The Continuity of Open Greened Spaces - Basic Principle of Urboecology

V Dormidontova¹, A Belkin²

¹Dormidontova V, Department of landscape architecture, Bauman Moscow State Technical University, 2 Bauman Str., 5/1, Moscow, 105005, Russia
²Belkin A, Department of architecture, Moscow State University of Civil Engineering, Yaroslavskoye Shosse, 26, Moscow, 129337, Russia

E-mail: v.dormidontova@mail.ru, an.belkin@mail.ru

Abstract. For home urban planning of the last quarter of a century, a very low level of urban culture is typical. Today, the ecological principles of the formation of an urbanized landscape can become the methodological basis for designing a city. These principles consist in striving to achieve the sustainability of the urban landscape, in other words, the balance of human management processes and self-regulation processes at the expense of its natural components. Urban-ecological approach is carried out through the formation of a system of open green spaces of the city. One of the basic principles of building a system is the continuity of intracity and external, suburban and inter-settlement green spaces. The existence of natural elements introduced into the urbanized environment is facilitated by connections with the biogenic complexes of the suburban area. Thus, instead of the convenient, but absent today, planned indicators of the development of the economy, more complex and not familiar ecological foundations of the formation of the city have been proposed. The most important is the principle of continuity of open green spaces, which determines the quality of the ecological framework of the city.

1. Introduction

The theory and practice of domestic urban development of the late XX - early XXI centuries is experiencing a deep crisis, which can be described as a sharp decline in the level of urban culture. The reasons for this are both non-professional, national, and domestic, professional factors. The first should include the priority of land and property issues, the lack of a state urban planning policy, the formulation of the task of planning and spatial organization of territories, the absence of a territorial planning management authority, and others. To the second - the lack of a theoretical and methodological basis of urban planning, adequate to modern socio-economic conditions [1].

These reasons led to the cessation of the development of master plans for cities, which was replaced by the fixation in the town-planning documents of piece situational non-system decisions made by the city authorities. It is clear that such a “design” has nothing to do with the desire to ensure the development of the city as a very complex system. The result of this vicious practice is the destruction of the most important structural elements and systems of the city created by the predecessors for many decades of their systematic development. A striking example is the destruction of the system of green areas of Moscow, and, above all, of its main element - the forest-park green belt.
The purpose of this work is to consider one of the basic principles of building a system of open green spaces - the continuity of its inner and outer, suburban and inter-settlement elements. Through the formation of a full-fledged system of open green spaces of the city, an actual urban-ecological approach to the development of the city can be implemented. The method of work consists in the implementation of a systematic approach to urban planning.

2. Theoretical part
The most important principles for the formation and development of a system of open green spaces in the city include:
- compliance with natural conditions and features, the relationship with the landscape fundamental principle;
- quantitative correspondence of the occupied space not only functional, but also environmental requirements;
- continuity;
- multi-level, relative uniformity of distribution, availability;
- functional diversity that meets the needs of the population;
- the ability to grow with the city [2].

The continuity of intracity and external, suburban and inter-settlement green spaces as one of the most important principles of the system has three aspects: environmental, functional and aesthetic.

The environmental aspect is associated with the desire for sustainability of the urbanized landscape. Its stability consists of two parts: artificial measures to maintain the components of the landscape (primarily vegetation, but also relief and water systems) and the proportion of self-regulation that is provided by the remaining natural components of the landscape in their interaction. [3, 4] This proportion is the higher, the more “natural” the landscape is. If the geranium in a pot on the windowsill is entirely dependent on care, then a tree even in street gardening can live for a relatively long time without any care. The park landscape has a higher degree of self-regulation than built-up areas, significantly increasing the sustainability of the urban environment as a whole. However, attempts to preserve the “islands of nature” in an urbanized environment, as a rule, are unsuccessful. “The feeling of unity, organic fusion with nature, necessary for the harmonious development of the personality, cannot be achieved by introducing elements of nature into the urbanized environment in the form of alien fragments. Both a separate tree and a park territory, recreating the image of the natural landscape, can be subjectively perceived only as a decorative design. Forming a genuine sense of unity with nature, with the environment comes, apparently, through the achievement of the organic nature of a new urban landscape in which biogenic and anthropogenic the elements make up the whole” [5, p.4]. The coastal areas of natural and artificial water bodies are particularly important in the formation of a system of green spaces. The “water-green diameter” formed along the main river of the city, water protection areas around lakes, reservoirs, ponds and small rivers, is the most important factor in achieving sustainability of the entire urban landscape.

Adequate space and connectivity not only between urban and suburban park territories among themselves, but also their connection with agrarian and natural landscapes of suburban and inter-settlement territories are necessary. The existence of natural elements introduced into an urbanized environment is facilitated by links with biogenic complexes located in a relatively natural environment. The stability of individual components and the landscape as a whole is much higher inside the developed, directly related to the natural environment of the system of green spaces. Therefore, urban development should be intermittent, discrete, and the system of open green spaces should be continuous.

The functional aspect reflects the role of the system of green areas and its elements as a network of recreational services for the population. When the system is connected, a citizen, having left the house, could reach the suburban recreation area, without leaving the park spaces of different size and different functional content. Leaving the house into the courtyard to get into the neighborhood's garden, then to the multifunctional district, city or specialized parks, then to the suburban recreation
area, not urbanized agrarian and natural landscapes, interconnected by pedestrian landscaped connections [6, p.48].

Achieving "functional" continuity is associated with the very difficult task of finding in the existing city the possibilities of creating green pedestrian connections. Modern practice gives such examples, one of the most complex, successful and expressive of them is the 4.5 km Promenade of Plants in Paris, connecting the Place de la Bastille with the Bois de Vincennes. This walking route runs along the surface of the earth, above and below ground, without interfering with the traffic of the city [7]. Efforts to “punch” this greened connection through the historically established dense development of Paris are also aimed at achieving continuity of the open green space system.

The aesthetic aspect of the principle of continuity is associated with the psychophysiology of human perception of space and its forming forms in the whole diversity of their compositional characteristics and properties. First of all, it is the scale of the environment in relation to its perception by man. How large can a homogeneous fragment of a city be without a feeling of monotony, boredom, and fatigue? When, after what distance will you need a pause in the perception of continuous development and changing it with a different, saturated with natural elements, park environment?

Little Barcelonetta doesn’t have enough time to get bored, it doesn’t bother the significantly larger picturesque Gothic Quarter, within the limits of the magnitude of perception, the building of the measured grid of streets of the large Eshample district in Barcelona. However, further these historical parts, which constitute a small part of the beautiful city, continue on 100 sq. Km of continuous development with small oases of parks (figure 1) [8].

![Figure 1. Barcelona.](image)

Of course, it would be nice if there were “gaps” between the proportional arrays of continuous development, pauses between parts of this huge stone symphony - Barcelona. [9, 10, 11] These compositional pauses - park spaces, surrounding the building, could reveal both the natural landscape basis of the city, and historical and architectural periods of stylistic domination, and, most importantly, commensurate with the possibilities of perception of the territory.

Perhaps it was precisely the striving for proportionality of a densely built urban environment that enabled Eliel Saarinen a hundred years ago to put forward the well-known idea of organic decentralization of the city in the process of its development and reconstruction. He wrote about his ideal like this: “... a separate district of a decentralized big city will become a small town surrounded
by nature — what medieval towns were like” [12]. After a hundred years, we go to admire the surviving remnants of this ideal, largely because of its proportionality to the possibilities of our perception. Thus, the improvement of the architectural composition of the city, the increase of its artistic expressiveness is due to the continuity of the system of open green spaces.

The quantitative parameters of built-up arrays and open spaces of large cities were determined in the studies of Central Scientific Institute of Town Planning in the 1970s of the last century [13, 14, 15]. To identify the optimal width of the open space, limited by the transport highway, three main indicators were taken: the depth of noise propagation (0.2 km), the depth of the visual impact of the building (0.15 km), the depth of the active effect of exhaust gases from transport (0.1 km). A “clean” zone that does not experience the negative impact of the environment will arise when the width of an open green space is more than 0.4 km. To create a comfort zone and have a significant impact on the improvement of the urban environment, a width of 0.5–0.75 km is needed, which is the optimal width of an open green space.

To determine the second indicator - the width of the development array surrounded by open spaces, three indicators were also taken: the pedestrian accessibility of open space (0.75 km), the depth of visual interaction (0.5 km), the depth of active air exchange with open spaces (0.25 km). Thus, the optimal width of the built-up array is 1.5 km. The impact of green spaces on built-up areas can be enhanced by the compositional features, planting design, the presence of water bodies, topography, and other things; an open space of 0.5–1 km can be accepted, and a built-up area of 1.5–2 km. It is clear that specific climatic, landscape and other conditions affect these parameters. The recommended indicators specifying the principle of continuity allow us to present a well-defined model of the city (figure.2).

Figure 2. Scheme of built-up and open green spaces of the city.

These figures are close to those proposed in projects of theoretical, “ideal” cities and in well-known competitive projects of real cities (for example, in competitive projects for the reconstruction of Moscow in 1931-32). They vary widely enough: 0.5 - 1 km for open spaces and 1.5 - 2.5 km for built-up arrays. [16, 17, 18, 19]. In the domestic practice of urban planning, the best achievement remains the general landscaping scheme of Moscow in 1975 [20] (figure 3).
3. Suggestions and recommendations
The method of designing master plans for cities based on planned indicators of economic development, which was developed in our country in Soviet times for obvious reasons, cannot be used for almost three decades. Designing master plans today has come down to fixing pinpoint situational, often random urban planning solutions that not only do not develop the city as a complex system, but destroy the previously achieved level of its development. A new method of designing master plans for cities is needed. The conceptual basis of such a system can be formed by the principles of forming a system of open green spaces as the ecological framework of a city. In this case, the most important is the principle of continuity of open green spaces, which determines the quality of the ecological framework and, not only as a consequence of this, the dissection of development arrays.

4. Conclusions
It should be noted that the practical significance of the work lies in the fact that instead of the socio-economic indicators of the development of the city that are absent today, the ecological concepts of the urbanized landscape — urban ecology — can be the basis of urban planning. The principle of continuity of a developed system of open green spaces and, as a consequence of this, the dissection of...
arrays of urban development can be put at the beginning and at the head of the development of master plans for cities.

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