

AN OVERVIEW OF URBAN PARK DEVELOPMENT IN ZHENGZHOU, CHINA

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Abstract: As essential elements of green spaces and social spaces in cities, urban parks significantly improve the quality of life and promote urban sustainability. Research on the development process of urban parks can be meaningful for coping with the current issues and future opportunities facing cities. This study takes Zhengzhou as the case aiming to outline the development process and characteristics of urban parks within the city. We adopted the empirical analysis to review the evolution processes and trends of Zhengzhou's urban parks from the perspective of implementation approaches, spatial layout, and functions and uses. Results reveal four subsequent phases: the emergence phase (1949-1977), the growth phase (1978-1996), the acceleration phase (1997-2012), and the promotion phase (after 2012), according to the periods of urban development and the opportunities for green space development. The discussion includes development issues and strategies regarding land use approaches, user group needs, and public participation. The findings may help formulate adaptive and effective policies and planning tools for urban parks and provide a basis for further research on urban parks and Zhengzhou's road to the ideal "Park City".

Keywords: development phases, evolution trends, implementation approaches, spatial layout, functions and uses.

1. Introduction

Urban parks are green spaces for the public to recreate, relax and communicate (Chiesura, 2004; Smith et al., 2013). It has been shown that urban parks can help improve the quality of life in cities, enhancing human well-being (Chiesura, 2004; Sherer, 2003), facilitating social cohesion (Kaźmierczak, 2013; Völker et al., 2007), contributing to the general education of the citizens (Fekete et al., 2020), and providing ecosystem services within cities (Forsyth and Musacchio, 2005; Haase et al., 2014). Thus, urban parks can promote the

sustainable development of urban society and environment (Harnik, 2012; Maas et al., 2006). The term 'public park' implies the park that is fully and freely open to the public (Conway, 1996), which refers to a crucial type of urban parks. Since Birkenhead Park, the first real public park, was established in the UK in 1843 (Crompton, 2007), urban parks have gradually developed into an integral part of the urban landscape with the development of cities.

In the broader context of global urbanization, more and more cities today are

increasingly exposed to a series of environmental and social issues. With urban sustainable development gaining increased recognition, ecology, unique urban character and preserved historic value have growing importance regarding the European settlements. Characteristic streetscapes and appearance make cities more attractive for both visitors and investors, strengthening also their economic position. An urban environment with increasing green infrastructure is a source of inspiration for the citizens, strengthening recreation, health and local identity.

Regarding China's rapid urbanization process, in order to optimize the urban human living environment, a series of urban development models have been explored and promoted by the country according to different urban development stages and goals. Among them, "Landscape Garden City", "Ecological Garden City", and "Park City" are progressive urban development models with various standard levels, which put an emphasis on urban greening, especially with urban park construction as an essential instrument. "Landscape Garden City" is guided by the

aesthetics of urban landscape and focuses on green space construction (Chen et al., 2013). The primary indicators for evaluation include public green area per capita, green area ratio, and green coverage ratio. "Ecological Garden City" aims to build a livable city with a good ecological environment (Cheng and Cheng, 2018; Zhang et al., 2017). It has a relatively comprehensive evaluation system, in which the park-related indicators mainly include the park area per capita, the coverage ratio of park catchment area, and the minimum park area per capita in each urban district. Currently, "Park City" is a proposed vision, emphasizing people-centered city and ecological civilization within cities (Wu et al., 2018; Li and Zhang, 2018; Wang, 2018; Zhu and Gao, 2018). The evaluation indicators have not yet been determined, but a higher standard is undoubtedly expected. Like many other cities, Zhengzhou was successively guided by the concepts of "Landscape Garden City", "Ecological Garden City", and "Park City" in the development process, which has greatly fostered the planning and construction of urban parks (**Table 1**).

Table 1. Comparison of "Landscape Garden City", "Ecological Garden City" and "Park City"

Urban development model	Year proposed	Core purpose & Focus of Construction	Park-related metrics	Year Zhengzhou reached
Landscape Garden City	1992	<ul style="list-style-type: none"> • Aesthetics of urban landscape • Green space construction 	Public green area per capita	2006
Ecological Garden City	2007	<ul style="list-style-type: none"> • A livable city with a good ecological environment • Urban ecological environment; urban living environment; urban infrastructure 	Park area per capita; coverage ratio of park catchment area; minimum park area per capita	2020
Park City	2018	<ul style="list-style-type: none"> • A harmonious coexistence between man and nature • People-centered city; ecological civilization; integration of urban park system and urban spatial pattern 	Undetermined	-

Despite considerable studies about urban parks from multiple perspectives, there is little empirical evidence on the analysis and evaluation of urban park development itself from a historical and local point of view, which should be the basis for a better urban park system. Therefore, research on the development process of urban parks can be of significance for dealing with the current problems and future opportunities of cities. This study takes Zhengzhou as the empirical case aiming to outline the development process and characteristics of urban parks within the city. The research questions are threefold: 1) What phases have urban parks in Zhengzhou gone through? 2) What are the evolution trends? 3) What development strategies can be formulated? We started by examining four progressive phases designated according to the city's development stages and green space development opportunities. Then we reviewed the evolution trends from the perspective of implementation approaches, spatial layout, and functions and uses. The last part discussed the development issues and strategies regarding land use approaches, user group needs, and public participation. The overview of urban park development in Zhengzhou may help formulate adaptive and effective policies and planning tools for urban parks and provide a basis for further research on urban parks and Zhengzhou's road to the ideal "Park City".

2. Study Area and Methods

2.1. Study area

Zhengzhou is one of the eight ancient capitals of China and became the capital city of Henan Province in 1954. Located on the North China Plain and the south bank of the Yellow River, the city has made full use of its critical central location to develop into a significant integrated transportation hub in central China.

Zhengzhou has a multi-layered natural and built heritage originating from various historical periods, strongly related to the unique topography of the city. Historic parks and open spaces are also scenes of the life of the city today. Development-oriented heritage conservation and green infrastructure development therefore makes an integral part of the renovation projects.

The paper takes the central urban area of Zhengzhou region as the study area (**Fig. 1**). It covers approximately 1010.3 km² and 5.22 million inhabitants according to the 2019 census (Bureau ZS, 2019), with several rivers passing through (e.g., Jinshui River, Dongfeng Canal, and Xiong'er River). There are five districts in the central urban area: Zhongyuan, Erqi, Guancheng, Jinshui, and Huiji, with the new east urban zone involved in.

The history of Zhengzhou dates back to about 3,600 years ago when it was the capital of the Shang Dynasty. The 7-kilometer-long rammed-earth Shang Dynasty city wall still exists in the city center. A series of historical parks have been developed around it. However, in the later troubled history of Zhengzhou, due to factors such as wars and floods, very few historical features were preserved in the urban area. After the start of the 20th century, it is worth mentioning that several major green spaces were developed by the local government. Pingmin Garden, with an area of 8 acres, was first constructed for residents to visit, but it was eventually abandoned. Then Bishagang Cemetery was established in 1928 to commemorate the martyrs, later converted into the urban park with the longest history in Zhengzhou. And there was a green space centered around Penggong Temple, where the first real urban park was established later. Besides, Longhai Garden covering an area of 75 acres, was built in a nursery in 1934 for citizens to relax and enjoy, which was later changed. By the time of liberation in 1948,

Zhengzhou was a dilapidated small county after the war with only a few green spaces, including Longhai Garden, Bishagang Cemetery, the green space of Penggong Temple, and several private gardens. And there were few street trees in the urban area. Furthermore, due to the accumulation of sand caused by floods, Zhengzhou suffered from frequent sand storms and was known as the "Sandy City" (Committee ZLHC, 1997). After the founding

of New China in 1949, Zhengzhou entered a development era and started urban construction. Notably, to improve the urban environment and change the city's image, a large number of trees were planted continuously in the urban area at the call of the municipal government. By 1985, the green coverage rate had reached 35.25%, which earned Zhengzhou a reputation as a "Green City" (**Fig. 2**).

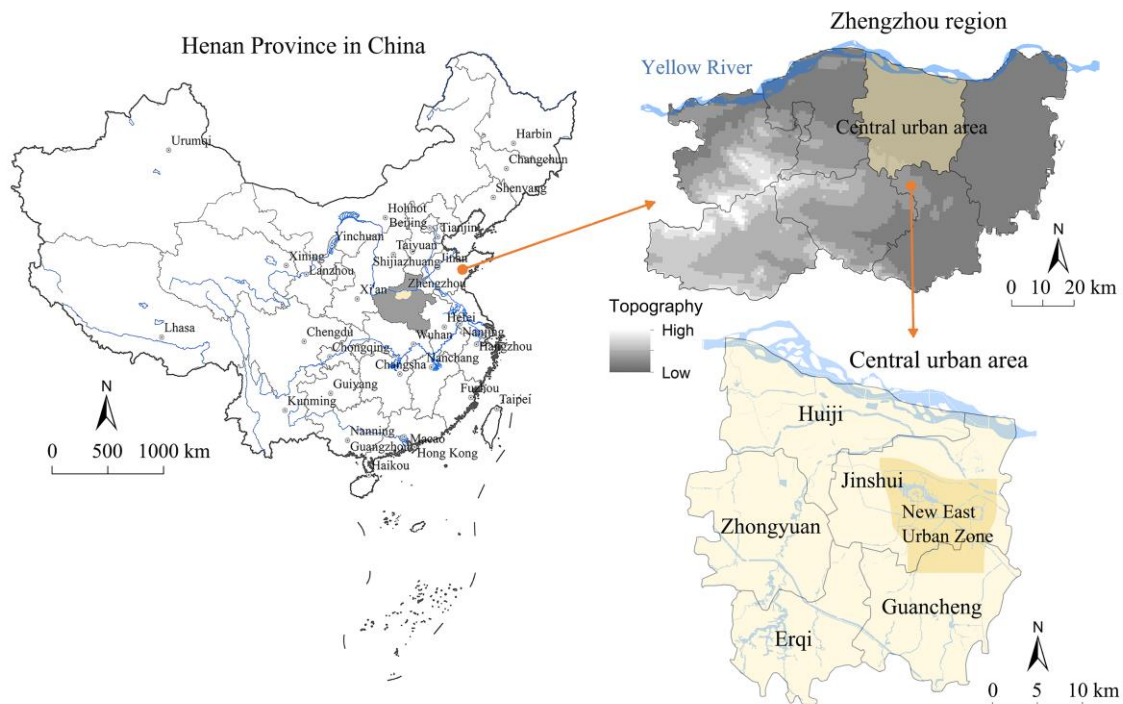


Fig. 1. Geography, topography and administrative units of Zhengzhou, Henan Province (Source: Prepared by the Author)

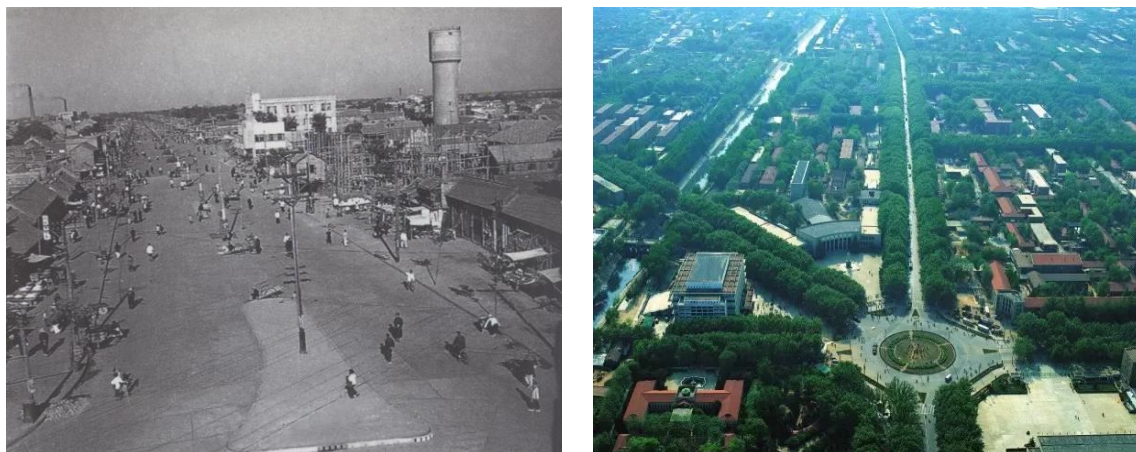


Fig. 2. Comparison of "Sandy City" image from the 1950s and "Green City" image from the 1980s (Source: mt.sohu.com; sh.dahe.cn)

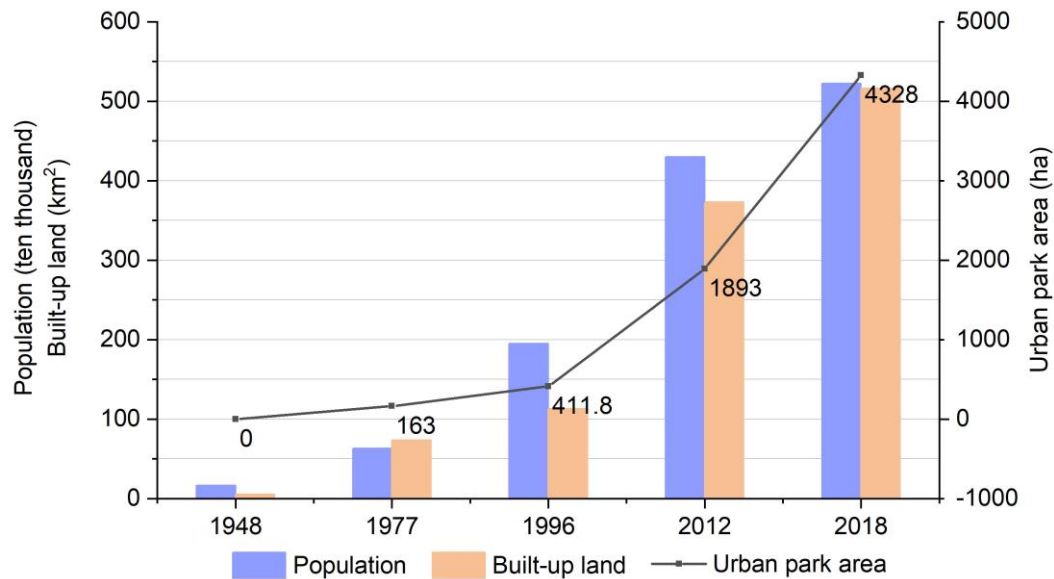


Fig. 3. Changes over the years in population, built-up land, and urban park area in the central urban area (Source: Municipal Bureau of Statistics and Zhengzhou Statistical Yearbook)

Over the past decades, Zhengzhou has undergone rapid urbanization with tremendous changes in population and built-up land in the central urban area. This has brought great development to urban green spaces, especially urban parks. According to statistics, the area of urban parks has grown substantially and rapidly (**Fig. 3**). The time frame of this study is from 1949 to the present.

2.2. Methods

This study was conducted using qualitative and inductive methods. We first applied empirical analysis based on text and illustrations to outline the development of Zhengzhou's urban parks from the perspective of implementation approaches, spatial layout, and functions and uses. It was followed by an evaluation of the main evolution trends. After that, a theoretical analysis on existing issues was conducted to discuss the development strategies for urban parks in Zhengzhou, referring to related research results.

3. Results and discussion

Zhengzhou's urban park development phases

- 1) The emergence phase (1949-1977)
 - Zhengzhou was transformed into the capital city of Henan Province in 1954, which brought unprecedented opportunities for urban development.
 - After the founding of New China in 1949, the country began to attach importance to people's leisure and recreation activities. Therefore, the construction of urban parks received support from the municipal government.

For Zhengzhou, the urban park was just an unfamiliar concept until 1952 when People's Park was established near the first planned city center with historical temples preserved. Subsequently, in 1957, Bishagang Park was converted from the original martyr's cemetery to be a landmark of another newly established city center. Then in 1964 Zijingshan Park emerged based on an ancient urban district from the Shang Dynasty (**Fig. 4**).



Fig. 4. Zijingshan Park
(Source: blog.sina.com.cn)



Fig. 5. The first three parks in the urban pattern of the 1960s (Source: Prepared by the author)

The implementation of the original urban parks mainly relied on municipal government investment, including the transformation of special green spaces and historic open spaces. The three urban parks were all built as municipal-level parks to attract citizens from the whole city. That is why they were located at the critical nodes of the urban layout (**Fig. 5**). They were all multifunctional parks, combining culture with leisure and social activities. Moreover, under the guidance of policies, urban parks usually also played a role in agricultural production.

Urban parks of Zhengzhou can be traced back to the first three park initiatives. All of them have played a vital role in urban life and enjoyed a high reputation among citizens.

2) The growth phase (1978-1996)

- Driven by economic reform and opening-up policies proposed in 1978, the national economy progressively underwent a historic transformation from a centrally planned to a market

economy, which significantly promoted urbanization.

- With a fundamental change in land development, land prices became a key factor in determining the urban spatial layout (Xu, 2007).

Since urban parks do not have an obvious role in generating economic benefits, it is difficult to reserve land for them through a purely market competition mechanism (Wolch et al., 2014). The "Management Regulations for the Construction of Urban Green Spaces in Zhengzhou" was promulgated by the municipal government to ensure development opportunities for green spaces, including guaranteeing required land and funds, supervising illegal occupation, etc. The area of urban parks increased by nearly 250 ha from 1977 to 1996. A few new urban parks were provided at essential locations, such as Shang City Park along ancient city wall and Xintongqiao Park beside the main road overpass.



Fig. 6. The belt-shaped park along Jinshui River (Source: Henan Business Daily)

Moreover, running through the central urban area, Jinshui River was an important but long-term polluted river. As part of an improvement project, the first belt-shaped riverside park was planned and developed here to enhance the urban environment and create leisure space for citizens (**Fig. 6**). On the whole, some critical scattered spots and linear areas were given priority to develop into urban parks.

In order to create leisure landscapes, plant design in urban parks was in focus. And, for exploiting economic benefits, urban parks increasingly accommodated diverse commercial facilities for amusement (**Fig. 7**). It can be said that leisure and amusement played a major role in urban parks.

3) The acceleration phase (1997-2012)

- The municipal government made a major strategic decision in 2000 to build a "Regional Central City", which greatly accelerated the urbanization of Zhengzhou.
- As the construction of green spaces lagged behind the urbanization process for a long time (Zhao et al., 2003), Zhengzhou finally lost its reputation as a "Green City". This largely urged the municipal government to initiate a greening campaign in 1997 and then set the goal of creating a "Landscape



Fig. 7. Amusement facilities in Bishagang Park in the 80s (Source: forums.nphoto.net)

Garden City" to improve the city's appearance.

Urban parks were increased through innovative development approaches led by the municipal government, including changing other types of green land into and renting land owned by farmers for urban parks. Subsequently, as part of a comprehensive renewal of the old city, multiple tools, such as regeneration of run-down areas, replacement of industrial land, and conversion of illegal construction land, were applied to develop urban parks. Furthermore, through the overall urban planning, a large area of parks at multiple levels was developed in the new east urban zone to create an ecological and livable environment (**Fig. 9**). In addition, "Management Measures for Zhengzhou Urban Green Space Boundary" was published by the municipal government to ensure designated existing and future urban green spaces. From 1996 to 2012, the area of urban parks grew rapidly, up to about 4.5 times.

The local authority approved the "Green Space System Plan for Zhengzhou City (2003-2010)" (**Fig. 8**) and the "Green Space Plan for Local Recreation in Zhengzhou Old City". As a result, a large number of residential-level parks were constructed with the consideration of spatial balance.

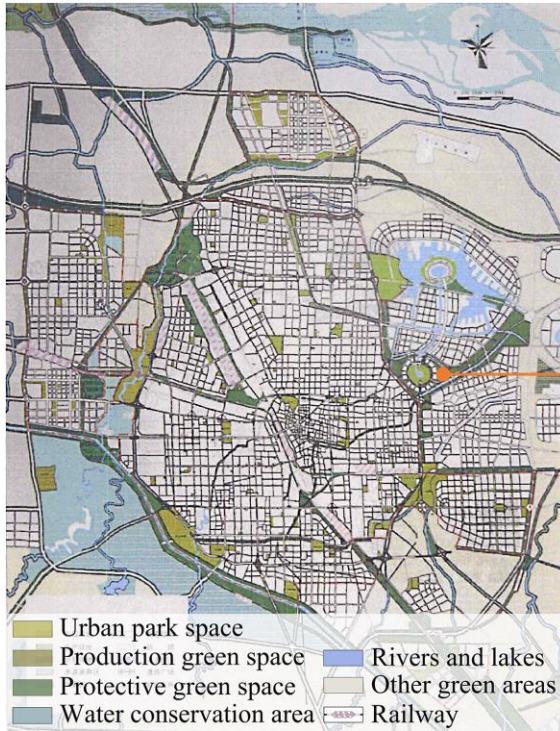


Fig. 8. Green Space System Plan for Zhengzhou City (2003-2010) (Source: news.zynews.cn)

The belt-shaped parks along Xiong'er River, Dongfeng Canal, and Jinshui River were built and open to the public, creating more convenient leisure opportunities. It was the first time that urban green spaces were defined as a system, and catchment areas of the parks were considered.

Under the call of the greening campaign, remarkably, most urban parks gradually changed into free-access public parks and gained more visibility from the outside by demolishing park fences. Various functional zones were added to the large parks, such as fitness areas for seniors and children's playgrounds. Due to the broad introduction of flowering plants, flower viewing in urban parks became popular. And urban parks had gradually played a role in attracting visitors during major festivals and events. In general, the uses of urban parks were significantly improved, and the parks' recreational functions were enhanced.



Fig. 9. The parks in the new east urban zone (Source: news.zynews.cn)

4) The promotion phase (after 2012)

- Zhengzhou was designated as "National Central City" in 2016 and is at the highest level in the national urban system planning with eight other cities, including Beijing, Tianjin, and Shanghai, which required a higher standard for urban development of Zhengzhou.
- After realizing the "Landscape Garden City", Zhengzhou took the "Ecological Garden City" as its new development goal and then "Park City" in order to improve the urban living environment.

To strengthen the construction and management of urban greening, the new version of regulations on urban green spaces in Zhengzhou took effect in 2012. In response to the rapid expansion of urban built-up areas, it emphasized reserving essential land for urban parks in the newly planned urban zones. In addition, the updated regulation clarified that

the municipal government was responsible for allocating land for the parks. In order to optimize the distribution of urban parks, along with the continuous comprehensive regeneration of the old city and run-down areas, appropriate plots freed up were encouraged to be used for developing urban parks. Compared with 2012, the area of urban parks more than doubled in 2018.

The local authority accepted the "Green Space System Plan for Zhengzhou City (2013-2030)". And the goal of developing an urban park system was put forward. Moreover, the planning and construction of green and ecological corridors along significant circular and radial roads were widely implemented, which has enhanced the link between green spaces. Furthermore, the "Three-Year Development Plan for Providing Public Green Spaces within 300m and Parks within 500m Ranges" was issued by the local authority in 2018, aiming to achieve full coverage of park

catchment areas (**Fig. 10**). Thus, many parks at the municipal, district and residential levels were planned and constructed step by step to mitigate the uneven distribution. On the whole, the connectivity and spatial balance of urban parks were much emphasized and improved.

In order to enrich the experience of park users, multiple types of parks were developed, including wetland parks and theme parks. Besides, through ecological approaches, such as urban rainwater collection and ecological revetment design, urban parks have been expected to provide ecosystem services. Furthermore, historical and cultural characteristics are valued, aiming to use urban parks to display and transfer urban culture. It can be said that urban parks are not only increasingly improved to meet diverse leisure and recreation demands but also play an essential role in promoting urban ecology and culture.

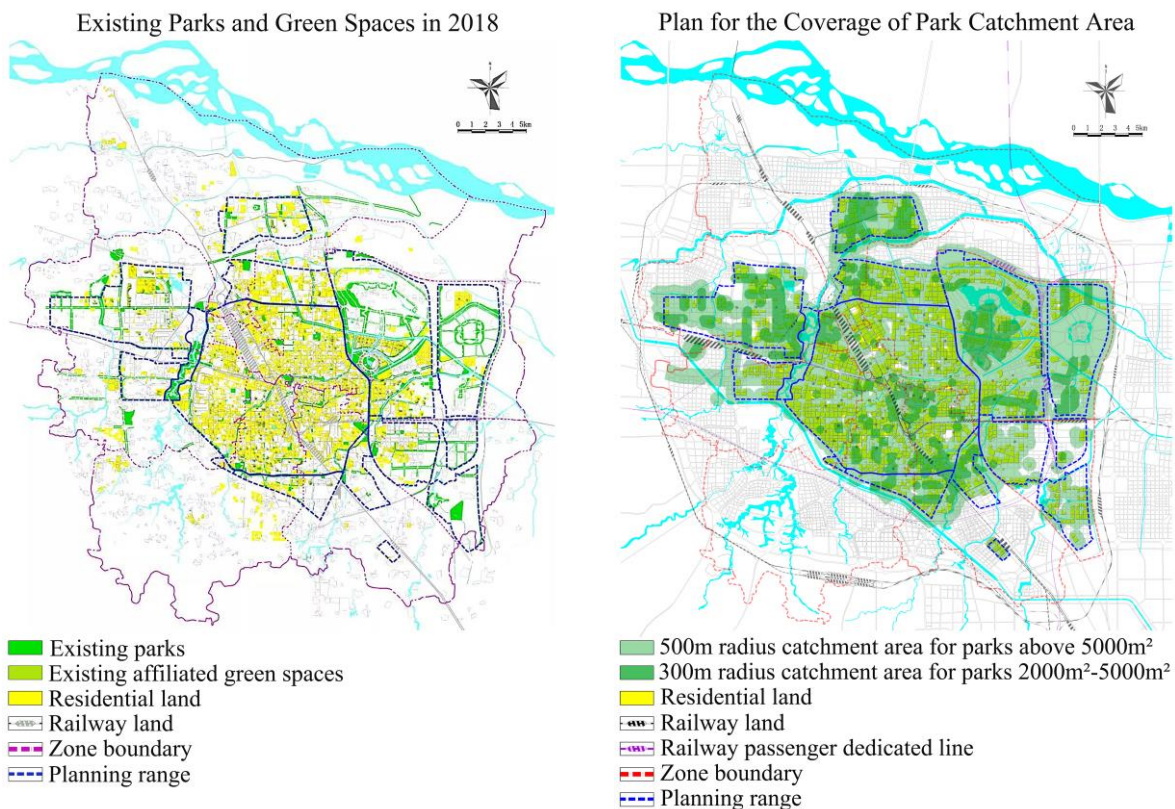


Fig. 10. Plan for the Coverage of Park Catchment Area (Source: www.sohu.com)

Zhengzhou's urban park evolution trends

1) Multiple implementation approaches

To cope with the weak position of urban park development regarding land availability under the market mechanism, a method combining centralized allocation and legislative control is formed. With the acceleration of urbanization, urban park development has been gradually integrated into the urban regeneration process, relying on land-use change. Besides, other available fragmented land is also encouraged to be flexibly converted to parkland. For newly expanding urban zones, urban parks are highly considered from the initial planning.

2) Systematic and balanced spatial layout

Urban parks have been gradually considered as a whole system with a distinct hierarchy. The connectivity of urban parks is strengthened through belt-shaped parks along rivers and roads, which significantly improves accessibility. The spatial distribution of urban parks has undergone a transition from relatively random to balanced. Moreover, the indicators for urban park allocation have evolved from controlling baseline (e.g., park area per capita) to assessing accessibility (e.g., park catchment area).

3) Humanized functions and uses

With the development of the city, special functions (e.g., agricultural production) caused by historical reasons are gradually abandoned. Leisure and recreation have become the main functions of urban parks to meet the needs of citizens. Meanwhile, as urban parks tend to be diversified, urban parks have taken cultural promotion and ecological improvement roles. Moreover, from closed to open, from payment to free, the service scope of urban parks has been dramatically expanded.

Discussion of development strategies

1) Innovating land use approaches

As Zhengzhou continues to undergo accelerated urbanization, the availability of land resources in the central urban area tends to decrease. Hence, the solution of simply planning more new land for urban parks will no longer be appropriate for the crowded urban environment. At the same time, the long-term relatively rapid and extensive urban expansion has resulted in unreasonable urban land use patterns. Thus, in order to change the insufficient and unbalanced supply of urban parks, comprehensive and efficient utilization of underutilized land and neglected space can be a promising approach (Ren, 2003; Wang et al., 2019). For example, Singapore reserves land for green space by rezoning and integrating low-efficiency land. In addition, for certain types of open spaces (e.g., schoolyards, rooftops, parking, roads, and markets), the application of double-use parks and temporary parks can be realistic solutions to increase park space (Harnik, 2012).

2) Responding to user group needs in a social context

With the development of modern cities, the connotation of public service equity has evolved from spatial equality to social equity (Jiang et al., 2011). Specifically, the concept and measurement standards of urban park equity have shown a more refined trend with the evolution of city level, social demand, and public awareness (He et al., 2019). It can be said that urban parks are expected to have higher adaptability, changing from place-based to people-based measures and from large-unit to small-unit measures. However, the allocation of urban parks in Zhengzhou has been limited to promoting spatial balance, and it is insufficient to deal with diverse user needs and uneven social context. Considering the development phase of urban parks, it is necessary to pay attention to diversified needs

of user groups within the complex social context in order to balance the supply and demand of urban parks.

3) Improving public participation mechanism

Various findings have proven that public participation is an integral part of sustainable urban park planning and management (Speller and Ravenscroft, 2006; Saruwono and Mohamed Anuar, 2018; Huang, 2010). On the one hand, public participation helps to understand park users' demands and integrate their ideas to improve the projects. On the other hand, involving local inhabitants in different stages of park development can significantly enhance their sense of responsibility for the active maintenance of urban parks (Yan, 2019). However, top-down planning and management have long been in operation for urban parks in Zhengzhou, which gives local citizens few opportunities to influence decision-making. Therefore, to achieve more effective development, the authorities should support and ensure public participation, including providing diversified channels for communication and ensuring the transparency of the decision-making process.

4. Conclusions

The sequential views, the place and its spirit, and the content altogether define urban parks, open spaces and streetscapes, as an integral part of urban design, is the art of relationship (Cullen, 1971). The duty is therefore to explore new, hidden relationships or strengthen existing ones, which provide both healthy recreation and leisure, and visual urban experience, unveiling the values and characteristics of the specific place to the spectator.

We selected Zhengzhou as the empirical case in urban China and reviewed its urban park development. The results show that the

urban park development in Zhengzhou is a continuous and changing process. It has gone through four progressive phases: the emergence phase (1949-1977), the growth phase (1978-1996), the acceleration phase (1997-2012), and the promotion phase (after 2012). On the whole, we can see an evolution in Zhengzhou's urban parks in terms of diversification of implementation approaches, systematization and balance of spatial layout, and humanization of functions and uses. The future development strategies to tackle existing problems mainly lie in innovative land-use approaches, response to user group needs in a social context, and improvement of public participation mechanisms. The research findings may help formulate adaptive and effective policies and planning tools for urban parks and provide a basis for further research on urban parks and Zhengzhou's road to the ideal "Park City".

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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