



APPLICATION POSSIBILITIES OF GEO PLASTICS IN CREATING A COMFORTABLE URBAN ENVIRONMENT (ON THE EXAMPLE OF KAZAN)

POSIBILIDADES DE APLICACIÓN DE GEO PLASTICOS EN LA CREACIÓN DE UN ENTORNO URBANO CÓMODO (SOBRE EL EJEMPLO DE KAZAN)

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abstract

Within the framework of this article, the authors, using the example of Kazan, considered the features of the manifestation of GEO plastics as a promising direction in the field of creating a comfortable urban environment. The concept and methods of GEOplast formation are identified in conjunction with the landscape components of the urban area. The authors proposed and reviewed the criteria for distinguishing GEO plastics according to the form of creation (horizontal, vertical) and seasonal characteristics (winter, summer), for the first time identified types of GEO plastics: natural-natural, natural-anthropogenic and cultural-artistic. The basis of the natural-natural type of GEO plastics is made up of objects of the protected zone and green areas, designed to perform environmental, recreational, aesthetic and artistic functions. The natural-anthropogenic type is differentiated by the authors into aquatic and relief geo-plastics, the basis of which form the unevenness of the relief of natural objects, as well as the introduction of elements of an artificial surface character into the natural environment. Finally, the cultural and artistic type of GEO plastics is based on the introduction into the natural environment of artificially created natural and artificial components and has as its goal the artistic education of citizens and the creation of the cultural appearance of the city. The authors found out that the largest number of them was located in the old central part of the city, on the left bank of the r. Kazanka, due to the history of the city, the accumulation of many tourist facilities here, the presence of historical symbols of the city. The work on the example of specific objects of Kazan showed the areas of application of GEO plastics, specifically for recultivation, solving engineering problems, improving the ecological situation, etc. As well as the authors gave some recommendations on creating a comfortable environment in urban landscapes using GEO plastics techniques.

Keywords: comfortable urban environment, GEO plastics, society, relief transformation.

En el marco de este artículo, los autores, utilizando el ejemplo de Kazán, consideraron las características de la manifestación de los plásticos GEO como una dirección prometedoras en el campo de la creación de un entorno urbano confortable. El concepto y los métodos de formación de GEOplast se identifican junto con los componentes del paisaje del área urbana. Los autores propusieron y revisaron los criterios para distinguir los plásticos GEO de acuerdo con la forma de creación (horizontal, vertical) y las características estacionales (invierno, verano), por primera vez identificaron los tipos de plásticos GEO: natural-natural, natural-anthropogénico y cultural. -artístico. La base del tipo natural-natural de plásticos GEO está compuesta por objetos de la zona protegida y áreas verdes, diseñados para realizar funciones ambientales, recreativas, estéticas y artísticas. Los autores diferencian el tipo antropogénico natural en geoplásticos acuáticos y en relieve, cuya base es la irregularidad del relieve de los objetos naturales, así como la introducción de elementos de carácter superficial artificial en el entorno natural. Finalmente, el tipo cultural y artístico de los plásticos GEO se basa en la introducción en el entorno natural de componentes naturales y artificiales creados artificialmente y tiene como objetivo la educación artística de los ciudadanos y la creación de la apariencia cultural de la ciudad. Los autores descubrieron que el mayor número de ellos se encontraba en la parte central de la ciudad, en la margen izquierda de la r. Kazanka, debido a la historia de la ciudad, la acumulación de muchas instalaciones turísticas aquí, la presencia de símbolos históricos de la ciudad. El trabajo sobre el ejemplo de objetos específicos de Kazan mostró las áreas de aplicación de los plásticos GEO, específicamente para la recultivación, la resolución de problemas de ingeniería, la mejora de la situación ecológica, etc. Además, los autores dieron algunas recomendaciones para crear un ambiente confortable en paisajes urbanos. utilizando técnicas de plásticos GEO.

Palabras clave: ambiente urbano confortable, plásticos GEO, sociedad, transformación de socorro.



Introduction

The urban environment is a combination of natural-anthropogenic objects and social phenomena that form a certain object-spatial environment in close relationship with human activity. The above interpretation of the concept of "urban environment" suggests that the basis of its functioning is the person and his activity. Human activities in cities are not always constructive, urbanized areas are under pressure from population growth and anthropogenic impact on the environment, which, as follows, has undesirable consequences for nature and comfortable human existence. Thus, the share of the world urban population increased from 13% in 1900 to 29% in 1950 and 49% in 2005, and the turning point was noted in 2007, where half of the population of our planet began to live in cities [1, 2]. According to the United Nations demographic projection between 2000 and 2025. The world population will increase from 6.1 to 7.8 billion. about 90% of the population will live in cities [3]. It is fair to say that already today the forecast of UN demographers is practically justified and is close to the predicted figures.

Along with demography in cities, in our country and countries around the world, interest in environmental aspects of urbanization has sharply increased in recent years [4].

In modern conditions, compliance of the urban environment with the requirements of comfort, environmental and aesthetic acceptability is a natural need of the society.

The comfortable urban environment is defined as the space of the city, the most adapted to the needs of citizens and meets the requirements of amenities, infrastructure, event-filled content created objects [13].

One of the ways to create or model a comfortable urban environment through the architectural, artistic, projective transformation of the elements of the urban landscape is GEO plastics.

GEO plastic - artificial modeling of the territory to transform the relief and the introduction of natural components in the urban environment. As already mentioned, GEO plastics perform certain functions, for example, artistic, aimed at imparting expressiveness, self-expression of objects being created or transformed. The protective function is manifested through the creation of artificial forms that allow to visually separate any space from the environment and protect it from external factors (highway, dust, wind, etc.).

GEOplasty, as it is called today, actually has a long history. So, in the X – VIII centuries in ancient Greece, Rome, Eastern countries, the creation of garden and park compositions was an element of GEO plastics and a form of

organization of the surrounding space. The means of creating such ensembles were pools, grottoes, fountains, straight avenues, dividing gardens, etc. GEO plastics flourished in the second half of the 18th century, but the culmination can be considered the 21st century, when in some countries, for example, Arab countries, bulk cities began to form, which performed life-supporting, protective hydrologic-geomorphological functions [14].

In Russia, GEO plastics have already been distinguished by its exceptional functionality — the creation of gardens for the production of foodstuffs, ponds for fisheries, and irrigation. In the 17th century. Gardens are beginning to perform a function aimed at creating recreation areas, where typical examples are garden ensembles in the city of Moscow — the Lower and Upper Embankment Gardens in the Kremlin, Izmailovsky Garden, and others.

Modern trends in the development of GEO plastics in large cities are aimed at creating a comfortable urban environment with graphics means of landscape art and design.

Methods

Questions of research in the field of GEO plastics, the possibilities of its application are outlined in the works of I.V. Tuliganova [5], V.A. Nefedova [6], G.A. Potaeva [7], A.E. Kozlova [8], N.V. Bauer and L.N. Shabatura [9], A.D. Chirvy [10], E.I. Shatokhina [11] and others.

In terms of methodology, GEO plastics in urban landscapes, based on geographical and ecological approaches, can be divided into two categories:

1. Arrangement of parks and natural landscapes to improve or restore natural components in cities.
2. The use of GEO plastics for the formation of the geographic-ecological framework.

Both approaches in GEO plastics are based on the use of the landscape component in cities, namely, taking into account the peculiarities of the relief, hydrography, vegetation, the study of which should be given special attention in GEO plastic studies.

Results and Discussion

Within the framework of this article, the possibilities of using GEO plastics in the urban environment are considered on the example of Kazan, a territory with an interesting geographical component and expressed elements of the cultural landscape.

Geologically and geomorphologically, the city is located on the left bank of the Volga, where the river valley is sharply asymmetrical: the right slope is made up of the high and steep slopes of the original bank, composed of sediments of the Permian system; the left slope of the valley is a



complex of terraces. The terraced complex of the Volga forms five terraces in the city of Kazan, differing from each other in morphometric parameters and degree of manifestation in the relief. The geomorphology of the territory is represented by forms of exogenous relief formation, among which are erosion (ravines), suffusion and karst, subsidence phenomena in soils, abrasion, landslide, bogging processes are developed. Within the city, some deposits are distinguished as a "cultural layer" that has accumulated over several centuries and has a thickness of 5-6 m, in some places up to 9.0 m. large areas are filled with bulk soils that can serve as an object of forming GEO plastics. Such features of the surface structure of the territory in question must be considered when creating various forms of GEO plastics.

The relief, as one of the main components of the landscape in cities, can be applied the following directions of its transformation:

- Imitation of naturally occurring landforms. These can be hills or hollows, artificially created with any artistic or functional requirements.
- Creation of new, not found in the city relief forms (channels, grottoes, etc.).
- Functional relief organization (arrangement of sites along highways, creation of dams on water bodies, etc.).

In climatic terms, the city of Kazan is characterized by a moderately continental climate with cold winters and warm summers. The average temperature in summer is + 17–20 ° C, in winter – 9 –12 ° C, the average annual precipitation is about 560 mm.

The territory of the city is characterized by a

significant proportion of water surfaces. Thus, within the city, there is a distinctly expressed strip of a part of the Volga water area more than 2 km wide, a shallow end and a mouth of the river. Kazanka with its tributaries - p. Knox, p. Dry [12]. The lake network, represented by the Kaban, Lebyazhye, Glubokoe, Golubye lakes system located in the peripheral part of Kazan and others, forms the basis of the hydrography of the city.

The basis of the soil cover of the territory of Kazan is the gray forest, sod-podzolic, floodplain, and other soils.

One of the defining natural elements of creating a comfortable environment is the vegetation cover used for gardening, landscaping and organizing urban areas and with which, in some cases, the conflict between nature and urbanized forms of a modern city can be smoothed out. The zonal vegetation of the city is represented by forest phytocenoses of the southern taiga subzone, consisting of mixed, coniferous and deciduous forests.

An overview of the landscape features of Kazan suggests that the main approach in the GEO plastics of a territory may be its transformation by restoring or creating parks and squares, reconstructing and improving the ecological state of water bodies, re-cultivating land, ravines, etc.

In the process of studying the territory of the city, the authors identified GEO plastics objects in all their diversity, incl. taking into account the seasonal attribute, and, based on this, they were typed:

1. natural type;
2. natural-anthropogenic type;
3. cultural and artistic type (Fig. 1).

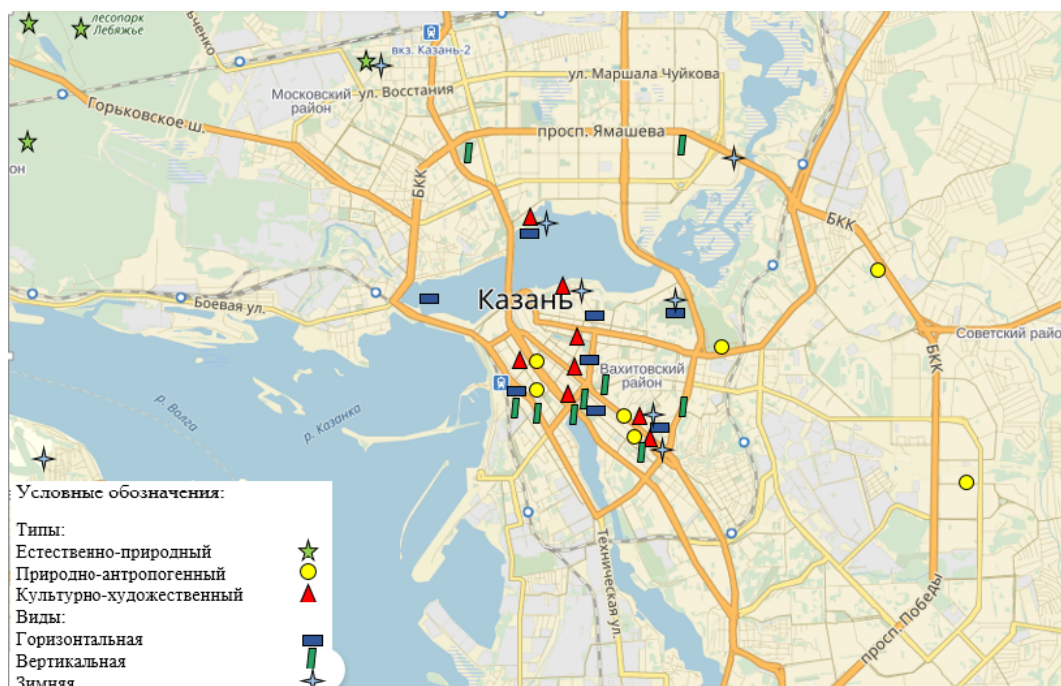


Fig. 1. Types of GEO plastics in the territory of Kazan



1. The natural-natural type of GEO plastics is determined by the objects of the protected zone, parks, squares, gardens as recreation areas, on the territory of which a special regime of conducting human economic activity is established. The purpose of this type of object is aesthetic, recreational, artistic, and ecological, to create a comfortable environment in cities. An example of a natural-type GEO plastics in the city of Kazan is the transformation of the former quarry and lake (settlement of Yudino) into a recreation area; Blue Lakes system turned into a recreational zone

2. The natural-anthropogenic type of GEO plastics can be divided according to water and geomorphological features. The aquatic objects of natural and artificial origin (pond, lake, channel, fountains) belong to water GEO plastic. For geomorphological GEO plastic - objects directly related to the artificial transformation of the relief, in particular, it can be artificially created elevations and depressions. The basis for identifying this type of GEO plastic material may be the presence of irregularities in the relief of natural objects, as well as the introduction of elements of the artificial nature of the surface into the natural environment, thereby giving greater expressiveness to the appearance of the territory (small architectural forms, frames, stairs). Examples of the natural-anthropogenic type of GEO plastics in the territory of the city of Kazan can be the refined slopes of the Bulak channel, a hill at the intersection of Butlerov and Pushkin streets.

3. The cultural and artistic type of GEO plastics is based on the introduction into the natural environment of artificially created natural and artificial components. The main purpose of this type of GEO plastics is the artistic education of citizens and the creation of the cultural image of the city. There are several directions for the development of cultural and artistic GEO plastics:

1. national, the objects of which include the national symbols of the city, created from natural or artificial materials, for example, shrub sculpture of a leopard, which is a talisman of Kazan;

2. historical, the basis of which is formed by sights and monuments that are connected with the relief of the area and the history of their people, for example, such as the elevation of the Kazan Kremlin;

3. childish, to which objects, it is possible to refer the figures attracting the attention of children, sculptures and other elements;

4. educational, to which in the city can be attributed the decorated ensemble of the building of the Kazan Federal University with a monument to VI. Lenin and the central library of Kazan.

In territorial terms, the largest number of objects of selected types of GEO plastics is located in the

old central part of the city, on the left bank of the r. Kazanka, due to the history of the city, the accumulation of many tourist sites here, the presence of historical symbols of the city (Fig. 1). It should be noted that with the current concentration zone of GEO plastics in the city, the right bank of the r. Kazanka, in connection with which, the primary task is to increase the number of environmental, aesthetic and artistic trends, as well as measures for gardening and landscaping residential areas of the city.

GEO plastic urban environment, depending on the nature and the genesis of the relief can be divided into horizontal and vertical (Fig. 1). The first one is a process of natural or artificial leveling of the relief; vertical GEO plastic - through the creation of artificial forms, or elevations, lowlands, or other forms that will imitate vertical changes in relief. On the territory of the city, on this basis, most of the objects belong to the horizontal form of GEO plastics, which is reflected in the design of parks and platforms on which decorative paths are made. Vertical GEO plastics in the city are expressed through the use of slopes as a city decoration or the creation of artificial mounds, street decoration with hanging flowers, arches of plants. Artificially arranged hills, slides, ramparts enhance the expressiveness of the landscape.

On a seasonal basis in Kazan, one can distinguish a group of winter and summer GEO plastics objects. Summer GEO plastics in the city is expressed in the form of artistic and functional transformation of the territory using earthen embankments, grass cover, water features, vegetation, terracing, small architectural structures, fountains, etc. Summer GEO-plasty aims to transform both flat and vertical sections to give them greater expressiveness and preserve scarce areas in the city.

Winter GEO plastics is focused on the use of winter attributes: snow, ice, followed by the formation of winter forms (hills, hills), which have their direction and function. Winter GEO plastics are differentiated by the authors for children's, artistic and aesthetic, and functional and recreational. The objects of children's winter GEO plastic can be playgrounds, slides, structures made of ice, as well as natural hills and hills transformed into slopes. The artistic and aesthetic winter direction of GEO plastics can be formed using elements of coniferous vegetation that attract people and create a festive atmosphere in the city, decorated with light illumination of trees and shrubs.

Finally, the basis of the functional and recreational direction of winter geo-plastics in cities can be: laying tracks in parks, squares for skiing and hiking (Gorky Park). This also includes the creation of skating rinks for mass skiing, special hills and downhill skiing and tubing



(recreation center "Sviyazhsky hills"), ice towns and winter amusement parks.

For winter GEO plastics, the vertical type of relief design is more characteristic, since, mainly, snow and ice structures are made for aesthetic diversity and entertainment of the population.

In general, geo-plastics distinguished on a seasonal basis may concentrate in itself the presence of different elements on the same landscape at different times of the year. So, for example, on the Kremlin Embankment in the city of Kazan in the summer a path longer than 1 km is used for the movement of people, cyclists, roller skating, and in winter these same tracks are converted into a skating rink.

Based on the selected types and signs of GEO plastics in the territory of Kazan, it is possible to designate areas of its application: for reclamation, solving engineering problems, improving the ecological situation, etc. For example, to reclaim land in Kazan, the square with the Chishmye ", And initially in the territory of the construction of the gas station.

To solve engineering and technical problems in Kazan, GEO plastics objects were recreated in the form of hydroprotective dams across the r. Kazanka, reinforcements of ravines slopes are made with the help of boulders and geogrids, bulk hills were created for laying railways.

To improve the ecological situation along the roads, trees and shrubs were planted to reduce dust and noise pollution in residential areas, protective screens were made along the edges of the ramps. An example of activities performed in the city can serve as trees planted along the roads on the street. Tank.

The study of the landscape conditions of Kazan allowed the authors to work out some recommendations on the use of the city's territory for various types and GEO plastics groups:

- Use of terraces p. Kazanka and the left bank of the Volga for the sports and entertainment direction (creation of cycle tracks, laying of winter ski trails, running and speed-skating tracks, etc.).
- Improvement of the near-lake and pericarp regions through the laying of footpaths, for example, for "Scandinavian" walking.
- Creation of children's playgrounds that imitate natural forms - mountains, grottoes, terraces, etc.
- Design of various surfaces employing landscape design, for example, using flower-shrub compositions, arranging walking areas for pets.
- Creation of environmental zones, parks, squares, etc. around production facilities.

As for recommendations, it can also be proposed to partly form geo-plastics within the city together with already existing sections (with a slight

reconstruction), especially using the geological-geomorphological-hydrological components of the territory, and some of the forms — creating a landscape-floristic composition using zonal vegetation.

Such reconstruction of areas (objects) of GEO plastics in urban agglomerations can be applied in any other territory where there is a need to introduce man-made objects of ecological and geographical orientation to the city image, including to create a comfortable urban environment.

Findings

1. The authors of the work define the concept of GEO plastics as a way to transform a relief by artificially creating its forms, taking into account the features of the landscape, aesthetic, functional and technical requirements for the GEO plastics object being created.
2. The authors have identified and carried out the typing of GEO plastics objects into natural-natural, natural-anthropogenic, cultural and artistic types. Depending on the nature and genesis of the relief, the authors distinguish horizontal and vertical GEO plastics, according to the seasonal pattern - winter and summer.
3. The authors proposed some recommendations on the use of the territory of the city for various types of GEO plastics: the use of the river terraces of the city for sports and entertainment activities; improvement of coastal and coastal landscapes; design of various surfaces of the city means of landscape design, etc.

Conclusion

The natural need of modern society in cities is the presence of a comfortable environment, by which they mean the space that is most adapted to the needs of citizens and meets the requirements of amenities, infrastructure, eventful filling of the created objects. Creating a comfortable urban environment is possible through the so-called. GEO plastic - artificial modeling of the territory to transform the relief and the introduction of natural components into the urban environment. The possibilities of using GEO plastics elements are considered by the authors on the example of Kazan, where typing of GEO plastics objects into natural, natural-anthropogenic, cultural-artistic types were identified and carried out, summer and winter GEO plastic based on seasonality and depending on the nature of the relief were also highlighted. - vertical and horizontal GEO plastic. The authors found that, in spatial terms, the largest concentration of GEO plastic objects is characteristic of the old central part of the city, on the left bank of the r. Kazanka, due to the history



of the city, the accumulation of many tourist facilities here, the presence of historical symbols of the city. The typing of GEO plastics objects carried out by the authors served as the basis for designating GEO plastics application areas, namely for reclamation, solving engineering problems, improving the ecological situation, etc. At the same time, the authors proposed some recommendations on the use of the city's territory for various types and GEO plastics groups.

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