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Development stages of ecological architectural and construction design in Russia

The history of environmental standards, the emergence of environmental architectural and construction design in Russia and the forerunners of environmental certification systems in construction are studied. Historical material is analysed and data is systematised chronologically.

Development stages of ecological architectural and construction design in our country are highlighted, their main features are given: Stage 1 (late 17th – mid 20th centuries) — the history of the formation of environmental requirements for the conservation of natural resources and the creation of a comfortable environment for life in urban areas; Stage 2 (mid XXth – early XXIth centuries) — the formation of environmental legislation, the opening of the first Russian Green Building councils, the adaptation of international environmental standards in construction to Russian realities; Stage 3 (the beginning of the XXIth century – the present) — the creation of sustainable requirements in the Russian Federation, increasing the viability of the architectural and construction environment, the introduction of a number of Russian environmental standards in construction, the formation of a national Technical Committee 366 to develop national standards to GOST R series on green construction and promoting green standardization at the national and international levels with the introduction of new green technologies, materials and products for a comfortable living environment.

Today in Russia, a new architectural and construction environment is emerging, aimed at saving resources, preserving health, energy conservation, reducing waste, safety, comfort, preserving biodiversity and creating holistic conditions. To intensify the development of this area, it is necessary to introduce new environmental standards for the design of sustainable space in Russian cities, using best world practice.

Keywords: *ecological construction, Green Standards, environmental standards, architectural and construction design, sustainable living environment*

In the Russian Federation, environmental regulations for the protection of natural resources began to be adopted to a greater extent in the mid-to-late 20th century, however, the stage of the formation of an ecological approach in architectural and construction design has a long history with the identification of prerequisites for its emergence [1]. The subject of study in this article is the forerunners of environmental standards and environmental standards in construction, as well as the formation of environmental aspects of design in Russia.

People have since ancient times intuitively adapted to natural conditions, carefully selecting sites, using materials at hand for construction, and making their homes compact. In those distant times, there was almost no harm from such human activity to nature [1].

With the development of settlements and the strengthening of the city walls, the built-up areas moved increasingly away from nature, the first environmental problems appeared related to unsanitary conditions, over-density of urban development and the lack of open green areas, Fig. 1.

The rudiments of the first norms on the conservation of natural resources appeared in the territory of Ancient Rus¹. Pressure on natural ecosystems was not felt in the XI–XVI centuries, accordingly there were no special state measures for nature's protection at that time [1].

A common type of dwelling in Russia was a wooden hut with a transitional buffer space in the

form of a canopy, which was originally placed on a "stage" for warmth. A person could assemble a hut without a single nail, disassemble it and transport it to another place. The structure was always scaled to the size of the human body. Consistency with natural phenomena was at the heart of everyday issues and construction processes of that time [2].

The characteristic features of the design of ancient Russian cities include: the choice of a secure site for construction; picturesque territory; fortifications around the city; lack of a clearly defined regular building structure; use of the landscape within the buildings' hierarchy; complex versatility of the urban silhouette; wooden planks used for paving paths, riverbanks and bridges [3].

The first significant measures for the rational use of natural resources were carried out by Peter the Great². He adopted many decrees for the protection of natural resources, evolving towards the all-Russian standards for the protection of nature [4]. Subsequently, the number of legislative acts in this area increased — in 1725–1801, over 140 laws were issued, and during the 60 years of the 19th century — about 300 [5, p. 196]. At the beginning of the 19th century, under Alexander I, the Forest Code (1802) was introduced, Nicholas I finalized the Forest Code by adopting new resolutions. In the second half of the 19th century, under Alexander II, the section on City Status (1870) provides for a number of requirements for creating favourable urban conditions.

¹ The collection "Russkaya Pravda", introduced in the 11th century by the Kyivian prince Yaroslav the Wise, established the rules to regulate hunting and foraging.

² Under Peter Great, over 60 decrees were adopted regulating the use of natural resources in the country.

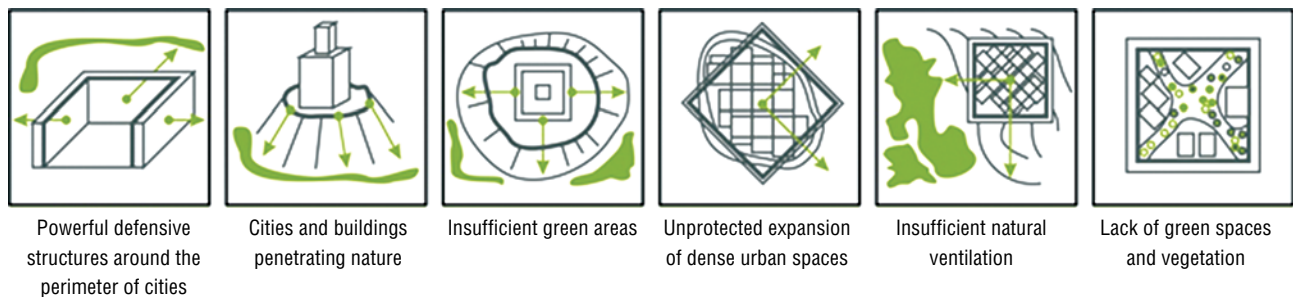


Fig. 1. First Eco Problems of Architectural Design

At the beginning of the 20th century, a number of projects were completed that reflected the environmental problems of cities at that time. Especially significant are the projects of the green cities of Ladovsky N., Barshch M., Ginzburg M. The increasing rates of urbanization and industrial production contributed to the development of a deteriorating architectural and construction environment. Since the 1920s, urban growth and the formation of industrial centers became the main socio-economic priority. Soviet cities were not balanced in terms of ecological balance, there was an increased rate of urbanization, typification of architectural solutions, geometric plans.

Researchers during the period 1917–1950 determined the traditional attitude to protect natural resources by creating natural parks and complexes in the USSR, the science of nature conservation begins to emerge, supported by legislative acts. In the 1960s and 1980s, the Soviet Union adopted a number of forest, land and water codes, which contributed to the development and formation of environmental legislation³.

Since 1990, there has been a special awareness of the importance and scale of many environmental problems and the global goals of sustainable development [6–9].

Evidence of environmental friendliness and energy efficiency of buildings are witnessed at the turn of the XXI century, as the first Green Building standards in construction are developed [10–13].

In Russia, the architectural space began to change since 2008 — as environmentally certified construction projects appear using the British BREEAM standard [14, 15], Fig. 2.

³ History of environmental regulation. URL: http://otherreferats.allbest.ru/ecology/00040234_1.html

International obligations determined the choice of sustainable construction requirements and environmental solutions for sports facilities of the Olympic Games in Sochi 2014.

The first documentation was produced by (the Olympic delivery body) State Company “Olympstroy” called “Additional environmental requirements and recommendations, DETiR”, for the construction of large-scale Olympic facilities [16, p. 61].

In 2009, the Russian Green Building Council — RuGBC was created, adapting English BREEAM and American LEED to Russian realities. In 2010, by the initiative of the Union of Architects of Russia, the “Council for Green Construction – NP SPSS” was formed.

In 2011, NP SPZS, taking as a basis the requirements of the German standard DGNB, introduces an eco-standard for low-rise buildings NP-SPZS 1.1.M–2011.

At the same time, in 2011, NP ABOK, NP NOSTROY, OJSC Ts-NIIPromzdaniy and LLC NPO TERMEK developed STO NOSTROY 2.35.4–2011 “Green Construction”. Residential and public buildings. The rating system for assessing the sustainability of the built environment.

In 2014, the Russian guild of managers and developers becomes the main initiator of the creation of the GREEN ZOOM system “Practical recommendations for reducing energy consumption and improving the environmental friendliness of civil and industrial construction projects”.

In 2016, The Technical Committee 366 Green technologies of the living environment and “green” innovative products (TC 366) was formed under Rosstandart to create a system of standards that introduce green technologies into the living environment [17, p. 369].



a



b

Fig. 2. The first BREEAM eco-certified buildings in Russia: a — Business center “Japanese House”; b — Ducat Place III office building

As a result of long-term work, the employees of NRU MGSU developed the first national Green Standards, approved by the Orders of Rosstandart on January 15, 2019:

- Green Standards. Green technologies of the living environment and "green" innovative products. Terms and Definitions;
- Green Standards. Green technologies of the living environment. Classification;
- Green Standards. Green technologies of the living environment. Assignment criteria;
- Green Standards. Green technologies of the living environment. Assessment of compliance with the requirements of green standards. General provisions.

SUMMARY

Analysis of ecological architectural and construction design in Russia in the late 17th – early 21st centuries. Allowed us to distinguish three stages:

Stage 1 (late 17th – mid 20th centuries): the history of the emergence of environmental law is characterized by the formation, in human understanding, of the need to protect natural resources and the inclusion of green spaces in urbanized structures of the city to protect against adverse factors.

Stage 2 (mid XX – early XXI centuries): the formation of environmental legislation and the creation of the first Russian Green Building councils, the adaptation of foreign environmental standards in construction is characterized by the most intense environmental pollution, an active policy in the field of energy conservation and the introduction of eco-methodologies.

Stage 3 (the beginning of the XXI century – the present): the creation of sustainability requirements in the Russian Federation that raise the environmental friendliness of buildings and urban spaces, the introduction of Russian environmental standards, the creation of a national TC 366 for the development of (state standards) GOSTs for green construction.

Throughout the history of the formation of ecological architectural and urban planning, the foundations were born for creating comfortable living conditions. Even in the methods of organizing the first settlements, some eco-aspects of design can be distinguished. In the 21st century, the rapid development of technologies and information processes should not ignore environmentally friendly methods of architectural and construction design, laid down in ancient times. Therefore, the national standards developed in TC 366 are expected to be in high demand.

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Этапы развития экологического архитектурно-строительного проектирования в России

Рассмотрены история экологических нормативов, зарождение экологического архитектурно-строительного проектирования в России и предтечей систем экологической сертификации в строительстве. Проведен анализ исторического материала, в хронологической последовательности систематизированы данные об особенностях взаимоотношения человека и природы, ограничения использования природных ресурсов

и проектирования зданий и городов в гармонии с окружающей средой.

Выделены этапы развития экологического архитектурно-строительного проектирования в нашей стране, приведены их основные характеристики: 1 этап (конец XVII – середина XX в.) — история формирования экологических требований относительно сбережения природных ресурсов и создания комфортной среды для жизни в городских кварталах; 2 этап (середина XX – начало XXI в.) — становление экологического законодательства, открытие первых российских экологических советов, адаптация международных экологических стан-

дартов в строительстве к российским реалиям; 3 этап (начало XXI в. — настоящее время) — создание в Российской Федерации устойчивых требований, повышающих жизнеспособность архитектурно-строительной среды, введение ряда российских экологических стандартов в строительстве, формирование национального Технического комитета 366 для разработки национальных стандартов серии ГОСТ Р по экологическому строительству и продвижению «зеленой» стандартизации на национальном и международном уровнях с использованием новых зеленых технологий, материалов и продукции для комфортной среды жизнедеятельности.

Сегодня в России происходит зарождение новой архитектурно-строительной среды, направленной на экономию ресурсов, сбережение здоровья граждан страны, энергосбережение, безопасность, комфорт, сохранение биоразнообразия и формирование гармоничных условий. Для повышения интенсивности развития данного направления необходимо внедрение новых экологических нормативов для проектирования устойчивого пространства в российских городах с учетом лучшей мировой практики.

Ключевые слова: экологическое строительство, зеленые стандарты, экологические нормативы, архитектурно-строительное проектирование, устойчивая среда жизнедеятельности

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