving the problems of permeability of large cities. As a result of centuries of development, large cities acquire a number of problems associated with structural disruption, lack of permeability of separate fragments, excluding them from citywide activity and actual unclaimedness. Urban rivers, which have a great length and which originally influenced the formation of the urban structure, can become the basis for the development of recreational carcass, increasing the cohesiveness of territories and social activity. The main difficulty in creating such carcass is the large amount of input data influencing the project. It is important to take into account the different conditions of the surrounding urban environment from the typology of development to the social characteristics of the local population. Only deep pre-project studies will allow integrating the newly created carcass into the city structure.

Based on this idea, a uniform Park Yauza project was created linking hard-to-reach and underutilized urban areas into a single space. The park is designed to launch unused areas and increase the level of urban activity not only within the project borders but also in the surrounding areas. To achieve these goals, the thorough study and accuracy of the design exclude errors and include careful work with natural resources. This system requires a scientific approach to the formation of such spaces.

Within the framework of the project, a well-structured mechanism was developed that describes the methodology and stages of work. In its structure, much attention is paid to pre-project analysis and the collection of source data. It was developed a system of quality control and accounting of the experience of operating the first stages in the implementation of the subsequent ones. A structure has been developed that allows creating a recreational carcass taking into account the existing infrastructure and sites with different levels of activity. Theoretical materials were tested during the design of the first sections of the future park. The first operational experience was obtained, the data of which formed the basis for the design tasks for the development of the following sites.

1. Introduction

The coastal river areas in the city have a great potential for the development of recreational spaces and, as a result, improve the permeability and connectivity of urban fabric. Unfortunately, in large historical cities there are coastal areas that hardly be called accessible and attractive for leisure activities. This is due to the history of the development of industry historically based on river transport. The City Rivers lost the priority transport function and eventually turned into areas of unused and impervious urban fabric due to developing of road and rail transport. Many industrial
enterprises, historically located on the river, have retained their borders, but deployed main facades in the direction of the road. As a result, in most cases the river and its coastal areas turned into a backyard of industrial enterprises.

The river is a unique ecosystem that can revitalize the city [1]. Therefore, the revitalization of urban rivers is becoming a new urban trend. In the world, there are many successful examples of channel cleaning and renovation of coastal zones by creating modern recreational spaces. However, the scale of such territories and their importance for the city give the project a special level of complexity and responsibility. The future development of the surroundings and the whole city depends on the results of the implementation of this project. With the right approach and scientific validity of solutions, the creation of a new recreational space will serve as a powerful incentive in the economy and urban activities. A striking example is the project of a park on the Chongheikhon River in Seoul, where the river was cleaned of contamination, and the project was created as a socially significant space [2].

Moscow has a number of rivers of different sizes and industrial production and technical zones are preserved on the banks of many of them. Already a major project has been launched aimed at equipping the main river of the city and giving it the status of pedestrian space [3]. The largest flow of the Moscow River is the Yauza River. Its length in the city is 27.6 km. It is the main waterway of the northeast district of the capital and occupies a significant area of it, passing through virtually every district. Together with its tributary the Chermyanka River, the rivers form a coastal zone of about 480 hectares. This territory geographically connects the Moscow region with the city center and directly with the newly created recreational coastal zone of the Moscow river.

Unfortunately, now the floodplain lands perform part of the linking function. There are many problem zones in the Yauza floodplain, which require reorganization and improvement. Some of its shores are waterlogged, some have industrial buildings, spontaneous dumps and remains of building structures and materials [4]. Everything of that harms the ecology of the natural complex and creates impassable obstacles that violate cycling and pedestrian links and isolate individual sections of the valley. The situation is aggravated by the presence of a large number of owners and balance holders of territories, which are difficult to move in a single direction to improvement of the territory.

In addition, in accordance with the Resolution of the Government of Moscow No. 208 dated April 14, 2015 [5], the coastal zone has the status of a Specially Protected Natural Territory and requires special approaches to its further development and operation.

The Park Yauza project is directed towards the creation of a uniform recreational space in the urban environment. The park will be located on the banks of the Yauza, Chermyanka, Lihoborki and Ichka rivers and will unite their scattered coastal territories and local parks. As a result of the project, the city will receive an uniform green space - Park Yauza with a total length of the coastline more than 24 km. Geographical location and the preserved green land of the coastal territories will allow to form an unique green highway, which allows you to make the step and bike tours from the Rostokinsky aqueduct to the Moscow Ring Road without access to motor roads.

At this moment, there is only one similar analogue of the natural park space - the Lee Valley London Park [6], but it is inferior to Park Yauza along the length of the floodplain and the thematic variety of routes.

The new Park Yauza is designed to influence the decentralization of the city as a whole, improve its ecology, develop small business, improve the pedestrian connection of neighboring districts, and provide a new recreational connection with the Moscow region.

The huge value of the hydrological basin and coastal areas of Yauza is the heterogeneity of the natural landscape. Along the coastline, you can meet parts of the regular, landscape and forest parks, picturesque marshy areas, steep and gentle descents to the water. One of the main tasks of the concept is a full-fledged use of the existing landscape diversity. The whole territory of the park will be divided into sections with different functional load (sports, scientific, historical-cultural, transport, natural-ecological) and activity of use. This will allow, along with the development of public zones, to preserve secluded parts of the park and unique lines of view.
The project focuses on abandoned and industrial areas. They are allocated to a separate pool of territorial reserves. These territories will serve to develop functional and cultural diversity and attract additional investment in the park.

The floodplain areas of the Yauza and Chermyanka rivers, as a particular example, show how high the potential of these territories for the city and how difficult the conditions for carrying out a high-grade project that really gives an impetus to the "launch" of the given territory. In this case, the main problems in the creation will be the consideration of a number of initial parameters that affect the design decisions.

In this way, the main goal is to create a clearly structured mechanism for working with urban coastal areas, taking into account the deepest pre-project analysis and flexible design tools.

2. Methods
A complex of surveys of the urban environment surrounding the design site was carried out to achieve the goal. The collected materials were systematized into sections and further analyzed. The main blocks for analysis were:
- District objects-magnets, points of increased social activity.
- Morphology of the surrounding buildings, which allows us to understand functional zoning, population density, and building structures.
- Social factors that show the population composition, their interests, needs, opportunities, health and sports preferences.
- Routes: transport and pedestrian, public and private. Availability and safety of existing and the emergence of new nature trails.
- The ecological condition of the territory, including the condition of land, water, the availability and diversity of flora and fauna, prospects for the development and improvement of the ecological situation.
- Town-planning features and projects, urban-scale works aimed at its development which can affect the project area.

It is worth noting that the scale of the covered territories within the framework of the study can vary depending on the task. For example, an essential element is transport and pedestrian communication. The river as a structure is an obstacle with limited permeability in the transverse direction, and transport bridges and communications passing through it, as a rule, break longitudinal pedestrian connections. Also, the coastal areas as part of the city's recreational framework have to be linked to other public spaces and routes.

Based on the pre-project studies, a model of the park frame was formed. Its structure is based on a balanced combination of nodal points and connections between them ‘figure 1’.

Nodes are the points of concentration of various social functions, arranged in the zone of influence of large objects-magnets. Such objects include The Exhibition of Achievements of National Economy (VDNH), Botanical Garden of the Russian Academy of Sciences, transport hub Botanical Garden, Rostokinsky Aqueduct, Sviblovo Manor, Sviblovo Stadium, Garden of the Future Park, Song Festival Field, Church of the Intercession of the Blessed Virgin Mary in Medvedkovo.

Connections are paths and routes used for transit traffic, which unite all points in a single continuous park. The primary linear objects are cycling and running routes (including marathon distance, running along both banks of the river), ski runs, educational routes for studying flora and fauna of the river valley and the history of the region.
Figure 1. Structure of nodal points and connections
Four central nodes (a sports node, a museum node, a transport hub and a central hub) were identified on the territory of the park, based on the existing infrastructure and indicators of visitors’ activity. Some territories along the coastal strip require particular attention - the sites occupied by objects of communal, warehouse and industrial purposes, garage cooperatives. In these points, it is proposed to create a creative environment for young artists with commercial real estate incorporation and interlacing in the network of nodes and connections of the park. The largest of them are marked as nodes of development. Their function will be determined during development of the whole park. Such a solution allows us to introduce the principle of self-regulation of the structure into the project, which is a vital element in the creation of modern urban spaces [7].

The following tasks were included in the structural model of the project to achieve this goal:
1. Creating a single management structure.
2. Including Park Yauza in the "Green Shield" of Moscow by Federal Law No. 254 of July 3, 2016.
3. Bringing all areas of the park in line with the uniform style.
4. Decentralization of the city territory.
5. Development of the peripheral zone.
6. Creation of a universal public space for citizens and guests of the capital.
7. A significant contribution to the environmental well-being of the city.
8. Recreational connection with Moscow region.
9. Improving the pedestrian connectivity of the NEAD territories.
10. An increase of positive activity of the population.
11. New opportunities for small business.
12. Creating a continuous recreational route.
13. Organization of a bicycle arterial road.
14. Development of sports, cultural, educational and leisure infrastructure.
15. Creation of a network of bicycle routes of different length and complexity.
16. Creation of an out-of-town marathon route with a length of 42,195 km.
17. Development and improvement of the territories of communal and industrial zones overlooking the river.

The fulfillment of these tasks will ensure a high level of project implementation and will allow step-by-step evaluation of the result.

A mechanism for dividing into stages with subsequent monitoring of the work performed and the resulting socio-economic effect is proposed for the implementation of such a large-scale facility. All data obtained during the studies at the operational stage, after appropriate processing and analysis, are transferred to the initial data section for subsequent design stages. This way allows the most efficient work on landscaping, rational use of territories and resources, eliminating design errors and ensuring the fulfillment of priority tasks. For the project, the following logic of division into stages was proposed:

1st Stage. Organization of the main links (2017-19).

To connect a single network of cycling routes of the territory with the highest level of comfort, including the creation of 5 new cycling routes under the bridges and the reconstruction of the bridge on the Kol'skaia street. This will allow uniting the disparate sections into a single route. The created infrastructure will allow carrying out on the riverbanks Citywide youth athletics competitions with the active use of the sports base of sports complex Sviablo. Also in the framework of the stage, the newly created and existing routes are provided with social facilities (information points, guard posts, toilets, rental offices, bicycle parks, self-service stations). Lighting, benches, urns, navigation and information stands are installed in newly equipped areas.

It is necessary to create or define a single management company that oversees the work on the project and is responsible for the operation and maintenance of the territory to implement the idea of a continuous park.
These works, taking into account the previously completed (the floodplain of the Yauza River from the Dezhnev Passage to the Shirokaya Street, along the Severodvinskaya, Sukhona, Zapovednaya, Agricultural, Lenskaya, Chukotsky and Azurevye Passages), will allow creating a single park space at a lower cost than 50% of all project areas.

2nd Stage. Creation of nodal points. (2019-20).
Within the framework of the stage, the Central, Sport, Transport, Scientific, and Museum units are being developed following the laid ideology. The main entrance areas and places of significant congestion of people are created and developed. There is saturation with the objects of the retail network, with small architectural forms. Each zone creates unique objects for each of the nodes.

3rd Stage. Development of the park. (2020-26).
The given infrastructure model is distributed to the rest of the park. Within the framework of the stage, works are carried out in undeveloped areas and on the site of the withdrawn industrial zones. Reserve areas are being developed, and new nodes are being established with new entrance zones. As a result of the implementation of the stage, all the project territories are united into a single recreational space Park Yauza.

A special place is taken by the environmental issue at all stages of implementation. The element of control of decisions taken and monitoring of environmental indicators is integrated into the system of design mechanisms. All project materials undergo strict control and coordination in the system of the Department of Nature Management and Environmental Protection of the City of Moscow.

A tool is developed that separates the size and importance of the improvement elements into categories "S", "M", "L" and "XL" to maintain a single stylistic design of the park. Small objects of the environment will be uniform for the whole park, whereas objects of the category "XL" will be designed individually for an unusually large site.

3. Results
As a result of the developed method, it was possible to structure the process of creation of recreational space in the coastal territories of the Yauza and Chernyanka rivers and take into account a wide range of parameters. It fully integrated the recreational framework created in the city structure, linking it with the existing and planned infrastructure. The project was reviewed and agreed by various Moscow departments and confirmed its validity, accuracy, and detail. A new recreational frame was included in the cycling structure of the city. The first realized areas showed an increase in activity by order of magnitude ‘figure 2’, ‘figure 3’. Feedback from users of new sites was collected and analyzed and included in the baseline for subsequent sites.

Figure 2. Realized areas. Aluminum pedestrian bridge

Figure 3. Realized areas. Wooden promenade
4. Conclusions

- As a result of the conducted research and design experiment, it was confirmed the expediency of creating recreational carcass in the coastal territories of rivers. The use of a well-structured mechanism in the design of such carcass with an extensive block of pre-design studies is necessary and leads to an increase in the quality of the object.
- The implementation of the carcass of the Park Yauza project will give the capital a unique multi-purpose recreational and educational natural complex that has no analogues in the world.
- Due to the in-depth analysis, the Park Yauza project was created taking into account the already completed works on the improvement of individual sections of the Yauza floodplain and its tributaries, and successfully integrates them into the future uniform park space.
- The project fits well into the transport infrastructure of Moscow, taking into account the large-scale transport projects MCC (Moscow Central Circle), NEC (North-Eastern Chord) and NWC (North-Western chord), and it becomes one of the key elements of the city's cycling and hiking routes.
- The project contributes to the decentralization of the city and the formation of new growth points in the North-Eastern Administrative District of Moscow. In addition, the bicycle and running network of Park Yauza form a full 42-kilometer route, which possible to take urban marathons out of the center.
- The inclusion of Park Yauza in the Green Shield of Moscow will ensure the protection status for not only existing SPNT (Specially Protected Natural Territory) near the river, but also of adjacent territories, which occupy more than 1400 hectares (about 14% of the area of the North-Eastern Administrative District). That will allow preserving a unique ecological system that rich in traditional flora and fauna for the metropolitan region.

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