

Mobile housing on the islands in post-industrial Dnieper

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Abstract. Mobile housing has extensive experience in various regions of the world. The popularity of mobile housing is due to the practical advantages of their designs and universal application in various functional typological areas. The use of mobile residential structures in Ukraine has significant prospects for the development of the tourism business, in particular, with the recreational development of the islands. Analysis of the possibilities of using mobile housing in the natural-landscape potential of the islands of the post-industrial Dnieper. The study is based on an integrated approach – application of general scientific and applied methods: the study of literary sources regarding the historical experience of using mobile housing, historical and local history heritage, modern scientific developments and state regulatory documentation; photofixations, experimental modeling. The Dnieper islands constitute a significant part of the recreational and tourist potential in the structure of the complex landscape zone of the modern Dnieper city. The use of recreational mobile residential facilities with the possibility of their placement on the islands and in coastal waters is proposed. The use residential technologies for organizing recreational and tourist activities on the Dnieper islands seems promising, since it is based on the concept of an ecological approach to the recreational load on natural landscapes.

1. Introduction

Current socio-economic conditions in Ukraine, the level of provision population with capital housing, of different types and quality, promote the introduction of mobile residential technologies. It is advisable to apply the structural and technological advantages of mobile housing for the organization of temporary residence in many functional and typological directions, in particular, during the organization of recreational and tourist activities on natural landscapes.

The urgency of the work is connected with the problem of using the mobile form of recreational and tourist accommodation in the territories of the islands in modern Dnieper and improvement of the means of interaction of anthropogenic and natural objects.

An analysis of recent publications shows that a lot of research is being done around the world on of mobile architecture. Some theoretical developments of mobile architectural shaping are presented in scientific works: V. Vorobiev (transformation of mobile structures and emergence of kinematic architecture) [1]; D. Tkach (conceptual proposals for the formation of residential buildings using mobile objects built on the basis of conical surfaces) [2]. Topical issues related to regional problems of the use of existing coastal territories, creation of artificial land plots, development of tourist business were considered in their research: I. Cherniak, L. Yaruchyuk (explored modern concepts of urban

planning on the example of the Hague [3]; G. Klopko (a comprehensive strategy for the use of the coastal territories of Dnepropetrovsk) [4]; D. Semenov, S. Kaloshina (innovative methods of creating artificial island territories are presented) [5]; E. Bugriy (analysis of the problem of artificial islands in the context of accretion) [6]; I. Kovalchuk (the problem of optimization of tourist business due to the use of innovative technologies is investigated) [7].

The following study examines the possibilities of using a mobile form of housing for the organization of recreational and tourist activities in the island territories of modern Dnieper city.

2. Presenting main material

The use of housing that moves with people has been known since ancient times. Over the millennia, land and water mobile homes have been shaped depending on the degree of mobility and occupancy of individual ethnic groups. Most often, mobile homes were part of a marching property or road props and were made from lightweight materials - wood, wool, leather, fabric (the historical heritage of mobile architecture is represented by a very small number of archaeological evidence mainly fragmentary and interpretative) [8], [9].

The use of mobile housing has been inextricably linked to the history of the arid zone of the Ukrainian state since ancient times. Yurts, carts and tents of nomadic cattle ranchers were the main types of residential buildings of the steppe south until the 15th century (the safe mastering of the Wild Field by the settled population, the development of the urban economy and the active formation of the capital housing stock began only after the peace agreement with Turkey in 1774) [10].

Over the next two centuries, under the new conditions of rapid socio-economic development of the steppe region, the typology of mobile residential structures was largely confined to the use of temporary housing during construction.

In today's Ukraine, mobile housing technologies have great prospects, and in some cases, even some advantages over capital construction. For example, it is advisable to exploit the territories of the islands with mobile technologies in recreational and tourism activities, given the legal prohibition and restrictions on stationary construction, since mobile housing does not belong to capital real estate [11].

Research into the possibilities of using mobile homes in the islands, in the structure of complex development of recreational activity, can be carried out on the example of post-industrial Dnieper and its suburban areas.

The modern city of Dnieper (Dnepropetrovsk) is located on both banks of the Dnieper River at the confluence of the left tributary of Samara. The waters of the rivers divide the city into three unequal parts (the Dnieper River has a length of 31.5 km within the city; the Samara River - 9 km; inland water accounts for 18% of the city); numerous islands are located throughout the water area [12].

Unfortunately, the modern Dnieper islands are only a small part of the historical natural heritage left after the Dnieper HPP was flooded due to the construction of the GES in 1932. In particular, there were more than 120 islands with diverse landscapes between the cities of Dnieper and Zaporozhye - rocky, sandy, and covered with forests, shrubs, and grasses [13].

For the coastal population, the island territories were not only of great economic importance, the picturesque sceneries were fascinating and enriching spiritually. About one of the small islands - Lozovaty (an area of 2 ha, on which oaks, willows, vines grew), D. Yavornitsky wrote: "This is a wonderful island of all the islands that are between the Dnieper rapids. This is a wonderful picture painted by Nature herself. It makes one forget all that sad and helplessness that is in real life." [13].

All high rocky islands that never flooded during the spring flood were "museums" of antiquity of different eras- from the Stone Age to the Cossack era (after the construction of the Zaporozhye dam, 50 settlements were under water and a large amount of lands rich in unique historical and cultural heritage [13].

Modern islands constitute a valuable fund of general natural landscape potential Dnieper (a large island system has a conservation status within the Dnieper-Orel Nature Reserve) [12].

Directly, in the industrial center, within the Dnieper water area, there are 24 islands and 2 peninsulas (19 islands are more than 1 km long and almost 300 m wide). The level use of island

territories in the structure of urban environment is different. The largest anthropogenic load on natural landscapes has 5 islands:

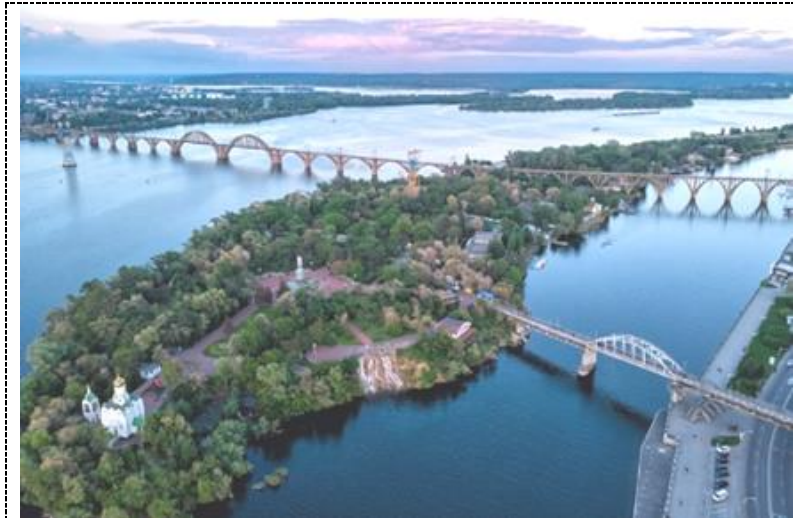


Figure 1. Monastyrsky Island, Dnieper, Ukraine.

- Monastyrsky - actively used as an urban recreational facility (the island is part of Shevchenko Park and connected to it by a bridge). But the quality of recreational services in a large area is low, because the island is crossed by arched supports of the Merefya-Kherson railway bridge (figure 1).
- Stanovy - recreational and sports area in the structure of the rowing canal (the island is almost all restored to its new form after the flooding); connected with the mainland by a bridge.
- Feinberg - used to organize the infrastructure of a city cargo port; connected with the mainland by dam.
- Namystanka - the Kaydak bridge passes through the island (figure 2).
- Kaminuvaty - the island has transmission line supports.

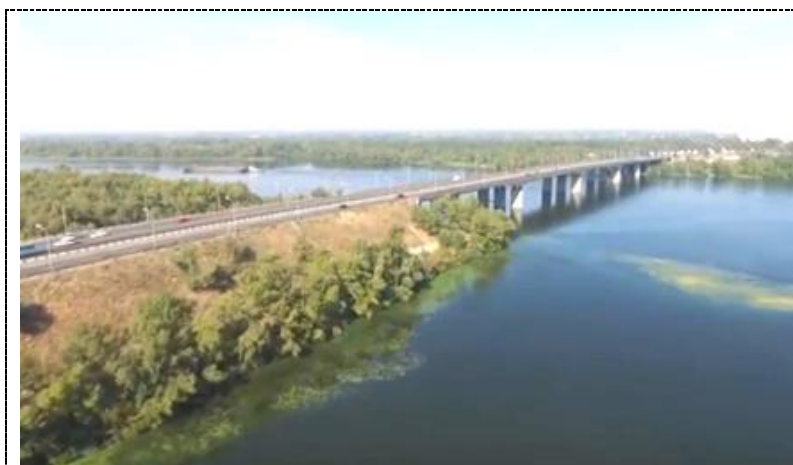


Figure 2. Namystanka Island, Dnieper, Ukraine.

At one time, the problems of the use of islands located near urban residential areas were actively engaged in architectural workshops in Dnepropetrovsk. The most interesting, from the town-planning

point of view, was considered the Green Island, located near the left bank of the Dnieper between the bridges Central and Amur. In one of the projects, the island is assigned the role of the main recreational facility of the Left Bank Community center (in the context of the structural planning concept of creating a large City Ensemble) [14]. There is currently no organized activity on Green Island (figure 3).



Figure 3. Green Island, Dnieper, Ukraine.

Recreational use of the Dnieper islands has considerable historical experience. In the pre-revolutionary period and in the Soviet era, the islands were a popular holiday destination for citizens. Residents of Ekaterinoslav-Dnepropetrovsk massively rested on the beaches and forest clearings of the Green, Shevsky and Alekseevsky Islands (especially through water transport) in the summer.

It is advisable to carry out recreational activities on the islands of modern Dnieper, as part of the regional program of qualitative development of coastal territories of the rivers: the Dnieper, Samara, Orel, Kilchen, Sura, Voronoi, Osokorovka.

First of all, it is necessary to develop a comprehensive model of recreational and tourist development of coastal zones and water areas based on a study of the natural landscape fund and historical and cultural heritage. The Dnieper islands can be considered as separate attractive objects in the routes of historical and local lore (for example, a vivid "collection" of archaeological sites has been preserved on Kodachok Island).

The use of mobile homes in the islands could optimize the organization of household services in the general tourist-excursion structure and promote commercial interest in the tourism business (significant revenue side of the local budget) [7].

The following principles are proposed in the design of recreational mobile homes:

- Bionic shaping (based on the use of biomorphic shaping for the delicate artistic and aesthetic inclusion of anthropogenic objects in the natural environment).
- Ergonomics (comfortable design of life process based on taking into account sanitary-hygienic factors, as well as spatial and anthropological parameters).
- Environmental safety (the use of structures based on building materials of natural origin, including restorative natural materials of plant origin; introduction of energy systems based on renewable energy sources; waste disposal [16]).

Accommodation of mobile recreational housing can be carried out both on the surface of the islands and on the water - off the coast.

It is advisable to use residential block-containers to set up mobile recreational complexes on land, fully equipped with furniture and engineering equipment (possible connection to centralized engineering networks and operation in offline mode); residential units are delivered to the island by floating means.

Installation of mobile residential units can be carried out directly into the prepared territory (crushed stone, sand or special plates are used to level the area). Spatial planning solutions can use modular elements and different blocking options (figure 4).



Figure 4. Fragment of model of recreational residential complex.

Also, it is possible to use frame-awning and pneumatic structures, but their installation requires more time, and creating a comfortable design, arranging the necessary engineering and technical equipment is problematic.

Architectural organization of mobile housing on the water provides structural and technological solutions using floating foundations and lightweight frame structures for housing (at the same time, the houses on the water have a fixed location, that is, they are deprived of the possibility of free movement in space) [17].

Hydraulic structures, depending on the principle of floating base arrangement, can be of two main types:

- houses on pontoons;
- houseboat vessels - in conditions where the boats are not subject to further exploitation on the water (the boat is safe for housing).

The use of campers and trailers is not very desirable, because it's necessary to create a minimum vehicle load mode in the islands.

Effective recreational use of the islands requires comprehensive landscape surveys, first of all, definitions: highs and lowlands, the ratio of forest covered and open spaces, wetlands [18].

Since the forest plantations on the islands belong to the category of nature conservation (like all the forests of the Dnieper natural landscape), schemes of permissible loads on natural landscapes should be developed [12].

Of particular importance is the aesthetic appreciation of the artistic and spatial qualities of island landscapes: selection of scenic landscapes and viewpoints for visual perception of the coastal space, in particular, panoramic disclosures from the water area (this is an important factor that has a significant psychological effect on humans).

Based on a comprehensive analysis of island landscapes and historical and cultural monuments should be located:

- mobile housing;
- mobile social service infrastructure;
- elements of improvement (network of pedestrian paths and grounds: to view landscapes and expositions, sports, children's, for picnics).

But most importantly, in the process of recreational activity in island territories, it is to find a reasonable compromise between anthropogenic loading and the maximum conservation of natural landscapes.

In the present ecological environment of post-industrial Dnieper region, the problem of communicating with the environment is becoming more complex. The issue of preservation the Dnieper River itself is particularly acute now (the sanitary status of the Dnieper water area is currently unfavorable for human health) [12].

Protection of the Dnieper water-green landscapes, the possibility of their regulated recreational use is one of the means of formation environmental and social stability.

3. Conclusions

The need for recreational use of the Dnieper islands is due to their unique natural landscape potential and special urban value. Application of recreational mobile residential technologies in island territories, in the structure of a complex strategy for tourism business development on the Dnieper coasts, is appropriate, since it is based on the principles of maximum reservation of the ecological framework and the natural landscape heritage.

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