

Research on the Optimization Strategy of Urban Park Green Space Layout under the Concept of Healthy City: Take Hefei as a Case Study

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Abstract: In the context of the construction of public health and safety for all, accelerating the construction of the concept of a healthy city is an important way to guarantee and improve people's livelihood. Based on the statistical data of Hefei in recent years and the spatial layout data of urban park green space, this paper uses the statistical analysis method to analyse and study the optimization strategy of urban park green space layout in Hefei. Urban park green space is an essential place for residents to relax in their daily life. Through this study, we put forward the urban park green space layout optimization strategy guided by the concept of a healthy city to create a model of a healthy city that people are satisfied with, vigorously promote fitness for all, improve the coverage and accessibility of health promotion sites, and provide useful reference for the research and construction of healthy urban park environment.

1. Introduction

The arrival of the post-2023 epidemic era has brought a lot of thinking to the people's work and life, and also made people start to reflect on the problems existing in urban governance, and pay more attention to the important impact of urban spatial layout planning and design on human settlements. In 2016, the "Healthy China 2030" Planning Outline was issued and implemented, which emphasized that the construction of a healthy space environment is an urgent need to ensure the quality of human settlements and improve the quality of life of residents [1]. Good spatial layout and accessibility of park green space is the key for residents to fully enjoy the ecological and social service benefits of park green space. It can not only increase the opportunity for residents to get close to nature, but also promote residents' sports and increase more health benefits [2]. Based on the statistical data of Hefei in recent years and the spatial layout data of urban park green space, this paper uses the statistical analysis method to analyze the spatial layout optimization strategy of urban

park green space in Hefei, and puts forward the layout optimization suggestions combined with the relevant theory and practice of healthy city, providing a useful reference for the research of healthy community environment.

2. Healthy City Concept

The concept of a healthy city originated from the research in the field of public health. In the broad concept of health led by the national strategy, the connotation of a healthy city has broken through the limitations of public health and expanded to social, cultural and other fields. It means that all aspects of urban planning and management are centered on human health, and become a development whole that organically integrates healthy people, healthy environment and healthy society necessary for the development of human society [3]. To promote the construction of a healthy city is to integrate health into all policies, constantly improve the factors affecting health around the healthy environment, healthy society, health services, healthy people, health culture and other aspects, and form a healthy urban development pattern of economic efficiency, social harmony, environmental friendliness, cultural prosperity and livable safety [4].

3. Current Situation of Spatial Layout of Hefei Urban Park Green Space

Hefei is the capital of Anhui Province, the sub-central city of the Yangtze River Delta urban agglomeration, and an important national scientific research and education base, modern manufacturing base and comprehensive transportation hub (Figure 1). By 2020, the urban population in the central urban area will reach 3.6 million; in 2020, the urban construction land area of the central urban area will be 360 square kilometers, and the per capita urban construction land will be 100 square meters. Urbanization level by 2020, the total population of the city will be 9.5 million, including 7.41 million urban populations, and the urbanization level will be 78% [5]. The development direction of the spatial layout planning of the central urban area is that the central urban area mainly develops to the south and west, and appropriately develops to the north and east; the space development strategy is to upgrade the old city, integrate in three directions, expand in two directions, and control in two belts [6]. The upgrading of the old city is to gradually relieve the existing administrative, cultural, educational and other functions of the old city, improve the municipal supporting facilities, and optimize and improve the comprehensive service functions; Three-dimensional integration is to integrate the resources of the traditional industrial zone in the east, relocate polluting enterprises, accelerate industrial upgrading and transformation, and form an industrial base dominated by new industries, commerce and logistics; Two-way expansion is to further expand the development space in the west and south of the city and make it a new growth pole for the future development of the city [7]; Two zones control urban and rural construction in two zones with high environmental sensitivity. One is the water source protection and conservation zone in the northwest of the city with Dongpu Reservoir and Dafangying Reservoir as the core; Second, in the southeast of the city, the lower reaches of the South Feihe River and its flood discharge area, polder area and other low-lying areas [8].

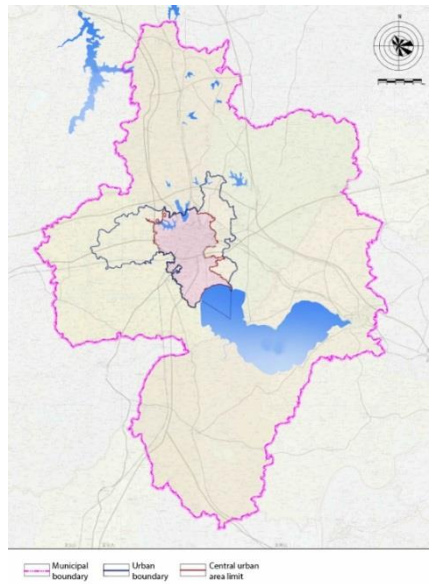


Figure 1: Overview of Hefei City planning.

The layout structure of Hefei urban green space system is based on the Chaohu Lake and Zipeng Mountain scenic spots as the background, the natural river system and the traffic corridor protection green space as the link [9], and the large park as the node to form a urban-rural integrated green space system combining points, lines and areas. The spatial pattern is "three rings, four veins, four wedges and multiple parks". "Third Ring Road": the green ring of the city park, a ring green belt formed by the protective green belt of the second ring road and the high-voltage line corridor, and a ring green separation belt formed by artificial and natural elements such as peripheral railways, highways, protective green belts. "Four veins": four water systems running through the city, including the South Feihe River and its tributaries, the Shiwuli River and its tributaries, the Paihe River and its tributaries, and the 20bu River and its tributaries. "Four wedges": wedge-shaped green space in the southeast, northeast, southwest and northwest of the city periphery. "Multiple parks": refer to Xiaoyaojin Park, Xinghua Park, Huachong Park, Yaohai Park and other urban parks [10](Figure 2).



Figure 2: Layout plan of park green space in Hefei central city.

The overall urban park green space in Hefei is characterized by "multi-center and cluster" spatial imbalance. The park green space is relatively concentrated in the southeast of Luyang District, the north and southwest of Baohe District, and the south of Yaohai District with high nuclear density values [11], while the nuclear density contours of Baohe District and Yaohai District are relatively sparse. According to the urban park data obtained and processed, the park green space in Hefei urban area is shown in Table 1. It can be seen that the number of park green space in Yaohai District is the lowest among the four districts, and the ratio of area to administrative area is also the lowest; Shushan District has the largest number of park green space and covers the largest area. Although the large area of administrative division leads to a relatively small proportion of park green space service area, there is a lack of park green space in the west; The number and area of park green space in Baohe District are large, and the proportion of park green space service area is the largest; Luyang District has a large number of parks and green spaces, and the overall area is larger than the administrative area. In general, the distribution of park green space in Hefei urban area is uneven. From the perspective of quantity distribution, the old area is better than the new area, and the overall park green space scale is small and the coverage rate is low.

Table 1: Statistics of urban park green space in each administrative district of Hefei City.

	Luyang District	Baohe District	Shushan District	Yaohai District
Number of parks	30	35	42	23
Park area (ha)	407	1552	2046	715
Administrative area (square kilometers)	139	340	663	269

4. Promote the Construction of Urban Park Green Space under the Concept of Health

4.1. The Construction of the Urban Park Demonstration Area is to promote the Coordinated Development of the Concept of a Healthy City and the Environment

Good ecological environment and efficient use of park resources are important ways to realize the concept of a healthy city. Hefei should adhere to the ecological civilization as the guide and organically integrate the park form and urban space [12]. First, focus on the ecological environment background of green ecology, and continue to carry out special treatment of the ecological environment problems of park green space; second, fully tap the value of green ecological products, and build a number of small parks, micro-greenbelts and other park greening facilities in the urban area.

4.2. Focus on Key Health Groups with the Goal of Building a Full-Age Friendly City

Urban parks need to focus on vulnerable groups such as the elderly, preschool children, disabled people, and vigorously promote the construction of a friendly and inclusive society for all ages to provide more effective park green space for vulnerable groups. This paper believes that the layout of park green space is to meet the balance between the supply and demand of park green space, and meet the residents' demand for park green space, not only in terms of the number of park green space, The deeper goal is to meet the needs of different people for park green space [13]. In the process of field research (Figure 3), there are more and more studies on the activity space of vulnerable groups such as the elderly, which can be implemented in urban parks to provide a higher level of park green space service by adding corresponding public service facilities, ensuring that the allocation of barrier-free facilities can meet the needs and other measures [14].



(Photo source: self-photo)

Figure 3: Demand for park activities of key health groups.

4.3. Disseminate the Concept of Healthy Culture with the Goal of Advocating Healthy Lifestyle

Health culture is an important support for the development of the concept of a healthy city. The core of health culture activities in urban parks needs to combine the promotion of health culture with the inheritance and promotion of excellent traditional Chinese culture, and effectively improve the health literacy of the public. First, continue to strengthen the heritage of traditional Chinese medicine culture. The second is to extensively carry out special health actions[15]. By carrying out science popularization activities of health knowledge in park corners and knowledge competitions in scenic wall exhibition, we advocate healthy lifestyle and promote fitness activities in parks for all. Third, vigorously promote the core socialist values. Deeply implement core value leading actions and build core value theme parks.

5. Layout Optimization Strategy

5.1. By Increasing the Number of Green Spaces in Urban Parks

At present, the spatial layout of urban park green space in Hefei is not balanced and there is a service blind area, which cannot fully meet the needs of current community residents for health activities [16]. Increasing the number of urban park green space in the region can improve the accessibility of park green space in the urban area to a certain extent, and also reserve safe and health protection space for the prevention and control of major infectious diseases. The urban population density is too high and the residential area is dense, so it is difficult to build a large area of park green space on the basis of the existing land use. Therefore, the construction of pocket park and small green space is an effective way to meet the needs of residents in the community and improve the service level of park green space.

5.2. Increase the Accessibility of Urban Parks by Improving the Regional Road Traffic Network

The perfection of urban slow traffic system will directly affect the accessibility of urban park green space. As the construction of urban branch roads and sidewalks is relatively dense, the slow traffic road network will be more complete, and the accessibility of park green space within this range will be higher. If there are many kinds of road traffic congestion and broken roads in the urban streets, it will lead to the obstruction of residents' walking or cycling, and reduce the accessibility of urban parks and green spaces within the city. Building a complete and smooth slow

traffic network is the main means to improve the accessibility of urban park green space. Strengthening road traffic construction can improve the accessibility of urban park green space.

5.3. By Strengthening the Planning and Construction of Urban Park Green Space

At the end of 2007, the Hefei Green Space System Planning (2007-2020) proposed that the urban park green space area of Hefei was 2500 hectares, the per capita park green space reached 9.26 square meters, the urban green space rate reached 33.26%, and the green coverage rate reached 37.09%. By 2020, the green space rate in Hefei urban area is 31.54%, the per capita park green space area is 9.41 square meters per person, the central urban green space rate is 29.87%, and the per capita park green space area is 8.29 square meters per person. It can be seen that although the urban area has met the requirements of the national garden city, it still lags far behind the planning goal.

5.4. Specific Optimization Strategies and Means through Urban Parks

As for the site selection of new urban park green space, the new park should adjust the imbalance between supply and demand of park green space, make use of existing resources, and shoulder the important task of reflecting historical and cultural characteristics. According to the characteristics of urban parks and green space in Hefei, especially the characteristics of the large population density in the old city and the high pressure of park services, relying on the unique water system of Hefei, such as the Ring Park, the Serie River, and the Banqiao River, a number of distinctive community parks and amusement parks will be arranged along the line to improve the urban park system, build the emerald necklace with Hefei characteristics, and improve the living environment. The specific location should be selected at the junction of the Tyson polygon and near the area with high demand evaluation. Secondly, smaller community parks and amusement parks can be built near areas with high demand evaluation.

Promote the construction of community parks and street parks. The reasonable layout of urban park green space can effectively improve the urban environment. Therefore, building a complete urban park system is an important part of urban development. Community parks and street parks play an important role in the urban park system because of their small floor area, small service scope, and easier construction than other types of parks. All kinds of urban parks in the urban area of Hefei City have more or less uneven distribution and other problems. Community parks and street parks also have problems of uneven distribution and small number. The areas under construction promote the construction of community parks and parks, which play a role in easing the pressure on the green space of comprehensive parks and parks of the same type, so that citizens can go out to see the green [17].

At present, most park construction is considered from the perspective of park green space supply from the perspective of layout, and rarely from the perspective of user demand. However, the main service object of Community Park is the surrounding residents, which is closely related to the life and recreation of residents. Therefore, the layout of such park green space should be changed from the traditional layout mode focusing on park green space supply to improving the attention to the needs of urban residents, this can better balance the relationship between community parks and amusement parks and the recreational needs of residents. It is suggested that community parks of different sizes should be configured in different areas according to scientific recreational needs analysis.

Compared with the community park, the area of the park is smaller, but the advantage is that the construction cost is lower, and it is easier to build in a narrow plot with limited conditions. It is suitable for adding street parks in areas with high population density and tight land use, such as the

old urban area, to meet the needs of residents for leisure and recreation. When planning and constructing the amusement park, we can analyze the expansion possibility of the existing amusement park in two ways, and supplement the design if conditions permit. To improve the layout of the park, but it is still necessary to pay attention to the planning and construction of the park. Due to the small area or subject to the shape of the plot and other factors, reasonable plant configuration and related service facilities are the main components of the park. When building the park, the overall style of the area or the whole city should be considered, highlighting its own characteristics, while also coordinating with the overall style and culture of the city. Urbanization construction will inevitably lead to increasingly tense land resources with the continuous expansion of the city, especially there are almost no unused land resources in the built-up area. In order to alleviate the pressure of urban public green space, we can consider gradually improving the utilization rate of green space.

In general, the planning of urban green space system requires that the improvement of urban ecological environment should be carried out from multiple levels and angles. Under the condition of fully protecting the natural environment, Hefei's natural resources should be used to create ecological corridors to realize the connectivity of ecological space, build a complete landscape pattern framework, and ensure the continuity and stability of urban ecological system. As a part of the urban park system and urban green space system, the construction of urban comprehensive parks should be consistent with the planning requirements of urban green space system due to the different development history and conditions of each administrative district of the city. The different population density, economic level, natural resources and other factors in each administrative district will lead to different levels of park green space construction in each administrative district, More targeted additional measures should be put forward according to their respective situations. From the ecological perspective, the comprehensive park should make full use of the advantages of Hefei's landscape, protect and construct urban park green space based on natural resources, create urban parks with profound connotation, highlight the long history and cultural landscape of Hefei, and enhance the attraction of urban parks.



Figure 4: Inadequate maintenance and management in urban parks.

Improving the utilization rate of dedicated green space plays a role in improving the urban ecological environment, and accounts for a large proportion of the whole urban green space. Although most of the auxiliary green space is a small green space, it has a large number and is more flexible than other urban green space. To improve the service level of the existing park green space, according to the field survey, most of the existing park green space in Hefei urban area can basically meet the needs of the citizens, and the maintenance and management effect is good, but there are also some community parks and amusement parks with poor maintenance and management, and inadequate public facilities (Figure 4). The best solution is to adopt different measures for existing parks to improve the service quality of existing parks. The service population of dedicated green space is limited, and the utilization rate is often not high. Opening part of

dedicated green space for surrounding residents to carry out recreational activities can not only increase urban public green space to alleviate the service pressure of urban park green space, but also make full use of existing resources and reduce the waste of urban green space resources.

5.5. Optimization through Internal Construction of Urban Parks

Attention should be paid to the shaping of park characteristics. Natural resources such as Chaohu Lake and South Feihe River in Hefei urban area, cultural and historical relics such as Li Hongzhang's former residence, etc., many of which have been used to create a number of urban parks that are popular with citizens. The transformation and upgrading of urban parks should match the overall urban landscape. Although the current can basically meet the needs of citizens, it still needs to be maintained, managed and upgraded in the future, it is important to pay attention to the protection and utilization of ecological resources and human resources. Urban parks built with human resources should pay attention to the characteristics of the park itself, display the human characteristics of Hefei, and finally build a green space system of urban parks that complement the urban style. Urban park green space serves urban residents. In order to improve the utilization rate of park green space, the connection between the park and the outside of the park should be strengthened, including the connection between the park entrance and the city road, the connection between the park and the surrounding public service facilities, so as to better integrate the urban park into the urban space.

Optimizing the internal roads of the park is the key for tourists to go everywhere in the urban park. Improving the quality of supporting facilities and roads not only provide access for tourists in the urban park. In the future construction of parks and greenbelts in Hefei, the performance and grade of roads in urban parks should be clarified, and primary and secondary roads, tertiary roads, recreational roads, fire roads, etc. should be set up. According to the needs of different people, barrier-free access roads should be considered to build a smooth and continuous park road system. In terms of supporting facilities in the park, the park shall be uniformly arranged to achieve full coverage of service facilities in the park. For example, protective measures shall be set up in the water area, mountains and other places where unexpected expenses are likely to occur, and warning signs shall be set up around the park, taking into account the needs of different people.

6. Conclusion

According to the previous article, from the initial focus on the number of urban parks to the service quality of parks to the macro layout of urban park green space, in the era of rapid development of big data, the diverse data sources and rich and huge amount of data provide a quantitative basis for the study of urban park green space layout, so that the author continues to explore and discuss how to optimize the layout of urban park green space to achieve the balanced distribution of resources, So that urban park green space can play a greater role. In short, the layout optimization of urban park green space in Hefei should take full account of the needs of urban residents, and be optimized after a comprehensive analysis of the supply of existing park green space. It should pay more attention to the green space around residents, make full use of its widely distributed and accessible advantages, and optimize under the conditions that the level of economic development and urban land use can support, so as to achieve a healthy and balanced layout of urban park green space Stable state. Effectively playing the role of improving residents' health plays an important role in building a healthy community environment and a healthy city.

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