PROBLEM ASPECTS OF CREATION OF ECOLOGICAL PARK AROUND THE SMALL LAKE CITY (AN EXAMPLE OF LAKE CHARA, KAZAN, RUSSIA)

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Abstract

Creating ecological parks - a new trend in landscaping and environmental activities in Kazan. Social and environmental prerequisites for the creation of ecological parks was a long struggle of environmental organizations and residents to preserve small reservoirs in the city.

Mainly in the design of the Protected area (Eco-park) is to create an ecological location in the city, while maintaining high biodiversity areas, which will carry the aesthetic function and be a place of rest of the townspeople. When the project Ecopark impact should be minimal, should be used only a small appliances, manual labor, and only environmentally ecological materials.

Department of Environmental Engineering and Water Management of the Kazan Federal University developed to date conceptual designs ecological parks on the basis of a number of small lakes in the city. Project of Ecological Park Lake Chara in Kazan partially implemented the recommendations of the Department of the Kazan Federal University.

Keywords: Ecological Park, Ecopark, Lake Chara, biodiversity, wetlands, environmental materials, environmental technology, small urban lakes, species listed in the Red Book.

Introduction

Solving problems of environmental restoration and conservation of objects is relevant, recently, in particular, water bodies in urban environments [1,2], as well as creating an environment comfortable for residence. The strategy management of the urban environment is of great importance landscaping small urban lakes and the creation of green zones around them [3], as well as the creation of ecological parks on the basis of small lakes.

Create an environment in Kazan was the reconstruction of the territory around the lake Chara. Ecologically valuable existing facility is located in the Moscow district of Kazan, at the intersection of Yarullina and Vakhitova. Fire brigade, standing near, uses a water body as a backup water source. The lake is in the summer, as its possible place for townspeople. In winter it is used for skiing.

Inefficiency natural object recreation position due to the high human and technological loads typical of the area, surrounded by dense urban areas.

Microdistrict is a functional densely built-up residential area. The concentration of human fluxes in this area is a characteristic feature of these factors throughout the day. Therefore, Stoneworts Lake with wetland is actually a variant of passage of the square.

1. Natural and Hydrology

The lake of Chara formed in the floodplain Kazanka, the site of the old peat pits. In the area of groundwater opened at depths ranging from 0.2 to 5 m. Ground waters have increased water salinity due to sulfates (bicarbonate-sulphate-calcium)/

The lake is small, shallow, floodplain, wetlands and partially draining the lake. The observed level mode, typical of small lakes middle belt of the European part of Russia. It refers to the lakes with mixed diet, with a predominance in the incoming part of the water balance of the groundwater. The lake consists of two parts - the main lake and shallow, marshy.

According to the research of the Department of Environmental and Water CFI in 2007, the main water surface area of the lake is 1.1 ha, maximum depth - 3.11 m. The lake had a blade configuration with three grooves.

By 2013, there was a reduction in the area from 1.1 hectares to 0.95 hectares; the lake has an overall oval shape with a long shallow bay in the northeastern part.

The maximum depth is 2.94 m (Table. 1, Fig. 1). The volume of water in the lake is 19.3 m3.

The changes reflect the complex hydrogeological situation related to flooding and groundwater pumping. At present, the area of the lake and wetlands with coastal zone is about 4 hectares.

Table 1. Hydrological and morphometric characteristics of the lake Chara

№	Название характеристики	2007 y.	2013 y.
1	The average height of the pool above sea level, m BS	-	52,67
2	The area of the lake, ha	1,1	0,95
3	The lake, m	174	172,4
4	The width of the lake, m	100,3	94,6
5	Depth: Maximum Average, m	3,11/0,98	2,94/2,07
6	Volume of water m3	10,8	19,3
7	Coastline, m	562,7	560,6

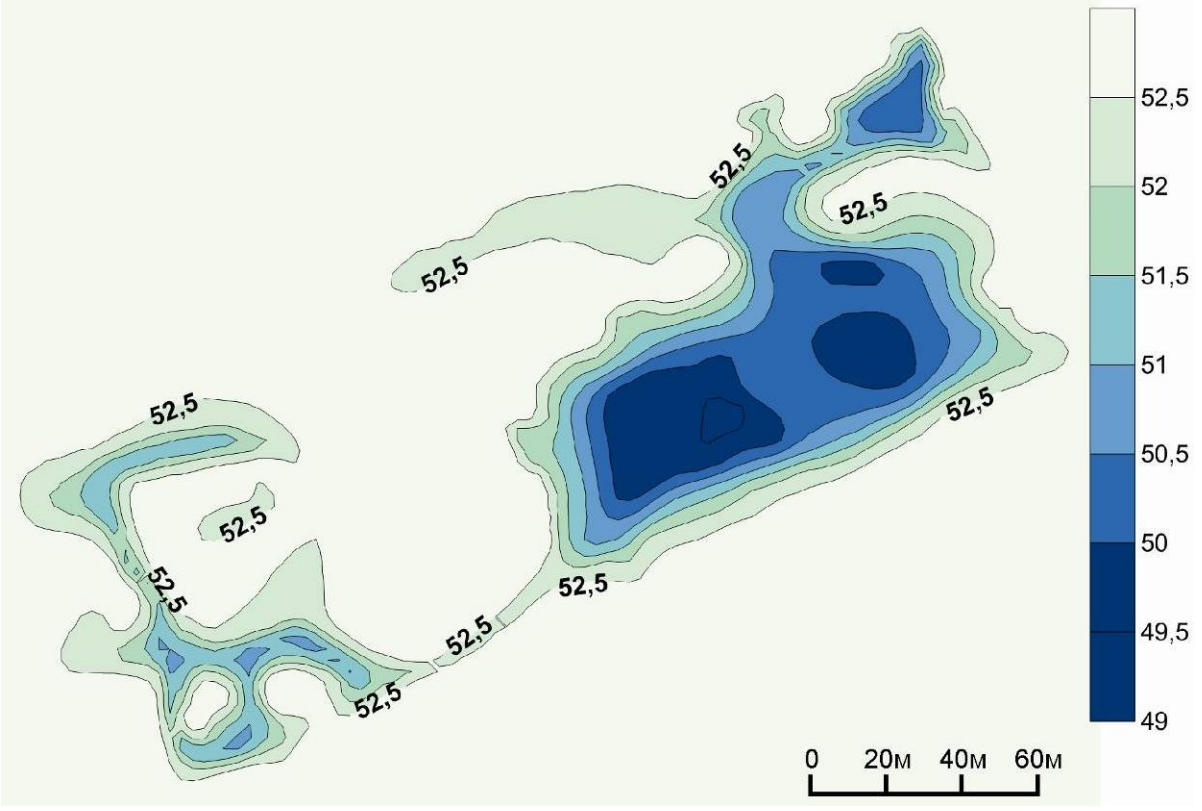

Fig.1. Bathymetric scheme Lake. Chara (June 2013).

The lake has a water transparency up to 1 m, greenish color of the water, and odorless.

Type of water Lake Chara, in accordance with the prevailing soil nutrition, sulfate-carbonate mineralization high (1124 -1235 mg / dm3), water hardness is high (14-22 mg.ekv / l). Class III (moderately polluted) characterizes water quality.

For small area because of the variety of conditions was noted high species diversity. According to the research of the Department of Environmental Engineering and Water Management of the Kazan Federal University here celebrated on 28 plant species (6 - in the area, 22 - in the coastal zone), 8 species of amphibians, the abundance of waterfowl and songbirds.

For this very small in land area in 2012-2013 noted habitats of rare species listed in the Red Book of the

Republic of Tatarstan: Hierochloe odorata, Typha laxmanii - from higher plants, algae Chara vulgaris - from lower plants; Bombina bombina - of amphibians, Gallinula chloropus - from birds.

2. Development of the project Ecological Park

In 2012, residents of the area, together with the Department of Environmental Engineering and Water Management of the Kazan Federal University (in partnership with the Laboratory of optimization of aquatic ecosystems Kazan Federal University), managed to defend the territory of the lake from the filling and further development. Thanks to the staff of the department and laboratory, studies were carried out of the lake and the area adjacent to it was made up ecological passport of a water body. Managed to attract the media and the public to the problem of preservation of the territory, to enlist the support of municipal authorities and the republic's leadership, with the intention of creating here specially protected natural areas. The department was asked to save this territory through the creation of an ecological park (as specially protected natural territories of local importance), naming the lake in honor of "Red Book" Charales algae. Several versions of the draft design Eco-park (2), discussed at a number of municipal meetings.

When creating the Department of Environmental ecological parks and water CFI having this experience, apply the best European concept («Living Lake», «Living Landscape», «Wetland Conservation and Restoration»). Projects are employees trained in eco-design (certificates) and practice abroad (USA, the Netherlands, China, Japan, Finland), experienced architects, designers, landscape architects, landscapers and other professionals.

Mainly in the design of protected areas was to create an ecological location in the city, while maintaining high biodiversity areas, which will carry the aesthetic function and be a place of rest of the townspeople. When implementing projects Ecopark is mostly minimal impact on the territory. Should be used only a small appliances, manual labor, only environmentally friendly materials.

The concept of creating Eco-park Lake Chara designed according to modern requirements of environmental engineering. Project are invited to share in the whole territory of the main functional areas: water area, wetlands (wetland complex), recreation area and parking. Suggested that a small recreational areas, adequate in size to the entire area (entrance areas, playground, playground, viewing platforms, track), aeration tower, ecological trails with information boards (mandatory for Ecopark).

Zone water areas and wetlands proposed to leave unchanged. It was planned to expand the canal between them, reinforcing the coast Geomats and geogrid. Eastern part of the body of water provided to provide aeration plant, the aerator offered to stay at a small lookout tower vandal consideration (bottom - placement of the aerator at the top - a small observation deck).

Parking area. In this territory along the houses there is a spontaneous parking for 150-200 cars, squatting coastline. Destroyed the top layer of fertile soil. The project offers a more compact parking lot, in accordance with regulatory requirements, the technology of "green parking" on 15-50 cars.

Recreational Area. It was proposed to create a proportionate landscaped facility - small area playground for active games and sports grounds, with views of the western part of the lake, cut through the "window" in the bush wetlands with environmentally friendly natural covering. Sketch plan provided for a small entrance lobby. The central part was a small area for recreation, as well with the natural coating, with a small flower garden. In the concept of Eco-park plan was laid eco-friendly materials and environmentally friendly technologies; arrangement of road and path network and viewing platforms.

For construction and development of affordable and safe areas to explore the natural attractions of Lake Chara planned arrangement of tracks and lookouts. Lanes were represented by three types: 1) bicycle-pedestrian path looped around the perimeter of the lake with a dense base of resistance to abrasion and slip materials; 2) walking path for exploring the ecological wetland area of the park, set on stilts made of decking; 3) a footpath that runs along the surface of the solid earth, made of natural stone.

These objects are harmoniously fit into the area and could not carry the damage and negative impact on valuable territory. While fully meet the needs in the recreation of local residents and visitors to the capital.

Fig.2. Option conceptual master plan Ecopark Lake Chara

3. Implementation of the project and the problematic aspects of the park

Unfortunately, the project Eco-park, developed by the Department of Environmental and Water CFI, was not implemented in the form of Eco-park, which was discussed with the municipal authorities. When the project initiative group of residents on the money fund established for the purpose of supporting the creation of Eco-park "Lake Chara" implemented the project a firm which had no experience of environmental engineering, design Ecopark and specialized in a different field. As a result, the company developed a project, which put as a priority the interests of the inhabitants of the local houses wish to establish on the shores of large recreational facilities that are disproportionate in scale with the size of the natural area.

For these purposes in 2014 was held powerful cutting willow vegetation and undergrowth to accommodate other types of roads around the lake and recreational areas. When working in the area working on large appliances, providing mechanical action on the narrow coastal zone (habitat "Red Book" species of amphibians and plants), as well as noise exposure during the nesting birds.

When the project to the wishes of the residents has been preserved spontaneous large car park, created large concreted area (for children's and sports playgrounds, recreation areas) on the banks of the not harmless materials (360-600 meters). Organized extensive hiking and biking roads, cutting the territory in half and clasping wetlands along the perimeter.

4. The effects are not eco-friendly landscaping.

As a result, the organization "concrete clutches" around the site significantly reduced the area of the already small area; destroyed by the migration route from lake surface to the wetland area for small wildlife species (insects,

amphibians); created a constant irritant to the fauna in the form of light; decreased the number of woody vegetation due to its thinning and harvesting; organized rubber coating concrete platforms that have an impact on the temperature regime and others. At the present time is calculated environmental damage caused by the project due to the felling of trees, damage habitat "Red Book" and other types.

In 2014, the study of landscaped grounds staff of the Department of Environmental and Water CFI failed to detect any of the individuals who lived back in the 2013 species of plants and animals listed in the Red Book of the Republic of Tatarstan (2006). Instead, they were expensive landscaping and information stands, with a description of existing species here.

The future projected gradual shrinking of the wetland complex, due to cutting its way from a small catchment and concreting of the watershed, as well as the gradual shallowing of the main lake, a further decline in species diversity.

At the same time, even when properly implemented project, which has negative consequences, this area can not fall asleep and be used for other purposes, as Lake is a place of discharge of groundwater, protecting against flooding of the metro station "Goat Sloboda".

Conclusion

Implementation of the project the park "Lake Chara" is an example of non-ecological improvement, leading to negative consequences for the flora and fauna of this natural site, assumes the creation of protected areas of local importance as Ecopark. In the course of solving the problem of the substitution of concepts, and instead of creating a protected natural area with moderate recreational functions was implemented in the normal park around the lake, with a fine and expensive design, who inflicted environmental damage.

Ecopark in a city should retain maximum available environment. Around it should be organized buffer green areas where recreational facilities should be planned structure without affecting the central part of the natural, preserving valuable areas and biodiversity.

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