

Prospects for the Development of Low-rise Buildings in Conjunction with the Landscape

Zoya Petrova

Federal State Institution "Central Research and Design Institute of the Ministry of Construction and the Russian Housing and Communal Services"
 Moscow, Russia
 E- mail: petrovaz777@mail.ru

Abstract—The relevance of the topic lies in the fact that due to the economic, environmental and aesthetic benefits, mass low-rise construction in all regions of Russia is one of the priorities of state policy. National wealth, including landscapes and waters, should be preserved and used. It is necessary to revive small and medium-sized cities, which carry the main genetic stock of the country's culture. Low-rise construction opens up broad prospects for socio-economic development by creating jobs, increasing the current level of environmental comfort, improving environmental performance, and relative cheapness compared to the construction of multi-storey buildings. The territories allocated for low-rise buildings are based on consideration of ecological-geographical, medical-hygienic, landscape-planning and historical-cultural factors. Low-rise buildings exert extensive loads on the natural complex and do not cause irreversible changes.

Keywords—*low-rise buildings; settlement system; landscapes; ecology; environmental comfort*

I. INTRODUCTION

Mass low-rise housing construction in all regions of Russia, due to its economic, environmental and aesthetic benefits, is one of the main priorities of the state policy in the field of urban planning. It is aimed at the integrated development of territories, due to the presence of large spaces of undeveloped territories. According to forecasts of the Government of Russia, the share of housing of this type by 2020 will exceed 70%.

The goal of the new strategy should not be to focus on the development of large 15–20 cities-agglomerations, but to update the urban planning system of the whole country. The enlargement of agglomeration cities, respectively, an increase in population density makes their inhabitants vulnerable in the face of various threats: mass epidemics and terrorist attacks, enemy attacks and others. Today, the revival of small and medium-sized cities, rural settlements, representing historically established settlement systems with large and large cities, is becoming important. Historical small and medium-sized cities, rural settlements carry the main genetic stock of the country's culture. For the country, the problems of modernization / development of social, engineering and transport infrastructure, preservation and

use of national wealth, including landscapes and water areas, remain relevant.

II. THE PERCEPTION OF BLINDNESS

Industrial low-rise construction is an effective tool for regional development. Low-rise housing construction opens up broad prospects for socio-economic development. It provides the development of the construction industry, the market of building materials and specialized services, as well as the creation of jobs.

The indisputable advantages of industrial low-rise housing in all forms of its manifestation are: the modern level of living comfort, environmental characteristics, relative cheapness compared to the construction of multi-storey buildings, the accelerated pace of construction, the variety of design solutions and materials of local production.

Today, the housing problem in Russia remains the main one: 45% of families want to improve their living conditions. To solve the housing problem is required to build 1.4 billion square meters housing [1]. The volume of housing construction in 2018 amounted to 75 million square meters, which is less than the planned volume of 120 million square meters. According to the calculations of scientists to solve the housing problem in the country it is necessary to build at least 200 million square meters annually meters of housing. For this, it is necessary to develop low-rise (one-four-story) construction mainly on an industrial basis, since it is characterized by the highest rates of construction [2].

Total low-rise housing in the country, including rural housing, is approximately 32% of the total existing housing of different heights. Studies have allowed to establish: in 2015, the share of commissioning the total area of individual housing completed by construction in Russia as a whole was 40.9%; the share of low-rise housing construction will be maintained in the Central Federal District at the level of 40-43% due to incentive measures for the allocation of land and the provision of housing infrastructure. At the same time, among the low-rise newly built houses are dominated by their own individual houses, including summer houses and garden houses, and not industrial mass houses [3].

The average housing supply in the country today is 24.9 \approx 25 square meters per person. But this averaged figure does not give a clear picture of the situation, since for ten million families it does not exceed 15 square meters per resident. In terms of housing security, Norway and the USA are leading with a level of almost 70 square meters. In Germany and France, it is 40-45 square meters (according to different methods of calculation), in Finland - 37 square meters [4].

III. TECHNICAL ASPECTS

The Council of Ministers of Norway in 1972, it was decided to develop the construction of low-rise buildings, not high-rise buildings. Instead of cramped concrete multi-storey buildings, it was proposed to focus the main efforts on the construction of private houses and townhouses ("Fig. 1"). The benefit of this approach to housing construction is that the private house does not require the construction of huge thermal power plants, as well as the construction of centralized energy supply networks. This became a nationwide approach to solving the housing problem by developing low-rise housing construction and providing the entire population with modern comfortable housing with the same average level [5].



Fig. 1. An example of a Norwegian house.

^a ["Houses in Norway" ... <https://yandex.com/collections/card/596cbd6b8cb1f77cf389655d/?torec=1>]

In Norway, it is not customary to stand out among the citizens of the country with housing with a high level of comfort. "House in Norwegian" means the opportunity to live in your own home in the maximum unity with nature, but also to enjoy all the benefits of civilization. If the Norwegian homeowner has a large income, he would prefer to invest in a design project of a modern and stylish home ("Fig. 2") [6].



Fig. 2. Villa Storingavika (Villa Storingavika) in Bergen, Norway. Saunders Architecture.

^a [Villa on the coast in Norway. Blog "Private Architecture" <http://www.magazindomov.ru/2012/05/10/villa-na-beregu-v-norvegii/>]

Low-rise construction most fully meets the criteria of accessibility and comfort. The requirements for reducing environmental pollution and preserving natural resources, as well as the progressive growth of energy consumption and prices for hydrocarbon raw materials put a number of tasks on the position of priority breakthrough directions. Their solutions are associated with the formation of low-rise, innovative, life-sustaining buildings — energy-efficient, resource-saving and low-waste technologies, comfortable residential buildings [7], [8].

Russia has almost a quarter of the world's forest reserves (22%). Historically, the tree was the traditional and main building material in Russia. However, the share of wood processing products in one square meter of residential houses under construction in modern Russia is no more than 3-4%. Wood is the most environmentally friendly building material and relatively renewable natural resource. A wooden house is the healthiest dwelling ("Fig. 3"). Costs, including energy consumption, for the construction of a residential house from prefabricated wall wood panels are about a third less than the construction of a similar house in the traditional way [9].



Fig. 3. Wooden single-family house made of round logs in Russia.

^a ["Okvil" - Wooden houses - DrevGrad@ <https://www.derev-grad.ru/2812-okvill.html>]

It is necessary to preserve and use national wealth, including, landscapes and water areas, the mineral resource base; small and medium-sized cities, as they carry the main economic potential and genetic stock of our culture [10]. The existing historical system of settlements is a great value, the national cultural heritage of our country.

Small cities are valuable as keepers of the historical roots of Russia, the original culture, identity and traditions of the peoples inhabiting it. The use of low-rise buildings in historic small and medium-sized cities contributes to the preservation of historical and architectural heritage, including architectural monuments, the historical urban environment [11]. Such building is best adapted to the historical-architectural and natural environment ("Fig. 4").



Fig. 4. The city of Yuryev-Polsky. Vladimir region. Top view of the building.

^{a.} [Sights of Yuryev-Polsky: St. George's Cathedral | Vladimirsky Krai <http://photobook33.ru/yurev-polskij/dostoprimechatelnosti-yurev-polskogo-georgievskij-sobor.html>]

IV. CLASSROOM MANAGEMENT STRATEGIES

Prospects for the development of urban planning in Russia are associated with the further use of low-rise buildings, the improvement of planning and architectural techniques. In the near future in Russia, the construction of low-rise buildings, mainly with housing for the most massive category of people — with medium and low incomes, will contribute to improving the quality of life.

Small historical cities act as supporting centers of local systems of settlement and the cores of the economic, demographic, social, and cultural culture of the surrounding area, the material and spatial environment of the population. Considering that small and medium-sized cities as well as large cities have important geopolitical importance for the country, ensuring the territorial and socio-economic unity and integrity of Russia, its national security, it is necessary to preserve and develop them. It is advisable to build them up with low-rise life-supporting residential buildings erected on the basis of the base of low-rise industrial housing, including wooden housing.

Landscape architecture as an open space architecture refers to urban planning, as its goal is to create a favorable external environment for the livelihoods and recreation of the population in cities, suburban areas and rural areas, taking into account natural-ecological, functional and aesthetic requirements. Landscape architecture has historically emerged at the junction of landscape art and modern urban planning. It is an integral part of the cultural landscape and includes elements of the natural landscape: the relief of the earth's surface, vegetation cover, and water areas. The tasks of landscape architecture include the design of parks ("Fig. 5"), gardens, squares, forest parks, recreational areas for mass recreation, landscaping and external improvement of residential, public and industrial areas, areas of transport and agricultural facilities.



Fig. 5. Park Paradise or Aivazovsky. Fragment. Village Partenit, Crimea.

^{a.} [Aivazovsky Park in Crimea: photos, history, how to get there <https://krym-portal.ru/dostoprimechatelnosti/park-aivazovskogo-v-partenite/>]

In modern conditions, landscape planning of urban areas with low-rise buildings should focus on ensuring environmental safety and minimizing environmental risks, comfortable living and public health.

It is proposed to use unified methods aimed at taking into account the regional and sectoral specificity of the territorial structure of cities and rural settlements in the formation of the cultural landscape. Comprehensive assessment of the territory allocated for low-rise buildings in the city is based on consideration of ecological-geographical, medical-hygienic, landscape-planning and historical-cultural factors. At the same time it is necessary to solve the following tasks:

- Search and justification of indicators for assessing the environmental situation in the city for the development of environmental policies, concerted measures to address environmental, social and economic problems;
- Optimization of the structure and functions of urban space using landscape planning methods to achieve

environmental friendliness, comfort, economy and aesthetics;

- Organization of the system of preserving the natural and historical-cultural heritage in cities and rural areas; planning and organization of specially protected natural areas (PAs) and recreational areas to preserve the functions of nature conservation, living comfort and public health;
- Development of functional zones of cities and suburban spaces, rural settlements based on innovative technologies of landscape planning and ecological urbanism ("green urbanism").

It is necessary to make the natural landscape accessible to everyone. To bring parks, forests and farmlands closer to all citizens, an integrated network of ecological frameworks throughout the settlement and natural spaces should be created. Large green areas in the planning structure of the settlement should be connected with each other and then with the surrounding natural landscape. In the district and city planning, cities should be surrounded by protective forest-park areas.

V. CONCLUSION

Today, natural, ecological, historical and cultural factors, which to a large extent affect the quality of habitat, are among the most important elements for organizing comfortable spaces of urban and rural settlements. Taking them into account in combination with socio-economic and engineering-technological factors will allow you to create a full-fledged living environment.

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