

# Urban public space design as a driver of sustainable development and the formation of an environmental culture of city residents

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**Abstract.** Design plays an important role in ensuring the sustainable development of cities along with economic, social, and technological means. The article is devoted to the design of the city's public space as an important tool for the formation of ecological culture and an ecological model of human behavior. The organic incorporation of natural objects into the urban environment promotes communication with nature, improves people's physical and mental health. The layout of the landscape, the visual appearance and the layout of public spaces influence the behavior and aesthetic taste of citizens, their attitude to nature. The author systematizes the means and methods of design, the qualities and functions of design objects that harmonize the urban environment and form an ecological culture, motivating residents to an ecological lifestyle. The author analyzes the principles of landscape urbanism and participatory design, justifies the need for community participation in the planning process. Interdisciplinary research, the synergy of science, architecture and design, art and education are needed to improve the environmental situation in cities. The conclusions of the article confirm that investments in high—quality design of the territory are a strategic necessity for creating sustainable and healthy, socially prosperous cities of the future.

## 1 Introduction

Environmental issues are currently included in the list of state priorities for strategic urban development. However, for many years environmental projects have been aimed at solving existing problems, eliminating the consequences of negative impacts on nature, rather than preventing them, changing human psychological attitudes. The dialectical opposition of nature and consciousness, nature and technology, nature and culture were noted by philosophers back in Plato's time. It is necessary to restructure thinking, take preventive measures, abandon consumer attitudes towards nature, form a different model of behavior and interaction with nature, and create a different value system.

The purpose of the article is to analyze the environmental problems of megacities, the impact of the design of public spaces on the behavior patterns of citizens, and to identify design tools and methods that contribute to the formation of an ecological culture. Ecological

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culture includes knowledge, attitudes, a value system, and environmentally sound actions. It determines the measure of human freedom in relation to nature, regulates a person's internal motivation, his systemic understanding of his place and role in the eco-, bio- and noosphere, regulates the culture of behavior in the natural environment. It should be noted that its main function is preventive.

## **2 Materials and methods**

The author uses a culturological approach as a methodological basis for considering research problems. This presupposes humanitarian problematization and analysis of design activity as a natural product of cultural development, innovative in its essence. This allows us to consider the problem in its entirety and in the context of socio-cultural significance. The axiological approach is important in analyzing the value and socio-cultural potential of design. A systematic approach allows us to analyze the design of public spaces in the city as a system of its components, to analyze the nature of their relationship between. The method of systematization was necessary to determine the typology of public spaces and their respective functions. The methods of generalization, analysis and synthesis are used to create a holistic picture of the role of environmental design in the urban environment.

## **3 The visual environment of the city**

The visual environment affects us constantly and regardless of our desire. The object-spatial environment of the city includes objects of architecture, engineering, fine arts and design, and natural objects. This is the place where all social processes take place. It is a product and reflection of social existence and consciousness. The interrelation of the material and spiritual aspects of society's life, changes in philosophical, scientific, and cultural concepts are visualized in spatial structures.

The city as a systemic architectural, economic, economic, and social complex ensures the vital activity of people, their needs from physiological and material to social, spiritual, and aesthetic. Cities were created not only for the sake of economic processes. In fact, life support in the city is much more difficult to maintain than in the countryside. People moved to cities to realize their abilities and opportunities. The city provided a division of labor and cooperation, rituals took place here, and power was concentrated. Lewis Mumford, a prominent theorist of urban planning and urbanism, followed Jean-Jacques Rousseau in emphasizing that "houses make a town, but citizens make a city" [1]. Does the city make citizens? What mechanisms influence their ecological consciousness?

The city unites the activities of many people into a single system, generates social patterns of behaviour, and its core is public spaces [2]. Firstly, these are platforms for communication, interaction, and self-realization of citizens. They are accessible to the young and the elderly, the poor and the rich, active people and contemplatives, the authorities, and the electorate. Secondly, it is a face, a business card of the city, which forms its image, brand – both for the residents themselves, as well as for its guests and potential investors. The role of public spaces does not weaken with the development of media technologies. Citizens must get to school and work, go out for walks, and meet friends, attend cultural and sports events, etc.

Functionally, the following components of public spaces can be distinguished, by which we mean both open spaces and interiors of public buildings: communications (squares, roads, streets, transport infrastructure, metro stations, post offices); recreational (squares, boulevards, parks), administrative (buildings of administrations, departments, ministries, etc.); commercial (shopping malls, shops, service centers, cafes, restaurants, etc.); cultural (theaters, clubs, cinemas, museums, libraries, exhibition centers, educational and scientific

institutions, religious buildings; sports (stadiums, sports palaces, sports schools, etc.), social welfare (polyclinics, hospitals, pension funds, etc.)

Accordingly, we will highlight their functions: providing various services (educational, medical, information, trade, etc.), service, communication, self-realization, recreation, sports and physical education. The listed functions are of a utilitarian nature. It is important for us that the visual appearance and spatial organization of public spaces have a socio-cultural impact on the citizens. The design of public spaces has communicative and organizing functions, aesthetic and hedonistic functions, and ultimately educational, cognitive, and axiological functions. Public spaces define the lifestyle of citizens, their behavior patterns, culture in general, and consumer and environmental culture.

The buildings and engineering structures that define the city's appearance maximize their resources, as they are economically very expensive, technically complex, and labor-intensive. The Khrushchev buildings, super-economical residential buildings of standard series, which were massively built in the USSR in the 1950s and 1970s to solve the housing problem, were designed for 25 years. However, they will soon reach the age of 80, and architects and officials optimistically propose using modern technologies to extend the life of these houses to 100-150 years. New residents are moving into apartments, and the purpose of the first floors of buildings can be changed depending on other requests and the economic situation. Unique buildings and structures become monuments of the era. They are being restored and reconstructed. While maintaining the main function, the building can be equipped with the most complex technical devices, and they will again meet the new needs of people. Let's recall the history of the Bolshoi Theater building from 1856 to the reconstruction, which ended in 2011.

Design objects, unlike architectural and engineering ones, change much more often, vividly reflect technological achievements, fashion trends, consumer demand and taste, and invade the fabric of an architectural structure. Storefronts and signage inform about the new function of the architectural object. Environmental design objects (building entrances, small shapes, outdoor furniture and lighting structures, storefronts, information stands, transport stops, bicycle parking, art objects, etc.) create a human scale, adapt the environment according to ergonomic parameters. Unfortunately, there are fewer and fewer natural sites in cities. They must be protected from the onset of development and commercial use. Actions by the greens, conservationists, and ordinary residents are not uncommon in our cities. I would like to increase the area of natural landscapes and landscaped areas, but if earlier buildings were built in a natural environment, now nature is being integrated into the architectural landscape.

## **4 Problems of formation of ecological culture of citizens**

The high concentration of industry, transport, engineering infrastructure, and high population density in modern large Russian cities (Moscow – 10,588 people/km<sup>2</sup>, St. Petersburg - 3,724 people/km<sup>2</sup>, Novosibirsk – 2,931 people/km<sup>2</sup>, Yekaterinburg – 2,933 people/km<sup>2</sup>) lead to several different economic, social, and environmental issues. In Russia, the number of urban residents is more than 70%, and in the northern and eastern regions with a harsh climate it reaches 92%. Intensive urban development in the 20th century. It is associated with industrialization, the construction of giant factories and research centers. Comfort and issues of preserving the natural landscape were considered last of all [3]. Cities account for 80% of all emissions into the atmosphere and three quarters of the total amount of pollution, consume 60-80% of energy. All cities in the world emit up to 3 billion tons of solid waste annually, over 500 billion cubic meters of industrial and domestic wastewater, the polluting and thermal effects of large cities cover a radius of about 50 km; instead of a natural landscape, an anthropogenic one is formed. The negative impact of the city is compounded by the fact

that most people spend up to 20-23 hours a day in rooms where the level of pollution is 1.5-3 times higher than the level of outdoor air pollution and there is absolutely no contact with natural objects.

Urban space includes the natural and anthropogenic environment. Natural objects can be either natural or man-made. A megacity changes almost all components of the natural environment: air, vegetation, topography, soil, groundwater, soil, and even climate (temperature, humidity, solar radiation, and precipitation) compared to the surrounding areas. Cities have less solar radiation, more precipitation, cloudy days and fog, as well as dust, highway noise and aggressive visual environment, which leaves a corresponding imprint on human consciousness and his attitude to nature.

A state of complete ecological equilibrium is achieved if the natural environment ensures the reproduction of its components. With the relative ecological equilibrium that is possible in cities, this does not happen, and the balance of biomass is disrupted in accordance with anthropogenic stress. Actions and efforts of the citizens are needed. But the inhabitants of a modern megalopolis are significantly removed from the natural environment, do not feel dependent on natural processes and personal responsibility for environmental problems, and treat nature in a consumer-like manner [4]. How is it possible to recall the coexistence with nature, how to form an ecological culture through the visual environment of the city? Can environmental design change human behavior patterns in terms of environmental aspects?

The urban environment defines the phenomenon of urban lifestyle [5]. It includes not only the subject-spatial component, but also its symbolic component, the semantics of the elements and the social component – interpersonal communication, interaction and behavioral patterns of citizens. The visual environment affects sociocultural communications, life processes, and people's worldview [6]. After all, design tools and methods design not only an artificial habitat, but above all human activity in it, the lifestyle of consumers, influence and even regulate the state, mood, and social behavior of both an individual and social groups, as well as form consumer culture, values, and worldviews.

## **5 Design objects in an urban environment**

From the point of view of the cultural approach, design is both a result, a product demonstrating the modern level of culture and social values, as well as a catalyst for innovation, progressive technological solutions, fashion trends, and socio-cultural changes. Design largely determines the utilitarian function of objects, their ergonomics, and their informativeness. But design is not only a functional, but also an aesthetic component of the object-spatial environment surrounding us. And aesthetic experience, which has spiritual and value components, is important for the formation of personality, for the development of cognitive abilities. It is perception and aesthetic reaction as a representation and experience, as a transition from an aesthetic attitude through an aesthetic event to an aesthetic effect and action [7]. Aesthetic taste takes place not only in the field of aesthetic evaluation, taste can be defined not only as "the ability to judge beauty", but also as an effect of experience. Design works are a transitional element from architecture and engineering structures to a specific consumer, and to a greater extent contribute to the harmonization of human and environmental coexistence. But it is the work of designers that contributes to the avalanche-like increase in mountains of garbage, both real and visual. It even becomes a theme of inspiration and a material for the creativity of contemporary artists when creating installations with environmental issues, for example, "The Trash People" ("Garbage Army"), an art project by Ha Schult, Germany, which he demonstrated in many capitals of the world (see Fig. 1).



**Fig. 1.** "The Trash People" ("Garbage Army"), an art project by Ha Schult, Germany.

Source: URL: <https://www.haschult.de/action/trashpeople>.

The art object "Technogenic Nest" by the artist Vera Ishutinova is a four-meter nest woven from branches, old plastic ties, hoses, and wires. At first, the art object was installed in the center of Yekaterinburg at an environmental festival. The object is now located in the park. It draws the attention of citizens to the environmental problem of garbage, makes them think about a responsible attitude to nature conservation (see Fig. 2).



**Fig. 2.** Art object "Technogenic nest", Yekaterinburg, artist Vera Ishutinova.

Source: URL: <https://momenty.org/city/17433>

Design is not only the design of industrially produced objects, but also a component of the consumer sphere and a means of influencing the life of society [8]. Designers, commissioned by economic and administrative structures, create commodity and information-sign redundancy, motivation for excessive consumption. Advertising captures all the free planes of facades and streets, disfiguring historically significant architectural monuments. The advertisement calls for: "Go in, choose, buy, use." The metropolis looks like a huge box with lots of candy wrappers glued on it. However, in various cities there are more and more environmentally oriented design objects that make citizens think about environmental issues, about their responsibilities and opportunities in solving environmental problems.

## 6 The possibilities of design in the formation of an ecological model of behavior

Ecological design as a cultural phenomenon unites and defines axiological foundations, objectives, visual natural and cultural solutions, socio-cultural changes in society, eco-friendly semantics of design objects, forecasting the anthropogenic impact of a design object on nature throughout the entire period of its existence, including disposal [9]. A design object can clearly demonstrate a rational style of consumption, its advantages, cause aesthetic pleasure, and harmonize a depressive or technocratic object. The appeals of educational posters are often perceived as edifying and have no impact, and with the help of visual images, the designer conveys information and psychologically interacts with the viewer, causing an emotional response.

Let's highlight the possibilities of urban environment design in the formation of ecological culture. This is, first, ensuring the possibility of "communication" with nature, the availability of recreational areas, and improving the quality of the urban environment. The inclusion of landscape design facilities in the urban environment, the preservation of natural objects improves the microclimate, contribute to maintaining clean air, allow comfortable walking in the "green corridors", walking dogs, and just admiring nature. Also, the organization of the city's space by means of landscape design makes it possible to use bicycles (paths, playgrounds, parking lots). Roof greening was promoted by Le Corbusier in the 1920s. Currently, green skyscrapers have appeared in Italy, Switzerland, and China, where there are places for landscaping on balconies and terraces. Vertical landscaping of facades (for example, the gardens of Patrick Blanc, France) has an artistic image, which enhances their emotional impact (see Fig. 3).



**Fig. 3.** Vertical landscaping of facades of Patrick Blanc.

Source: URL: <http://www.tekku.ru/francuzskij-botanik-patrik-blank/>

In the climatic conditions of Russia, such solutions are not feasible, but there is a fashion for winter gardens in public interiors, and mobile gardening has also been actively used. But even in the largest cities, it is possible to include natural areas. For example, Moscow was recognized in 2019 as the greenest metropolis in the world, with about 90% of the population having access to green areas in close proximity. In ten years, about 10 million trees and shrubs have been planted, 441 streets and public spaces have been landscaped, and 36 embankments of the Moskva River, almost 65 kilometers long, have been transformed. Singapore uses an integrative approach in the Gardens by the Bay project, where urban spaces are formed around natural objects. Gardens by the Bay is a park with greenhouses and coastal areas, as well as tree-like structures using solar energy. The metropolis has integrated green spaces into the urban fabric. Parks have become artistic and cultural landmarks and effectively ensure sustainable interaction with water bodies (see Fig. 4).



**Fig. 4.** Singapore. Gardens by the Bay.

Source: URL: <https://grant-associates.uk.com/projects/gardens-by-the-bay>

There are many examples of design objects in the public space of various cities around the world that solve or pay attention to environmental problems. These are multifunctional and transformable, with plastic biomorphic forms, urban furniture and equipment that simultaneously include advertising or information planes, chargers, and lighting devices.; These are solar-powered urban lights that resemble natural images. Technological materials, including recycled materials, are used to create small architectural forms, art objects, urban furniture, and lamps. The use of local construction and finishing materials, which are relatively cheap, affordable, and harmless, do not require high shipping costs, and are easily recyclable for recycling and recycling (wood, stone, ceramics), also ensures the environmental friendliness of the facilities.

Small forms, art objects and natural objects harmonize the space, considering the comfort of perception, competent proportionation, scale, become a compositional accent, artistic, imaginative, emotional element of the environment [10]. The use of biomorphic structures, natural colors, materials, textures, and traditional regional motifs in images makes objects psychologically comfortable and shows aesthetic values. Images of natural objects are often present in monumental murals of buildings, supergraphy, and inanimate natural objects (rocks, driftwood, etc.) are used in decoration. Visually appealing and informative waste collection containers guide the actions of the citizens. Advertising shows eco-friendly products and goods, informs consumers, calls for action, and personal participation in solving problems. Design is fully integrated into solving environmental problems. For example, bins for separate garbage collection, which recycles garbage into compost (see Fig. 5).



**Fig. 5.** Envi outdoor organic waste bin by Braun.

Source: URL: <https://www.behance.net/gallery/264728/Envi>

Thus, by means of design in the fabric of urban space, it is possible: to show true values, to introduce to the beautiful, to form the aesthetic taste of citizens; to draw attention to the problem, to attract to its solution; to form a culture of rational consumption by creating

multifunctional, transformable objects, things of long-term use, out of fashion and time; to minimize visual garbage or to make The appearance of man-made objects is so aggressive; to increase people's environmental literacy, spread the ideas of ecological design, and form habits of ecological behavior (separate waste disposal, protection and restoration of natural objects, active and healthy lifestyle). As a result, the components of ecological culture are formed: knowledge and understanding of the relationship between man and nature; attitude to nature as a value, which determines the nature of the goals of interaction, includes environmental ethics, ecological thinking, and culture of behavior. This action involves the possession of technologies for interacting with nature, the need to communicate with nature, the desire for its knowledge and perception, nature-appropriate behavior, responsibility and conscious observance of rules and norms, one's own active position, and the promotion of eco-ideas. The following trend can be noted: when solving the environmental space, designers began to pay more and more attention to the artistic and figurative function of design, using the means and methods of art design and contemporary art. This is not the artist's self-expression, but the desire to convey ideas to people. Not only the technological solution, but also the artistic image of design objects began to carry an ecological function to promote eco-ideas in attractive and emotional objects. Designers can ensure that people's reasonable needs are met, as well as create motivation for a rational style of consumption, an environmentally friendly lifestyle, and harmonious coexistence with nature. In this regard, their professional responsibility, design ethics and environmental culture are of great importance.

## **7 Conclusion**

Design can act as a link between urban space, architecture, man and nature. The trend and reality of the time in shaping public spaces is the power of business: to occupy and master for commercial gain. The professional role and responsibility of the designer is to bring an axiological component to the project, to make these spaces filled with a socio-cultural mission and environmental content. The use of the participatory method is of great importance, that is involving citizens in design at the stage of ideas, construction and selection of concepts, evaluation of design solutions [11]. After all, the uniqueness of public spaces lies in the fact that the concepts of "mine" and "someone else's" are complemented by the concept of "ours", which gives rise to social responsibility, a sense of belonging, a public position and consolidation, the birth of positive initiatives, the opportunity for creative expression and the involvement of citizens in social and environmental projects.

It should be noted that a design object of any type and scale must be environmentally friendly both in terms of technological solution, content, purpose and meaning, and aesthetic image. The value-ideological and ethical components of design should be determinants, and understanding the possibilities of design in shaping people's ecological consciousness and culture should be a professional quality of the designer. To change the design paradigm, it is necessary to form professional ethics, introduce environmental issues into the content of various disciplines in the process of training a specialist, inter-subject relations on these issues, mandatory analysis and solution of environmental issues in projects in the general design complex of morphology, ergonomics, function and image of the object. The proposed approaches should become a meaningful and methodological basis for the educational and real-life design of public spaces in the city, industrial design and art design facilities, while building strategies for the development of the urban environment. The materials of the article can be useful to specialists studying the problems of urban space formation, ecological culture of citizens, teachers of theoretical and special design disciplines of universities in determining the cultural and axiological foundations of the content of design education and the competencies of a specialist.

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