Economic Aspects of the Development Processes of Urbanized Territories

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Abstract. The article is devoted consideration of the processes of ecologization of urbanized territories. The author notes that urbanization has caused many environmental problems, among which the vulnerability of urban systems and the low level of environmental quality can be noted. In the modern Russian Federation, 75% of the total population of the country lives in urban areas. The features of the development of modern urbanized territories, leading to environmental pollution and further degradation, are highlighted. Improving the system of green spaces, based on urban zoning, soil conditions, climatic features, can significantly improve the ecological situation in the urban environment. It is noted that urban ecology leads to an increase in the quality of life of the population living in these territories through the greening of urban landscapes, approaching the natural environment, phytomelioration, and the formation of an attractive image of the city. Some physiological and ecological features of green spaces, which determine their important role in the greening of urban areas, have been studied. Plant species that are most suitable for landscaping urban areas in modern conditions are proposed. It is also noted that the growth of the ecological and economic competitiveness of the territory based on the use of an environmentally sound approach in the creation and operation of urban green spaces can cause an increase in revenues to the municipal budget.

1 Introduction

Issues related to the sustainable development of urban areas are among the most relevant for the modern technogenic society. Due to the sustainable development of territories, it is possible to achieve significant increase in productivity and the standard of living of society while minimizing the existing environmental risks for the environment and public health. One of the factors of such development can be considered the greening of urban landscapes, the creation of a comfortable living environment for citizens. Since 1972, within the framework of UNESCO, all cities in the world have been considered as ecosystems, which are collections of interconnected natural elements, which include various living organisms and man-made objects. This approach indicates the need for the

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formation of wildlife zones in urban areas along with the development of production technologies and their monitoring [1].

2 Research Methodology

In the course of this scientific study on the development processes of modern urbanized territories, the works of famous Russian scientists devoted to the study of the features and problems of the development of urbanized territories were used.

According to the Concept of the country’s transition to sustainable development of 1996, priority measures are identified that are aimed at protecting the environment and its development. Much attention is paid to the sanitary cleaning of urban areas and land reclamation.

In his work on the ecology of the city, Kasimov N.S. notes the need for the development of wildlife zones and their monitoring in urban areas.

Tetior A.N. considers the development of architectural and spatial planning of cities, the implementation of the protection of urban and suburban green areas, the conservation of environmental biodiversity, etc. as the main principles of sustainable development of settlements.

Kovalenko P.P. in his research, he also explores the features of climate formation in urban areas, the reasons for this specificity, noting the higher temperature of urban air and its dryness.

Pivkin V.M. also indicates the specificity of the processes of urban air formation, in particular, the formation of “urban breezes”, indicates a significant difference between the urban climate and the climate of other territories.

Vladimirov V.V. in his research, he claims the impossibility of achieving sustainable development of the urbanized environment without achieving an ecological balance between urban subsystems, also notes the need to use complex and highly productive biogeocenoses that are more resistant to negative environmental factors, to achieve diversity and mosaic of urban landscapes, etc.

Gamalei A.A. proposes, as one of the options for greening, the creation of a landscape-ecological framework, which singled out landscape-planning ecological modules with continuous greening of spaces in urban areas.

Pertsik E.N. believes that in the study of the processes of sustainable development of cities, their economic and geographical position should be given great importance, since it is a kind of “spring” for the development of the potential of an urban settlement in a certain territory.

Frolov A.K. identifies a number of reasons for the depletion of urban soils in organic matter, among which one can note the lack of litter and ground cover due to trampling and the annual cleaning of fallen leaves from green urban areas, etc.

Gonchar A.A. notes the high phytoncidal properties of coniferous plants, due to which, with the same density of tree crowns, the number of pathogenic bacteria in a pine forest is two times less compared to deciduous.

Belov S.V. considers air ionization among the important reasons for the beneficial effects of plants on human well-being.

The level of dust in cities, as noted by Beryushev K.G., in the summer can be reduced by 30-40% due to the influence of plants.

Bessmolnaya M.Ya. and a number of other well-known Russian scientists consider the leveling of the negative anthropogenic impact and the most complete disclosure of the ecological and natural potential of the urban environment to be the key task of “green infrastructure”. The most important factor contributing to the growth of the quality of life of
the urban population is, in their opinion, the scientifically based landscaping of the urban environment, which in the future leads to an increase in economic efficiency.

In this work, such scientific methods as statistical analysis, comparative analysis, functional analysis, positive and normative analysis were used. The scientific research was carried out in accordance with the problem-chronological principle, the principles of consistency and scientific objectivity.

3 Results and Discussions

In modern times, cities account for a significant part of the total population of the world. The twentieth century is characterized by the emergence of a large number of different cities in the form of both small urban-type settlements and giant megacities. According to UN experts, the urban population at the turn of the 20th-21st centuries should have been equal in number to the rural population. Today, in the Russian Federation, urban areas account for 75% of the total population of the country.

With its development, urbanization changes the landscape, land and water resources, and waste polluting natural ecosystems arises in massive quantities. Urbanization has become the cause of many modern environmental problems, especially topical among which are the low quality of the habitat, the vulnerability of urban systems, which increase the processes of migration and concentration of the population, the presence of various types of waste, and the reduction of fertile land. The further development of all mankind depends to a greater extent on whether it is possible to transform urban areas into areas of sustainable development. Cities, concentrating in themselves scientific, educational, technical and cultural activities, at the same time are environmental pollutants, leading to its degradation, since they account for the bulk of industrial enterprises, landfills, etc.

In cities, due to the radiation of some of its territories and the presence of power plants, “heat islands” arise, while technical heat in quantity can be at least half of solar radiation. This leads to an increase in urban air temperature, which can be 7–15 °C higher than in the suburbs. In winter, there is also more precipitation here - by 50% than in the suburbs, the reason for which is the presence of aerosols in the air, and in summer precipitation is 15% more. Artificial coatings, occupying up to 50% of the territory of the city, make the surface runoff of atmospheric precipitation several times higher. City air is also more dry - by 5–10% on average, with humidity up to 30–40% in summer; more often - 1.5–2 times in industrial cities than in suburban areas and fogs. [2] In urban areas, “urban breezes” are also observed, as there are differences in air temperature in cities and suburbs. “City breezes” in the form of fairly constant air movements, in turn, are the reason for the thermal “hood” over the city in calm weather. Often, a “thermal cap” is polluted air that gathers in the central part from the urban periphery, where industrial companies operate. [3]

Only when there is an ecological balance between the urban subsystems, in which the natural environment of the area self-regulates; its protection is taking place and its soil and vegetation cover, atmospheric air, water resources and wildlife are being restored, we can talk about the sustainable development of the urbanized environment. [4] “Ecological” reconstruction of settlements, aimed at the organic entry of the city into the surrounding biosphere, in the form of its friendly component, acting as an ecologically favorable environment for humans without harmful effects on the ecosystem, can be a solution to this problem.

In cities, natural elements should create a natural complex, which gives them greater stability both in time and space, better resist possible deformations. In settlements and cities, where there is a significant concentration of people and households, such important features of the ecosystem for humans as the availability of natural recreation areas, the purity of the atmosphere, the aesthetic properties of landscapes, etc. are lost or undergo
significant degradation. Improving the system of green spaces can significantly improve the ecological situation in the urban environment. Landscaping should be carried out taking into account such parameters as urban zoning, soil conditions, and climatic features. It is necessary to develop “green infrastructure”, competently combine natural urban phytocenoses with artificial green spaces. It is important to form a landscaping system so that it performs all the basic ecological functions. In addition to the environmental component, landscaping forms the image of the city, is responsible for its aesthetic perception, and provides emotional and psychological comfort.

Urban green spaces provide important ecosystem services. Green spaces act as a social stabilizing factor, which manifests itself in providing citizens with affordable recreation, significantly reducing conflict and tension in the environment. The key task of “green infrastructure” is to level the negative anthropogenic impact and maximize the full disclosure of the ecological, natural potential of the urban environment. Science-based greening of the urban environment is the most important factor in improving the quality of life in the city.

The application of ecosystem approaches and investment in the development of the “green infrastructure” of the city in the future will be expressed in economic efficiency. The group of indicators of sustainable development of urbanization centers includes indicators of urban greening. Today, the most important factor for the sustainable development of the urban environment is the formation of new approaches and the improvement of environmental aspects in the development of a system of landscaping in settlements that meets modern requirements.

Russia’s transition to sustainable development implies, as priority environmental measures, sanitary cleaning of urban and suburban areas, as well as other settlements, their greening and improvement, and land reclamation. According to experts, the greening of an existing urban area or part of it is easier and more expedient than the creation of a new ecovillage.

In the field of urban ecology, the main ecological task is the formation of “good” biogeocenoses, i.e. such landscapes, which in the conditions of urbanization would have increased resistance to the anthropogenic impact of the environment. To do this, it is necessary to use complex and highly productive biogeocenoses with high resistance to the effects of negative environmental factors, which make it possible to achieve a variety of urban landscapes, to make the right choice of plants for landscaping.

The landscape-ecological frame, dividing the urbanized areas into constantly planted landscape-planning ecological modules, is one of the types of such ecologization. The presence of complexity and diversity in the structure of artificial biogeocenoses in their modeling allows us to have such qualities as productivity and resistance to anthropogenic impact from the environment.

Of great importance in the sustainable development of cities is their economic and geographical position as a kind of “spring” deployment in a given geographical point of the potential of an urban settlement. The natural complex of the city, where the main role is assigned to urban green spaces that perform important ecological functions, is an important part of this potential. The physiological, morphological and ecological specificity of green spaces is the reason for their high sanitary and environmental efficiency in the implementation of the greening of urbanized lands. Plants, accumulating in the tissues of the leaves part of the gases such as sulfur compounds, heavy metals, etc. from the environment, reduce the level of pollution in cities. Thus, plants can absorb on average up to 50-60% of toxic gases from atmospheric air. To a greater extent, the gas-protective role of plants is determined by the gas resistance of the elements and rocks of landscaping. Plants also emit oxygen, while absorbing carbon dioxide, reduce bacterial air pollution due to phytoncide. During a day of average size, a tree provides up to three people with oxygen.
for breathing, while a forest in one hectare can absorb up to 220–280 kg of carbon dioxide and give up to 150–220 kg of oxygen needed for breathing by 40–50 people at the same time. In the process of formation of 1 ton of organic mass, 1.3-1.5 tons of oxygen is released. The foliage surface of 1 m² during the growing season can give oxygen in such quantities: lilac - 1.1 kg; 1.0 kg - aspen; pine - 0.81 kg; 0.62 kg - maple. More than 500 species of volatile trees and shrubs are capable of destroying bacteria dangerous to humans or preventing their development. Thus, a hectare of juniper can disinfect the air throughout a small town. [11] Coniferous plants are especially distinguished by their phytoncidal properties, so in a pine forest there are two times less pathogenic bacteria than in a deciduous forest with the same crown density. [12, p. 84]

Also, to a large extent, many woody plants improve the ionic composition of the air, increasing the amount of negatively charged light ions in the surrounding atmosphere, thereby playing an important role in geosanitary terms. For 1 cm³ of air in industrial cities and crowded premises, the average number of light ions can be 100–500 pieces, while the minimum limit of light negative ions per 1 cm³ of air is considered to be 25. At the same time, the number of light negative ions per 1 cm³ of forest atmosphere can reach up to 2-3 thousand pieces. Resinous substances released by woody plants and various natural processes affect the ionization of air. Air ionization has a beneficial effect on a person’s well-being. [13, p. 65] Mixed plantings and mature pine forests best ionize the air.

The physicochemical ability of the surface of plant leaves and their branches to trap and deposit dust particles leads to a significant reduction in the amount of dust in the atmosphere, which plants can do even in the absence of leaves. During the year, coniferous plantations can retain about 40 t/ha of dust, up to 100 t/ha - deciduous. Plants have different dust-collecting properties, for example, in elm, the dust content of the leaf surface is 3.4 g/m²; in Hungarian lilac, it reaches 1.6 g/m²; 1.0 g/m² - in ash-leaved maple; 0.6 g/m² has laurel poplar. The ability to retain dust is determined by the texture of the leaf blade. So, due to the roughness of the leaves, elm can retain dust six times more than poplar, whose leaves are smooth. Resinous needles with sticky leaves at the beginning of the growing season have high dust-collecting properties, which then begin to decline [19].

Lawns also retain dust well: a lawn with an area of 1 m² and a height of 10 cm has up to 20 m² of leaf surface. Compared to unvegetated soil, grass cover can deposit 3–6 times more dust and ten times more than wood. Due to plants, the level of dust in cities in the summer can be reduced to 30-40%. [14, p. 567-593]

In general, green spaces can be considered not only as a natural resource that creates favorable living conditions for citizens and improves its quality, but also as an economic resource, allowing to increase the attractiveness of the territory and giving, if used correctly, additional funds to the municipal budget [16].

For city streets for the purpose of their landscaping, the most suitable may be such as Siberian larch, warty birch, fragrant and balsamic poplar, squat ligature. As additional for such purposes, you can offer berry and Chinese apple trees, Siberian spruce, Maca bird cherry, Siberian mountain ash, Ussuri pear. Also, hawthorn, golden currant, white deren, pinnately branched elm (bush form), brilliant cotoneaster, Hungarian lilac are suitable for landscaping city streets as shrubs. Among shrubs, as additional plants for landscaping, one can point to the wrinkled and Dahurian rose, Amur and Siberian barberry, golden and Tatar honeysuckle, and silver sucker. Due to the fact that the yellow acacia is not decorative, it is not advisable to use it when planting on the streets. [15, p. 72]

Plants classified as sanitary-protective plantings for special purposes play an important role in reducing the harmful effects of industrial emissions. In cities, vertical gardening of buildings, retaining walls, blind fences, etc. tree vines do well [17]. Climbing plants, decorating the deaf ends of buildings, also protect buildings from overheating and dust, dampness and noise in the premises become less. Due to the leaves of the creeper, it is able
to reduce the thermal radiation from the walls by 50%, which reduces the air temperature around and inside buildings. Covering window openings, balconies and loggias with their foliage, creepers reduce the air temperature in rooms by 2–3 °C and increase its humidity, and this improves living conditions for people in them.

Climbing plants can beautifully decorate any fence. Most fences of climbing vines such as garlands are applicable in gardens, parks, boulevards and squares. Creepers also showed themselves well when landscaping lighting matches with a cable connection to the mains. One plant can vertically green an entire light tower [18]. Applicable are the climbing plants that create beautiful column-shaped “living” structures, which in the future will completely cover the mast. Since tree-like vines have a rapid annual growth - from 2.5 to 4.5 m, they need to be cut often for the desired shape. [15, p. 74-75]

Flower gardens for lawns need to be formed at a lower cost, but achieving a beautiful design, for which decorative vases, sculptures, beautifully flowering shrubs, climbing plants, sand, stone, etc. can be used. According to urban greening practice, it is more correct to combine perennials with annuals in flower beds, when 80% of the flower garden is perennial and biennial, and 20% are annual flowers. This composition of the flower garden is determined not only decorative qualities of perennials, but also their cost advantages. Thus, flower beds from perennial plants are both durable and more profitable, despite the high costs of creating it than for an annual one, since the operation and sale of planting material not only pays off costs, but also provides a good income [15, 75-76].

4 Conclusions

The economic role played by green areas is to increase the quality of life and health of the population by improving the conditions of sanitary and hygienic and recreational nature, as well as in the formation of landscapes with aesthetic appeal. An increase in the efficiency of the use and preservation of green spaces, an increase in the level of competitiveness of both individual urban areas and the entire urbanized ecosystem leads to the implementation of accounting for the environmental and economic value of the natural frame of the territories of settlements.

Today, the competitiveness of goods and services is also affected by the consumer properties of a green area, thus determining the possibility, with an increase in the standard of living of the population, to forecast growth in demand for areas that are environmentally clean. By increasing the environmental and economic competitiveness of the territory, an environmentally sound approach to the creation and operation of urban green spaces can provide the municipal budget with additional revenues.

References

3. V. V. Vladimirov, *Settlement and the environment*, 228 (1982).