

MOBILE SYSTEMS URBAN GREENING, AS A FACTOR OF SUSTAINABLE DEVELOPMENT (ON THE EXAMPLE OF ODESSA)

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Abstract. The article examines mobile systems urban greening as a factor of sustainable development, because in modern cities urbanized structures absorb landscaping. Cities are growing and developing very fast, and green areas are becoming less and less. In response to high-rise compacted buildings, the search for other forms of returning natural complexes to the city structure is required. The growth of urban population and the density of urban development attaches special importance to the problem of creating zones of ecological comfort. The development of the city leads to a reduction in clean air, water, green space and silence, which is so lacking in modern man with his fast pace of life in cities.

Nowadays, the problem of landscaping of urban areas can be solved without demolition of buildings, by creating environmentally friendly areas with the help of mobile landscaping systems. Mobile systems urban greening is city landscaping that is implemented through structural elements that can be implemented, moved, and if necessary, removed from the city fabric.

The article analyzes the world experience of creating a vertical park with the help of mobile greening systems. The vertical park was developed in New York by the architectural firm «EFGH Architectural Design Studio». The park is developed in a small area and its effective use is created by upward development, instead of planar. This design not only allows you to plant greenery in highly urbanized areas of the city and improve the environment, but it can also attract tourists.

The article emphasizes that the sustainable development of the city of Odessa requires a single landscape and ecological framework, which would be connected into a single system of urban green spaces. With the growth of the city of Odessa, increasing the number of stories, building density, construction of public services, especially in the central part of the city, the question of maintaining the continuity and uniformity of green spaces in the city. To create such an environmentally sustainable green framework of the city, it is advisable to use mobile systems urban greening.

Keywords: sustainable development, urban landscaping, mobile greening, green frame.

Introduction. The new millennium poses a number of new questions for architects and urban planners, without which it is impossible to create quality living conditions. One of the most important issues is the problem of shortages of green spaces in megacities. Nowadays, the city with all its complex system of socio-economic, psychological and cultural ties is the main type of settlement. Odessa is a resort, administrative, cultural and economic center of the southern part of Ukraine. Modern urban situations (growth and compaction of urban development) leave virtually no places that would separate people from the factors that adversely affect the health of the city population (aggressive urban environment – noise, dust, etc.). There are fewer and fewer places for comfortable human rest.

According to SBC B.2.2.12:2019 «Planning and development of territories» the norm of areas of landscape-recreational territories makes 12 m² on one person, and in the city of Odessa the area of landscape-recreational territories is equal 0.01 m² on one person [1].

Relevance of the topic this of scientific research is due to the fact that the system of urban landscaping requires the creation of innovative tools not only for preservation but also for harmonious

interaction with the modern urban environment. Harmonious interaction of various objects of city gardening will promote sustainable development of the city. Unfortunately, the green areas of Odessa have been significantly reduced in recent decades, therefore, the definition of new methods of ecological renovation of the urban environment is extremely important.

Analysis of recent research and publications. The scientific and methodological basis of the study were works related to the substantiation of the concept of sustainable, ecologically balanced urban development and the development of appropriate methods and norms of urban planning, which were based on the results of researches of such scientists as: V.I. Vernadskyj, V.V. Vladimirov, L.M. Gumilov, V.R. Dolnik, M.M. Domin, L. Kibla, G.I. Lavryk, M.F. Rejmers, V.O. Timoxin, G.J. Fil`varov, I.O. Fomin, Dzh. Forrester. The scientific works of the following scientists are of great scientific and methodological significance for this study: I.V. Lazaryeva, O.M. Mykulina, S.B. Chystyakova, A.G. Bolshakova, V.V. Vadimova, V.I. Zareczkogo, I.A. Didy, K. Doksiadisa, T.O. Lebedinskoyi, M.K. Mirzayeva, T.F. Panchenko, S.M. Procenko, I.D. Rodichkina, Yu.Ya. Sabana, G.A. Sadvokasovoyi, T.V. Ustenko, Yu. B. Xromova. The basis of research in the field of ecology were works: G.O. Bilyavskogo, M.A. Golubcyu, V.P. Kaznacheyeva, D. Medouza, M.M. Moyiseyeva, Yu. Oduma, S.S. Shvarcz.

Problem statement. In connection with the growth of cities, the ecological balance is disturbed, the space loses the initial ratio of architectural and natural dominants; opportunities for achieving aesthetic expressiveness of the environment by means of landscape architecture are not realized; undervalued the role of natural elements of the landscape as integral components of the urban environment.

For Ukraine as a whole, the issue of building green areas in cities remains relevant. Modular landscaping can serve as a solution to this problem, with the help of which it is possible to link the green areas of the city into a single frame.

Purpose and objectives. The purpose of this work is to determine the role of mobile systems urban greening in the concept of sustainable development of modern cities. Inclusion of mobile systems urban greening in the structure of the green framework of Odessa.

Materials and methods of research. Research based on the analysis of literary sources, domestic and foreign experience in the implementation of mobile urban greening systems, as well as the author's experience in designing and operating green areas of the city, experimental studies of their elements, schemes of mobile urban greening systems. Thus, the basic directions of scientific researches of systems of mobile urban greening for increasing of efficiency of their use are defined.

Mobile systems urban greening it is city landscaping, implemented through structural elements that can be implemented, moved, and if necessary, completely removed from the urban space. They are necessary in the conditions of the condensed building of the central part of the city or at creation areas of recreation in short terms. These are easy-to-install mobile and portable systems that allow the city to change regularly, be more diverse, heterogeneous and interesting to residents. Mobile systems urban greening – one of the ways to implement in the structure of the city so necessary for human green elements [2].

Mobile systems urban greening – a method of landscaping by planting plants in special mobile planting containers (containers, pots, etc.), which is used when it is impossible to create conditions for natural plant growth.

Mobility of systems urban greening is achieved through:

1. Possibilities of moving. These are a kind of eco-centers that can be implemented in any urban environment, be a self-sufficient element of the city and meet all human needs in the absence of nature, performing recreational and sanitary functions.
2. Systems for quick installation and rebuilding of modules. Simplicity constructive, modularity of elements, ease of installation and dismantling of mobile greening systems allow in a short term to create an ecologically friendly environment. To retrofit and place these systems, a minimum time spent and other resources are required.

Mobile of systems urban greening play three main functions:

1. Utilitarian function (ensuring functional diversity through green spaces, as well as in

identifying spatial compositional and functional connections).

2. Sanitary and hygienic function (formation of a full-fledged space of the urban environment that meets the requirements of comfort – neutralization of negative factors: noise, dust, gas, overheating, etc.).

3. Aesthetic function (creation of favorable conditions in the city in terms of psychological and emotional comfort and organization of compositional and artistic spaces, creation of compositional links between nature and urban areas) [3].

The concept of mobile landscaping systems was first demonstrated at a garden festival in France in 1994, by French botanist and landscape designer Patrick Blanc. He turned the walls of an abandoned factory in an urban area, into real tropics, which aroused the admiration of famous architects and ordinary citizens (Fig. 1). Mosaic vertical panels of plants grown on hydroponics soon adorned various buildings around the world. In less than ten years, technologies for creating mobile greening systems have been mastered by many companies and become available to the mass consumer.

With the help of mobile greening systems, you can create not only green walls or green roofs, but also create mobile vertical gardens and parks. For example, in 2011 American architectural studio «EFGH Architectural Design Studio» presented a project «The Billboard Park» – a unique recreational landscape project to transform the industrial zone of Rosario (Argentina). The structure, which develops upwards, is a concrete honeycomb, which serves as a basis for a vertical garden with stairs for rest and walks. For the first time in 1937, an Illinois professor took out a patent for his «Botanical Bricks». Stanley Hart White (brother of famous children’s author E.B. White), is thus credited with being the inventor of the «green wall». Sadly, the large-scale industrialization of the post-war era was not a favorable climate (literally and figuratively) for green building.

In 1988, Patrick Blanc of France also took out a patent on his «Mur Vegetal» (first constructed in 1986) and remains one of the foremost designers of green walls today (Fig. 2).

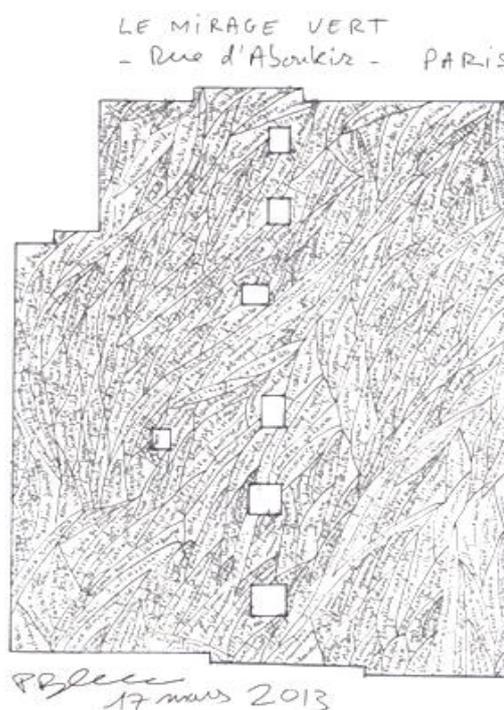


Fig. 1. Green wall project «L'Oasis D'Aboukir». France, 2013. Author: P. Blanc

Urban population growth is the main reason that demand is growing for buildings. In the world more than a billion buildings, and their negative potential environmental impact can be viewed as a percentage: consumption of 17% of all freshwater; use of 25% of all cut down wood; 33% of all carbon dioxide emissions; consumption of 40% of all materials and energy [4]. Therefore, mobile greening systems can be considered as a mechanism to ensure sustainable development of urban areas.



Fig. 2. Project vertical park. USA, 2011. Architectural studio «EFGH Architectural Design Studio»

The historic UN Summit took place on September 25, 2015 in New York. It resulted in the adoption of the resolution «Transforming our world: The 2030 Agenda for Sustainable Development». This document actually defined new guidelines for the development of the whole world, which will contribute to economic growth, rational use of natural resources and the solution of a number of social needs. These benchmarks are reflected in the 17 sustainable development goals.

Mobile systems urban greening as a structural element of the green frame of the city of Odessa. Ukraine has also joined the global process of sustainable development. In September 2017, the National Report «Sustainable Development Goals of Ukraine» was presented. And in 2019, the Presidential Decree «On the goals of sustainable development of Ukraine for the period up to 20300» highlighted sustainable development as the only possible way to develop the domestic economy and public institutions to ensure the growth of the level and quality of life of citizens, compliance with constitutional human rights and freedoms.

Odessa is one of the cities in which natural resources have significantly decreased. Odessa, as a large city for the sustainable development, in the 21st century, needs a single landscape and ecological framework that would unite urban green spaces into a single system. Such a natural framework allows to achieve sustainable development and preservation of urban green areas, as it is formed on the principles of uniformity and continuity. With the growth of the city of Odessa, increasing the number of stories, building density, especially in the central part of the city, the question of preserving green spaces became acute. The foundations for the creation of a green framework should be laid consistently in the development of the master plan of Odessa. If compare the scheme of green areas of the city in 2010 and the scheme of 2020 (Fig. 3) it can be seen how much the green areas of the city have shrunk. The transition from destroyed natural landscapes to their reconstruction in order to obtain a comfortable environment requires the development of conceptual approaches in design. A system of modules can serve as a solution for planting greenery in urban areas of the city (Fig. 4).

Of course, the growth of the city is inevitable and it is impossible to keep all green urban areas intact. The green area in Odessa along the coastal zone has decreased the most. The problems of preserving and restoring the green areas of the city, as well as the sustainability of green spaces, the development and preservation of their functions and biological development over time are very relevant. Not only the city authorities pay attention to these problems, but also various public organizations, for example, the NGO «Green Leaf» in 2019 launched a large-scale project «Green Odessa» aimed at improving the city's ecology, landscaping and preservation of the green zones of the city.

For megacities, such as Kyiv, where the problem of lack of territorial reserves for the development of green areas is acute, compensatory landscaping techniques are important: green roofs, mobiles containers and vertical landscaping. For Odessa, such methods of mobile landscaping are also innovative and promising. Mobile greening systems would help to reconstruct existing green areas, as well as to create new landscaping of public space in the city. With the help of mobile greening systems in Odessa, it is possible to create a unified system of green areas covering the entire city, which would improve the quality of the urban environment.

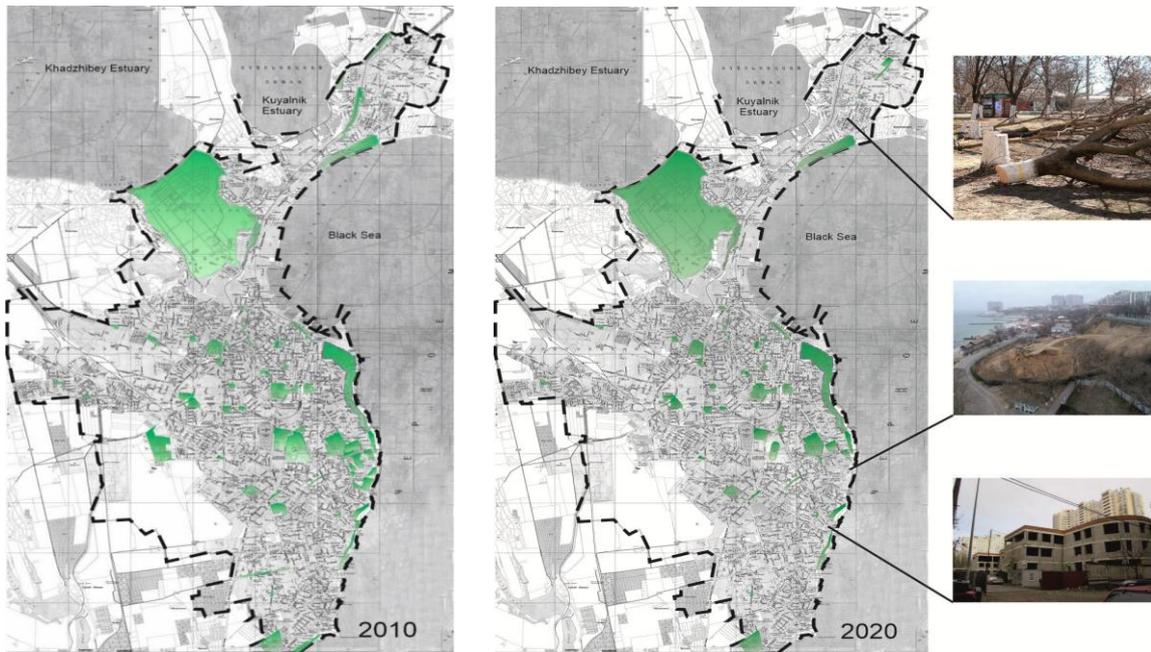


Fig. 3. Analysis of the green areas of Odessa 2010-2020

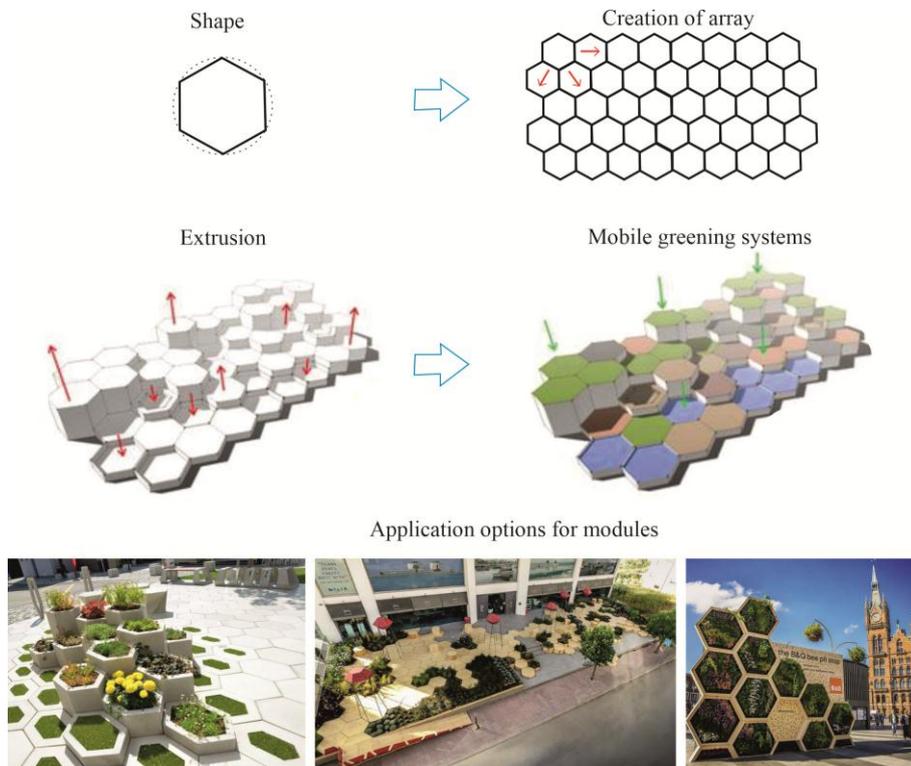


Fig. 4. Scheme of urban greening using a modular structural element

Summary and Conclusion. Thus, analyzing the world experience of creating green areas with the help of mobile greening systems, we can conclude that mobile greening plays not only an aesthetic role but is also the main means of rapid transformation of the urban environment and improving the environment.

For a satisfactory solution of urban-ecological problems for Odessa, the green frame should be formed in the form of an integral and continuous structure that permeates the entire space of the city and goes into the suburban environment. The quality of the urban environment will generally depend on the harmonious combination and elimination of contradictions that arise between the technogenic and green frames of the city.

Mobile greening systems can be used in various functional areas of the city. Mobile systems in residential areas of the city. In addition to designing comfortable housing with a convenient layout, the most important requirement is the organization of an environmentally friendly zone around the house: the creation of parks, playgrounds in the yard, etc. In other words, it is necessary to hold events for the improvement of the territory and ensuring the standards of improvement. If conventional long-term greening is not possible, are being used mobile systems greening.

Mobile systems in public areas of the city (stations, airports, shopping centers). The adjacent territory of the building, as well as the roofs of buildings are used for the implementation of mobile systems. One example of mobile greening systems in a public building – Dubai International Airport. In the waiting room there is a park with plants of various species, which extends over long distances with recreation areas and playgrounds for children. Such a concept creates aesthetic comfort for passengers and has a positive effect on their emotional state.

Mobile systems in industrial areas. Each production area must be separated by a sanitary protection zone from a residential one. The sanitary protection zone must perform two tasks: to protect the atmospheric air of the residential area from pollution and to protect from by emission pollution. Landscaping of the territory is necessary for absorption of industrial dust. The use of mobile greening systems in industrial buildings is justified in terms of sanitary and environmental standards.

In this way, mobile greening systems contribute to the creation of a continuous green frame that permeates the entire city.

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МОБІЛЬНІ СИСТЕМИ МІСЬКОГО ОЗЕЛЕНЕННЯ, ЯК ФАКТОР СТІЙКОГО РОЗВИТКУ (НА ПРИКЛАДІ ОДЕСИ)

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Анотація. У статті вивчені мобільні системи міського озеленення, як фактор стійкого розвитку, тому що в сучасних містах урбанізовані структури поглинають озеленення. У відповідь на висотну ущільнену забудову потрібен пошук інших форм повернення природних комплексів у структуру міста. Зростання міського населення та ущільнення міської забудови надає особливої важливості проблемі створення зон екологічного комфорту. Розвиток міста зумовлює скорочення кількості чистого повітря, води, зеленого простору та тиші, чого так не вистачає сучасній людині з її прискореним ритмом життя у містах.

В наш час проблему озеленення міських територій можна вирішувати без знесення будівель, за рахунок створення екологічно комфортних зон за допомогою систем мобільного озеленення. Мобільні системи озеленення – це озеленення міста, що реалізується за рахунок конструктивних елементів, які можуть впроваджуватися, переміщатися, а при необхідності взагалі забиратися з міської тканини.

В статті проаналізовано світовий досвід створення вертикального парку за допомогою систем мобільного озеленення. Вертикальний парк був розроблений в Нью-Йорку в архітектурній фірмі Architect EFGH Design Studio. Парк розроблено на невеликій території і його ефективне використання створюється шляхом розвитку вгору, замість площинного. Така конструкція не тільки дозволяє озеленити високо урбанізовані території міста та поліпшити екологію, але і можуть служити додатковою точкою тяжіння для туристів.

В статті наголошується, що для сталого розвитку міста Одеси необхідний єдиний ландшафтно-екологічний каркас, що зв'язувався б в єдину цілу систему міських озелених просторів. По мірі росту міста Одеси, підвищення поверховості, щільності забудови, будівництва об'єктів громадського обслуговування, особливо в центральній частині міста, гостро постає питання про збереження неперервності та рівномірності розміщення озелених просторів міста. Для створення такого екологічно стійкого зеленого каркасу міста доцільно використовувати саме системи мобільного озеленення.

Ключові слова: сталий розвиток, міське озеленення, мобільне озеленення, зелений каркас.

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