



A satisfaction analysis of the infrastructure of country parks in Beijing



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ABSTRACT

The city of Beijing began its “country parks circle projects” in 2007; since then, more than 50 country parks have been built to provide recreational facilities and to improve the quality of the landscape surrounding the city. As this fast-paced and massive construction of country parks has been put into public use, many problems that are associated with infrastructure and support services have arisen. In this study, we analyzed the infrastructure status of 38 built-up country parks and performed a cluster analysis to determine the correlation and characteristics of the parks. Meanwhile, a public opinion survey was conducted on infrastructure support. The results indicate that the parks had an average green space ratio (green space area over park area) of 91.0%. The average road density was less than 200 m/ha. The public restroom service radii ranged from 178 m to 480 m. The average density of waste disposal bins was 1.3 pcs/100 m, and the average density of resting facilities was 32.3 pcs/km. Twenty-one percent of the country parks were equipped with sports, fitness and children’s entertainment facilities, and 19 of the country parks were equipped with a complete signage system on the roads and plants. Using a cluster analysis, the 38 country parks were classified into four clusters (cluster 4 had only one park). However, the results of the public acceptance survey in eight of the parks indicated an overwhelming dissatisfaction by park visitors toward the park facilities. These findings reveal a clear picture that the massive build-up of the county parks system faces massive management challenges in the present and future. A large amount of work on public facilities is needed in order to improve the fundamental services in these parks.

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Introduction

By 2050, the urban population in the world is projected to increase by 63.4% relative to the population in 2014 and this increase is expected to be accompanied by an increase in urban land cover (United Nation, 2014). The growth in the urban population and urbanization have not only triggered a series of ecological and social problems, e.g., water and air pollution, noise and shrinking green spaces for recreation, but have also stimulated the public’s demands for better living environments and more outdoor recreational opportunities (Kabisch and Haase, 2013). Facing the conflict between the shortage of outdoor recreational spaces in urban areas and the increasing eagerness of the public for nature, urban planners and policy makers have turned their attention to suburban areas for solutions. For the purpose of nature conservation and

public recreation, since the 1970s, various rural recreational programs have been started in suburban areas in developed countries, e.g., the country parks in the UK, the park system that was developed in the forest preserves surrounding Chicago and the recreational and leisure facility enlargement program that was developed in the green belt of greater Copenhagen. These programs achieved great successes in enhancing residents’ outdoor recreational and natural experiences (Lambert, 2006; Gobster, 1998; Caspersen and Olafsson, 2010). In particular, the country parks, which have a history of over 40 years, have gradually developed into a typical park pattern for recreation, environment protection and outdoor education, and they attract millions of visitors every year.

Country parks first emerged in England and Wales and then flourished in Hong Kong. In the 1970s, under the *Countryside Act 1968*, hundreds of country parks were designated in the UK. Unlike city parks in urban areas, country parks are located on the outskirts of cities where there are natural landscapes, countryside vegetation and pastoral features, and the parks provide people with recreational facilities (Lambert, 2006). They have fine natural conditions (rich landscape resources and biological diversity), good

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accessibility (in suburbs near cities), humanized spaces for various recreational activities and they importantly provide opportunities for the public to get close to nature and learn (Xu and Liu, 2009; Zhu and Sun, 2009). In 1976, the Hong Kong government enacted the country parks ordinance and has since opened 24 country parks for the great enjoyment of the population (Hong Kong Government, 1990). The Hong Kong country parks comprise scenic hills, woodlands, reservoirs and coastlines and provide residents with easy access to natural areas for walking, exercising, hiking, barbecuing, camping, educational services and other recreational activities (Chen and Yang, 2003; Zhuang, 2006). Because they are popular attractions, country parks provide multiple benefits, including biodiversity, heritage and culture, and they positively contribute to public services such as health, education and community development (Zhu, 2010).

China is now experiencing similar challenges of fast urban population growth and urbanization. To meet the rapidly rising demands of residents for outdoor recreation, many cities in mainland China, including Shenzhen, Guangzhou and Beijing, have incorporated the country park concept into their comprehensive urban planning systems by learning from Hong Kong's experience (Liu and Li, 2009). Hundreds of country parks have been built and put into use. However, unlike the UK and Hong Kong, there are as yet no ordinances or standards for country parks at the municipal or regional levels in mainland China. Experts in relevant fields are still exploring the path forward for the development and management of country parks. During the country park planning and development processes, park designers and urban planners conducted extensive research based on their own as well as foreign experiences and paid serious attention to the role of country parks in urban development (Peng and Zhuang, 2007; Chen and Li, 2009). Experts in geography and ecology were also consulted regarding the location, distribution and ecological functions of country parks in the urban and suburban interface areas around cities (Cong et al., 2005; Liu and Li, 2009). Generally, a review of the existing literature that is relevant to country park research in China shows that more attention has been given to country park functions, while less attention has been paid to infrastructural support (Qi et al., 2010; Yang, 2010). Studies on visitor demand at country parks have also been limited (Jim and Chen, 2006; Zhu, 2010). A large gap remains in the knowledge of the construction of infrastructure and the analysis of the demands of the public for country parks in China.

As the largest country park project in China, the Beijing country park circle is undergoing rapid development. In 2007, the *Guidance on Constructing Country Parks Inside the Greenbelt 2007* was promulgated with the aim of providing Beijing residents with more outdoor recreational opportunities. In the same year, the Beijing country park circle project began and was brought into the Beijing master plan (2004–2020), which specifies a goal to build 100 country parks in Beijing by 2020. When our study was conducted in 2011, 52 country parks had been built, and the country park circle had been preliminarily formed. However, because there were no regional or national standards to guide the rapid construction, the massive project brought some undesirable outcomes. Some studies have found that the country parks received a satisfaction of 56% for their overall conditions and were largely empty, whereas most city parks had exceeded their carrying capacities (Li et al., 2010; Zhang and Yang, 2014). From the literature review, limited information was obtained to answer the following questions. What is the overall status of Beijing's country parks? What are the characteristics of these country parks? Which aspects of the country parks are visitors unsatisfied with, and most importantly, how can the parks be improved? The park management departments urgently need answers to these questions to meet the public's demands and to fulfill the goal of the country parks.

This study was conducted in Beijing's country parks to address these questions. There may be similar issues in other country parks that were built during the same period. Accordingly, a critical review of current development practices would be beneficial to help modify the country parks to achieve the outcomes of the park development program and to meet the specific demands of public users. Our study objectives include (1) an analysis of the infrastructural status and characteristics of Beijing's country parks that were rapidly constructed, (2) an assessment of the public's satisfaction of the infrastructure using a public survey and an identification of the problems faced by the existing country parks and (3) a reference to develop a standard for country park facilities.

Methodology

Study area

Beijing is located on the Northern Chinese Plain between longitudes 115°25' and 117°30' E and latitudes 39°28' and 41°05' N, and the basin has a sub-humid continental monsoon climate. The regional vegetation contains mixed *Pinus tabulaeformis* Carr. and *Quercus variabilis* Bl forests. The majority of Beijing's existing forests were planted in the 1960s, and *P. tabulaeformis* and *Platycladus orientalis* (L.) Franco forests comprise 43% of the total planted forest area. Based on these planted forests or forest plantations, country parks have been built between the 4th ring and the 5th ring roads in Beijing (Fig. 1). The country park circle connects six major districts (Chaoyang, Haidian, Fengtai, Shijingshan, Changping and Daxing) that contain 26 townships, 91 administrative villages, 339 natural villages and three state-owned forest farms.

Country parks selection

Information for 10 parks was not available from the Beijing Municipal Bureau of Landscape and Forestry, and the data for four parks were incomplete, therefore 38 of the 52 newly constructed country parks in Beijing were selected for our study (Table 1). Meanwhile, we performed a public acceptance survey in eight of the 38 country parks: Dongxiaokou, Jingcheng Liyuan, Gaoxin, Taiyang-gong, Tianyuan, Wangxinghu, Yudong and Yukang (Fig. 1).

Data collection and processing

The accessibility of the 38 country parks was evaluated by travel time. The travel time by private car and public transportation to each country park was obtained from Google Maps. The vegetation and infrastructure data were compiled from the project acceptance reports, including the construction operation contents and the final project quantities for the 38 country parks that were provided by the Beijing Municipal Bureau of Landscape and Forestry. The country park orientation information was from the country park website.

The data included the green space ratio (green space area relative to the park area), road area, public square and building area and the number of sanitation and resting facilities per park. The proportion of traffic land area was calculated per park by the total traffic land area (including roads and the public square area) divided by the total land area of the parks. The road density was computed based on the road length per hectare per park. The ratio of lateral roads (for pedestrian and bicycle use only) to main roads (for all traffic) was calculated based on the total length of lateral roads to the total length of main roads per park. The proportion of land area used for buildings was calculated based on the land area used for management and public buildings to the total land area per park. The service radii of the public restrooms were calculated per park based on the effective service areas of the public restrooms

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