The Changes in Barnaul Park Zones over the Past 30 Years as an Indicator of the Depressive-Extensive Development of Society and Economy

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Abstract. The authors argue that the decrease of green spaces in Barnaul is caused by the low economic and societal development of the Altai Krai. In this study, the authors analyze the development of park zones in Barnaul, especially of the Industrialny [Industrial] District Park. The authors discuss the importance of park territories for leisure and recreation of unhealthy citizens. The correlation between the quality of urban life and the economic development of the city is made in the study. Moreover, it analyzes green spaces in the context of inclusive growth and sustainable development of the whole regional system. The paper assesses the greening of Barnaul districts, emphasizing the importance of green spaces in the emotional, psychological, and medical well-being of a person. The authors presented a table with data on city districts, population, and areas of green spaces, as well as cadastral and satellite maps with the location of Industrialny District Park. Based on the cartographical data, the authors calculated and demonstrated the areas lost in the post-Soviet period. Park zones become a sort of free capital, taken from public use in the interests of small population groups.

Keywords: Barnaul · Parks · Quality of life · District · Green space · Ecological footprint

1. Introduction

Quality of life is one of the most critical social indexes, showing the structure of human needs and their satisfaction. Modern urban citizens want to be comfortable not only in their homes, but also in their immediate environment. Most people try to buy houses in areas with a developed infrastructure. Green spaces are an essential part of infrastructure; they perform ecological and aesthetic functions.

Creation and management of green spaces is one of the main tools of urban development. They both enhance the appearance of the city and contribute to the urban societal life [2].

At the end of 2018, Russia approved the Federal Project “The formation of a comfortable urban environment.” In the framework of this project, the city administration of Barnaul developed a municipal program “The formation of a modern urban environment” for 2018–2024 [11].

Throughout the history of Barnaul, greening was a priority vector of urban development. Several times the city was named one of the greenest cities in the Soviet period. The situation began to worsen in the late 1980s, when the crisis in the country put the economic values above the societal ones.
2. Materials and Methods
In this study, the authors applied the system-dialectic method to the analysis of Barnaul green spaces. The authors analyzed their functioning in providing comfortable urban environment and ensuring a high quality of life.

The authors used cartographic materials [1, 7] and the results of various surveys and lists on the quality and standard of living in cities [8, 16]. This study views green spaces as an area-material basis of urban development [14]. Therefore, Barnaul parks were considered to be a basis of inclusive growth and sustainable development [3] of the city.

3. Results
Barnaul is a sizeable regional capital with over 630 thousand people (21st place in Russia). It is the city with average opportunities for rural youth who come to the center from other regions. Barnaul has a relatively cheap and affordable infrastructure. In terms of average wages, it is inferior to almost all regional capitals of the country [10].

The level of urban development largely determines the ranking of the region. At the same time, urban development depends on the attractiveness of the region to qualified personnel and investors [13]. The post-industrial stage of urban development pays close attention to the quality of life and human comfort in the urban environment.

The Russian Union of Engineers, jointly with “Blackwood” company, compiled a rating of the most attractive urban living areas [16]. The rating is based on 13 indices. In 2013, Kazan became the leader of the rating. Barnaul took only 68th place. City dwellers spend most of their time in the urban environment. Therefore, greening is one of the most essential factors of urban development. Green spaces fulfill several different functions: ecological, social, urban planning, economic, historical-cultural, and aesthetic. All the functions are equally important. The importance of green spaces for the urban environment is difficult to overestimate. Green spaces have a beneficial effect on the psychophysical state of a person. Colin Ellard, an American specialist in cognitive neuropsychology and psychogeography, concluded that people living in a greener environment feel happier and more protected; the level of aggression and crime in green spaces is generally lower. He also noted that people living among greenery are more likely to communicate with each other, developing a sort of social cohesion that not only protects them from mental pathologies, but also helps prevent petty crimes [4]. However, the greening of cities and the economy can be assessed from various positions [6].

Nowadays, in Barnaul, according to various estimates, there are at least 10 parks and around 40 garden squares and green corners. Inaccuracies are explained by the fact that green private areas, boulevards and arboretums are often mistakenly referred to as parks. The greenness of Barnaul is currently at 6 m² per person, within the norms for cities with less than 1,000,000 people. However, since the 1990s, many parks and green spaces fell into disrepair. This trend continues to this day.

The set of rules by the Ministry of Construction, Housing and Utilities SP 42.13330.2016 [12] determines that a park must cover an area of at least 15 hectares to be considered one. According to this criterion, there are three parks in Barnaul: “Yubileiny” with an area of 57 hectares, “Park of the Industrialny District” with 40 hectares, and “Izumrudny” with 19.4 hectares. This list excludes the amusement parks “Solnechny veter,” “Barnaulskaya krepost,” and the oldest city parks – the park of the Tsentralny District, and “Nagorny Park.” They occupy a significantly smaller area and, therefore, and bear the name of a park only formally.

SP 42.13330.2016 establishes the standards of greening for common areas and planning areas of large cities. Thus, the city-wide standard for common areas is 10 m² per person, and 6 m² per person for landscaping objects in planning areas. The calculation, presented in Table 1, show that most city-wide and district indexes are significantly below the standard.

The situation in the city is unfavorable. The worst greening index is in the Zheleznodorozhnny district, where, despite a significant population, green spaces cover an insignificant area. Likewise, the situation...
in Industrialny district is adverse, since it lacks large-scale green spaces. The city is mainly greened by garden squares, boulevards, and alleys.

The authors did not consider the Barnaul ribbon-like relict pine forest, part of which is located in the Tsentralny district, to be a park. Otherwise, it would considerably skew the indexes. However, urban areas of forests can be classified as a green space for public use, provided they are converted into urban forest parks with a developed recreational infrastructure. Currently, the state of this forest area does not allow one to classify it as a public green space.

| Table 1. The greening indexes of common areas in Barnaul districts in 2019. |
|-----------------|-----------------|-----------------|-----------------|
| District        | Population, people | The total number of plantings in the district, ha | Per person, m² |
| Leninskiy       | 144,075           | 121.3           | 8.4             |
| Tsentralny      | 90,344            | 28              | 3.01            |
| Oktyabrsky      | 100,848           | 40.8            | 4.05            |
| Industrialny    | 184,336           | 42.8            | 2.3             |
| Zheleznodorozhny| 113,120           | 11.2            | 0.9             |
| Total           | 632,723           | 244.1           | 3.8             |

Source: Compiled by the authors.

The population of Barnaul and urban concentration is rising because of the fast-paced real estate development. In stark contrast to this, the park zones are not being developed. Moreover, real estate development decreases the areas of park zones (parks of the Oktyabrsky district, “Industrialny,” and “Yubileiny” parks). The existing parks lack entertainment equipment for all age groups. The condition of park trees is also poor, since their average lifespan in urban environment is around 40–50 years. The green spaces in the city are unevenly distributed, which causes citizen dissatisfaction with the greening of Barnaul.

Since late 1980s, the development of park zones and green areas has practically stopped. Most trees are over 40 years old. New parks are mostly filled with amusement rides and small buildings, rather than greenery (e.g., parks “Arlekino” and “Solnechny veter”).

Newly-built areas are less green overall. Real estate developers mainly plant lawns, flower beds, and flower gardens, not trees. New residential areas look like “stone jungles”, since they lack trees and shrubbery. Greening improves the ecological state of the city and enhances the appearance of the environment. The decorative and hygienic qualities of green spaces must be accounted for in the city planning, which was historically formed over the period of urban development.

The Altai Krai is the least prosperous region in Siberia (table 2). Barnaul has one of the lowest salaries among the regional capitals of Russia. Most of the residents do not belong to the middle class; families cannot afford frequent leisure activities and trips to the sea.

These figures stress the importance of preserving recreational spaces for the underprivileged majority of Barnaul. The Industrialny District, which ranks first in real estate development and population size, lacks large green spaces. The eponymous park is practically the only large green space for the recreation of its residents.

The Park of the Industrialny District, created in 1985, occupies about 40 hectares [15]. The area of the park has decreased significantly in the past decades, because of the residential buildings, sports facilities, parking lots, garages, and a zoo that were built on its territory. There are plans to construct a new sports facility in the park.
Table 2. The rating of Russian regions by salary, 2019.

| Rank | The subject of Russia | The share of employees with a salary above 100 thousand rubles per month, % | The share of employees with a salary below 15 thousand rubles per month, % | Median salary, thousand rubles | Most common salaries in the region, thousand rubles |
|------|-----------------------|--------------------------------------------------------------------------|--------------------------------------------------------------------------|-------------------------------|---------------------------------------------|
| 25   | Novosibirsk region    | 3.9                                                                       | 10.4                                                                      | 30.3                          | 19–45                                       |
| 27   | Kemerovo region       | 3.7                                                                       | 10.1                                                                      | 31.1                          | 20–47                                       |
| 43   | Omsk region           | 2.4                                                                       | 18.1                                                                      | 26.1                          | 18–39                                       |
| 61   | The Republic of Altai | 1.5                                                                       | 8.2                                                                       | 24.7                          | 18–36                                       |
| 73   | Altai Krai            | 1.1                                                                       | 24.6                                                                      | 21.7                          | 14–32                                       |

Source: [8].

The authors analyzed the degradation of the park and concluded that it lost over half of its territory (see Figure 1). The park boundaries are not clearly defined on the public cadastral map (see Figure 2). The territory is divided into land plots of different categories. Most of the territory with preserved tree plantations does not legally belong to the park. This is extremely convenient for the businesses that can use the public park territory for their own gain.

Figure 1. Territorial structure of the Park of the Industrialny District. Source: [7].
Despite this, the Park of the Industrialny District, located in a bedroom suburb, is very popular among the residents of the entire city. The park is located near several transport hubs, which ensures its availability.

4. Discussion
The Park of the Industrialny District unites two parks – the park “Lesnaya Skazka” and the park named after V. I. Lenin. Hence, there are inconsistencies in area properties and territorial boundaries of the park. In general, the park is falling into disrepair, losing its qualities.

One must bear in mind that reconstructing a park is always cheaper than establishing a new one. The creation of a new park takes at least 25–30 years, so that the trees can grow and create shade. Urban success is possible only when the needs of the largest possible number of residents are taken into account. Some experts advocate the equal development of society at all levels [5] and the investment in public property [9].

5. Conclusion
The development of green spaces in the city has slowed down. Green spaces are in dire need of reconstruction and a well-thought-out functional organization. Parks need a new stimulus. They should become a symbol of regional development, strong economy, and high quality of life.

The development of urban economy is beneficial to the living standards, since it reduces unemployment and increases population size. However, the quality of life cannot be raised in a balanced way, without preserving the green spaces near residential buildings. The population of any city needs good leisure opportunities within the urban environment. One of such opportunities are green spaces, but their state is only getting worse in Barnaul.

The urban potential contributes to the development of leisure and entertainment, one of the critical components of which is the park system.

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