

PECULIARITIES OF THE ORGANIZATION OF HUMAN ACTIVITY IN THE ENVIRONMENT

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FORMATION OF CENTERS FOR ECOLOGY AND SUSTAINABLE DEVELOPMENT OF NATURAL RESOURCES: FOREIGN EXPERIENCE

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Introduction. It is difficult to overestimate the importance of ecology as the environment in which we all find ourselves. It is just as difficult as science, which is engaged in the study of vital questions for humanity. In the modern world, the issue of the coexistence of humanity and its surrounding ecosystem is extremely acute. It directly affects our daily life, preventing harm to the animal and plant world and the environment in general.

The creation of ecology centers of various scientific directions is extremely relevant and important. Each country, city, settlement has its own local and global environmental problems that require immediate solutions. These are air quality deterioration, water pollution, etc. If we talk about the center of ecology as an architectural and landscape object, then such an environment should be aesthetically and functionally inscribed in the urban structure, natural environment. These objects can be qualitatively integrated into different parts of the urban and suburban environment. They can act as centers of the urban composition, while being part of public territories with large park and recreation areas. The advantage of such centers is that their design takes into account the current demands of society. They use more modern technologies that are effective in fighting environmental pollution.

Such objects in themselves become a good example of solving pressing problems of today. They are the embodiment of the architecture of the 21st century with economical energy and water consumption, nature use, economical in construction and operation, friendly to the environment. So, the relevance of this research is justified:

- The need to solve today's urgent problems related to climate change, deterioration of the ecological situation, depletion of natural resources;
- The need to conduct scientific research and obtain quality results in a specially designed facility and environment;
- The possibility of implementing modern innovative technologies and techniques in the design solution, which can exist in an economical mode without harming the surrounding environment.

Aim. The purpose of this publication is to analyze the experience of forming centers of ecology and sustainable development of natural resources in foreign practice. To achieve this goal, a number of tasks have been outlined, in particular:

- To analyze the previous work of scientists on this topic;
- Identify objects of research in foreign practice;

▪ To analyze the formation of centers of ecology and sustainable development of natural resources discovered during the research.

Materials and methods. These are the methods used in this study:

1) *Historical and theoretical* – when analyzing the scientific source base of the research, the previous work of scientists in this field;

2) *Comparative and historical* – when studying the evolution of the formation of such and similar centers of ecology in world practice, substantiating the peculiarities of the formation of such an environment;

3) *Structural and functional* – when studying the functional-spatial organization of the centers, the scientific theoretical and practical processes that take place in them, the relationships between them;

4) *Empirical* – during the visual analysis of modern centers of ecology, their field survey;

5) *Experimental conceptual design* – during the implementation of a design proposal for the landscape design of the Center for Ecology and Sustainable Development of Natural Resources in the city of Poltava (Ukraine) under the guidance of the author.

The analysis of available research materials on the topic (theoretical works of scientists, information sources on the implementation of project solutions, etc.) showed their small number, the absence of theoretical materials related to the formation of specific centers of ecology and sustainable development of natural resources. Therefore, the work covered materials from the concept of sustainable development, ecological and biological issues, and landscape design. These are literary works, encyclopedic editions, textbooks, manuals, scientific articles and monographs, dissertations. The works of foreign specialists E. Schumacher, B. Gatsov and M. Gaitsova are valuable from the point of view of this study. The search for ways to solve pressing problems of ecology and global climate change is highlighted in the works of scientists from various spheres of life – ecologists, biologists, botanists, urban planners, architects, landscape architects and designers. Among the architectural community, Merilova I. [1], Holubchak K., Obynochna Z. [2], Kryvoruchko N., Timashkov M. [3], Lei Ren [4], Tatarchenko H., Dyomin M. [5]. Textbooks and works by such authors as V. Kucheryavy [6-7], N. Kryzhanovskaya [8], S. Novyts'ka [9] and author's works [10-13] are devoted to landscape issues. They highlight the planning and compositional aspects of landscape design and their constituent elements. Materials devoted to the aesthetic component of objects are valuable. The works of Osychenko H. [14], Tsigichko S. [15] and others became useful. They are important in the sense of increasing the artistic and aesthetic appeal of the studied objects. Important material is contained in Internet sources – websites of centers of ecology of sustainable development of natural resources and similar objects operating in the world [16-19].

Results and discussion. The Center for Ecology and Sustainable Development of Natural Resources is a research center that studies and protects nature and the environment. The center conducts scientific research, develops technologies and methods of conservation of natural resources, studies the impact of human activity on ecosystems and develops measures for their protection. Such a center can conduct a

variety of research, in particular, the study of biological diversity, monitoring of air, water and soil pollution, etc. They should carry out research, development and implementation of ecological technology that allows reducing the use of natural resources and waste, reducing emissions of harmful substances, preserving biodiversity and improving the quality of life of the population. Also, the centers of ecology and sustainable development should be engaged in raising the environmental awareness of the population, perform the role of scientific consultants for authorities, develop and support programs of information work and popularization of the principles of sustainable development.

These centers and similar ones appeared in many countries of the world in the second half of the 20th century. These organizations aim to develop sustainable approaches to the use of natural resources, ensuring environmental safety and preserving biodiversity. The environmental protection community developed significantly after the Second World War. At all times, ecological problems were divided into two types: environmental problems arising from natural processes and problems caused by anthropogenic factors and irrational use of nature.

The period from the beginning to the middle of the 20th century was marked by a negative anthropogenic impact on the global ecology. It is a glut of military actions, during which objects that helped the natural environment to function were destroyed or damaged. This is a lot of destruction, emissions of harmful substances that polluted water bodies and soils, all this led to changes in the ecosystem. Leading scientists understood the enormous scale of the ecological crisis. In the 1960s, social movements arose whose goal was to protect the environment. The activation of society, both ordinary citizens and specialized scientists, forced politicians to pay attention to these issues. Most of these centers were founded on the basis of higher educational institutions. In 1969, the Environmental Protection Agency was created in the United States, later Ecology Centers and similar ones appeared in many USA states, and then in European countries (Fig. 1). There are some researched facilities in the USA:

- *Global Ecology Research Center of Stanford University, 2007* (current research priorities in the field of ecology: biodiversity protection, water use and climate change, renewable energy, sustainable urban development, etc.; re-use materials were used in the construction of buildings and furniture; hydronic system for cooling the building);
- *Department of Ecology and Evolutionary Biology at Yale University* (research aimed at increasing the sustainability of the economy and reducing the impact on the environment, cooperation with scientific and public organizations on the development of innovative solutions for the preservation of natural resources and biodiversity);
- *Columbia University Center of Ecology, Evolution, and Conservation Biology* (development of innovative solutions and technologies to reduce the impact on the environment and increase sustainability, climate change issues, ecology and biodiversity conservation, cooperation with the authorities, public organizations and the business sector to develop and implement programs aimed at reducing the impact on environment and increasing sustainability).

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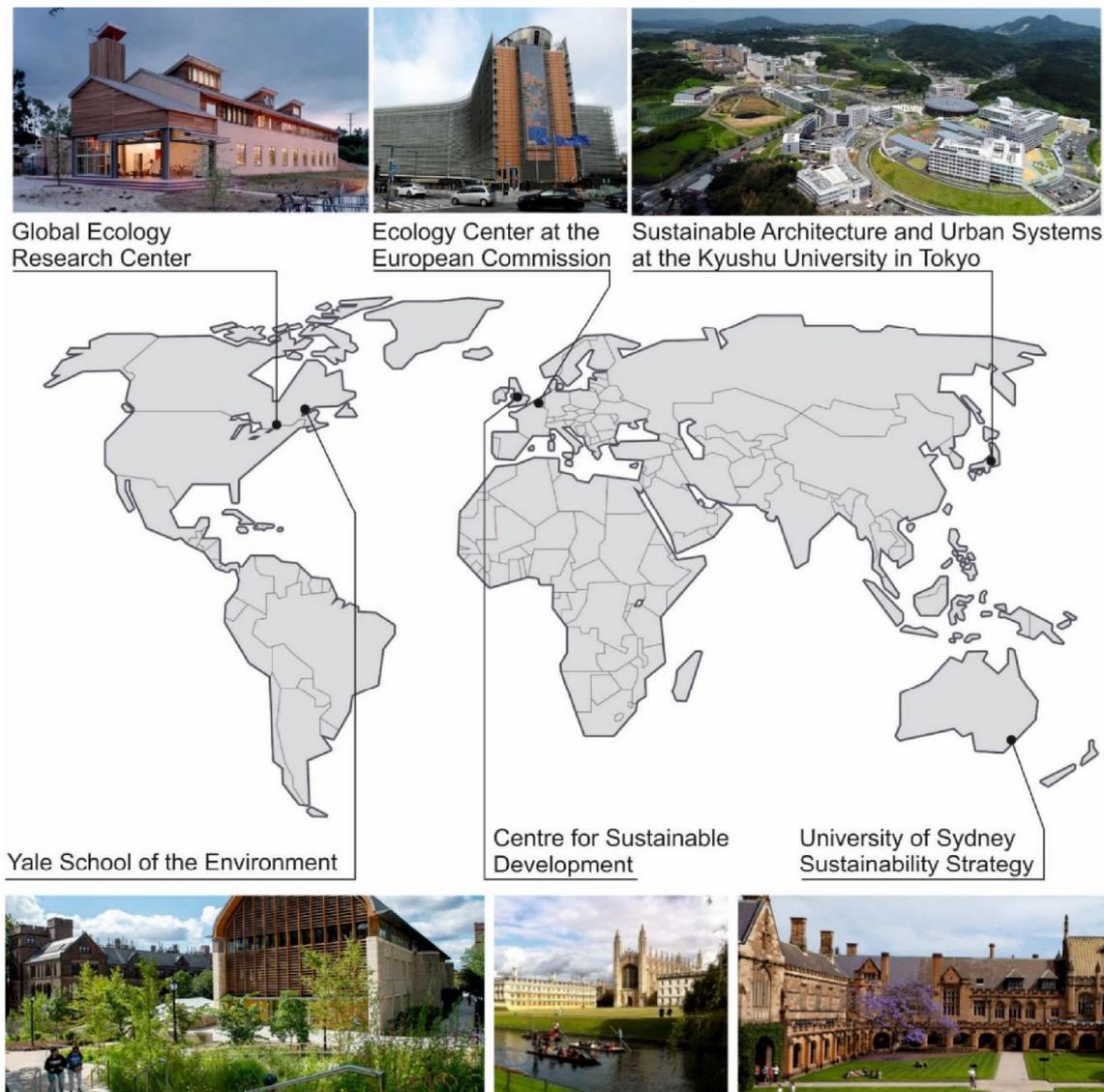


Fig. 1. Some Centers for the Ecology of Sustainable Development of Natural Resources and similar ones on the world map (author's drawing, photo from open sources)

In European countries, centers began to spread in the 1980s. In France, for example, in 1982, the Ministry of Environmental Protection and the Center for Ecology and Sustainable Development of Natural Resources were established. In Germany, there was also a need to create a similar structure, which led to the establishment in 1994 of the Federal Center for Ecology. There are some researched objects in Europe:

- *Centre for Ecology and Conservation at University of Exeter, UK* (based on the Cornish landscape, with a particular emphasis on ecology, conservation, evolution, zoology, microbiology and marine sciences);
- *Centre for Ecology, Environment and Sustainability at Bournemouth University, UK* (conducts internationally recognized research into environmental change and its impact on biodiversity, and is a leading provider of environmental education and training);
- *Federal Council for Sustainable Development (FRDO-CFDD), Belgium*

(advises the government on many aspects of sustainable development policy, offers research in all areas related to sustainable development, informs citizens, organizations and public services about sustainable development).

In the countries of Asia and the Pacific region, such centers appeared later, but their development is actively supported by international organizations, such as the United Nations and the World Bank. There are some researched facilities in Asia:

- *Toyo University's Center for Sustainable Development, Japan* (to conduct research activities by focusing on the creation of research bases and the promotion of collaboration in Japan and abroad (mainly in Asian countries); to foster the implementation of measures for the Sustainable Development Goals (SDGs) as post-MDG);

- *Centre for Sustainable Energy Development of the University of Sydney, Australia* (activities focus on clean energy technologies and their role in mitigating climate change, as well as exploring new ways to deliver sustainable energy solutions on a global scale).

The beginning of the formation of centers of ecology and sustainable development of natural resources in domestic practice was laid from the moment of the declaration of Ukraine's independence. The first such and similar centers were created within the Ministry of Environment and Natural Resources. However, after the adoption of the Law of Ukraine "On Environmental Protection" in 1991, such centers began to be formed in higher educational institutions. In 1995, the Ministry of Ecology and Natural Resources was created, within which the formation of similar centers continued. In 2006, the State Agency for Energy Efficiency and Energy Saving was established in Ukraine. The agency also deals with issues of sustainable development and environmental protection. Today, such centers operate in all regions of Ukraine. There are some examples of researched centers:

- *Vyacheslav Chornoval Institute of Sustainable Development of the Lviv Polytechnic* (research work, educational courses in the field of natural sciences, environmental safety and environmental protection activities, balanced environmental management, environmental expertise);

- *Scientific Research Laboratory of Natural Ecosystems' Protection (SRL ESP) at the Uzhgorod National University* (comprehensive study of the diversity of the flora of Zakarpattia, ecological foundations of the optimization of the nature reserve fund of Zakarpattia);

- *Institute of Energy Saving and Energy Management of the National Technical University of Ukraine "Ihor Sikorsky Kyiv Polytechnic Institute"* (development and implementation of innovative energy efficiency and energy saving technologies);

- *Nature Research Center of Podillia* (study of flora, fauna and landscapes of Podillia, systematic research expeditions and field studies of biodiversity and landscapes of Podillia and adjacent territories, organization and implementation of research work, innovative technologies in biology, ecology, geography);

- *Center for Global Sustainable Development of the Educational and Scientific Institute of International Relations* (research activities in the field of sustainable development, development of a strategy for the sustainable development of Ukraine,

dissemination of knowledge in this field, strengthening of cooperation channels within the framework of a wider partner network, development of joint research programs);

▪ *Institute of problems of Nature Use and Ecology of the National Academy of Sciences of Ukraine* (development and justification of the methodology for choosing a strategy for the sustainable development of technogenically burdened regions, the scientific foundations of the regional environmental monitoring system, the introduction of new eco-technologies of mineral extraction into production, the creation of ecological maps as a basis for systemic multi-purpose research regions).

Conclusions. So, the main goal of the centers of ecology and sustainable development of natural resources is the preservation of nature and biodiversity, popularization of knowledge about the environment, education and consultation of the population on issues of nature and environment protection. These issues are currently relevant and require new solutions and research. Centers of ecology and sustainable development of natural resources are the personification of nature, science and landscape art. This environment is aesthetically and functionally integrated into the urban structure, the natural and climatic conditions are available. The formation of the center as a center of such scientific research will be the contribution of the architectural community to the solution of the above-mentioned issues and problems.

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