Analysis on Several Issues Concerning Sustainable Development of Urban Fringe Green Open Space in Chinese Megalopolis: Taking Three Types of Leisure and Recreation Projects as Examples

Yang Ling*
School of Landscape Architecture, Beijing University of Agriculture, Beijing 102206, China

*Corresponding author e-mail: yangling@bua.edu.cn

Abstract. Taking country parks, sightseeing agriculture and golf courses as cases, the paper analyzes the law of the emergence and development of green open space leisure and recreation projects in the fringe of megalopolis in China, based on building of a comparative model of the correlation between different project development stages and the economy and the analysis of the preference of three types of projects in the location of space, transportation and scenic resources. The results show that: ① The three representative recreation projects have basically gone through the "embryonic stage-accelerated development / upgrading transformation stage-sustained and stable development stage", as well as the different development stages of the three kinds of projects are related to some specific nodes of urban per capita GDP. ② The higher the degree of public welfare of the type of recreation project, the later the start and development, and vice versa. The emergence of golf courses is earlier than that of sightseeing agriculture, while the emergence of country parks is much later than both. At the same time, the non-public welfare recreation projects driven by market capital obviously have a more sustainable and strong development power than the public welfare recreation projects led by government investment. ③ The three types of recreation projects are consistent in the location of space, transportation and scenic resources, and are bound to face fierce spatial competition in the limited urban fringe of megalopolis. ④ From the three aspects of strengthening the development guidance of recreation projects, gradually optimizing the spatial layout of recreation projects and optimizing the allocation of traffic infrastructure, this paper puts forward some countermeasures and suggestions for optimizing the recreation utilization of green open space in urban fringe.

1. Introduction
As of the end of 2017, there were more than 100 megalopolises in China, according to the standard that urban non-agricultural population exceeded 1 million. China is in the midst of rapid urbanization. Hundreds of cities will enter the ranks of megacities in the future.
The urban fringe area is the transition zone from the city to the countryside, which is adjacent to the outskirts of the urban built-up area [1]. Green open space is mainly composed of various types of ecological green space [2], and various types of green land, such as green belts, green wedges, and green isolation areas, are the core components of green open space in the fringe area. Taking Beijing as an example, the inner area of the first green isolation area and the second green isolation area constitute a typical green open space in the fringe area.

With the rapid development of economy society and urbanization, in recent years, the types of leisure and recreation projects such as country parks, forest parks, theme parks, farmhouses and agricultural sightseeing parks, golf courses, and tourist resorts have appeared in the green open spaces in the fringe areas of mega cities such as Beijing, Shanghai, and Shenzhen. Presents the phenomenon of multi-type, multi-stage, multi-level, and multi-investment subjects co-existing, its generation, development, scale type, and spatial evolution have certain regularity. The exploration of these laws is conducive to guiding the healthy development of urban suburban recreational projects, and then providing citizens with convenient, high-quality, rich and diverse suburban recreational activities, ensuring the sustainable development of ecological green spaces, narrowing the gap between urban and rural residents in economic income and infrastructure is conducive to achieving urban-rural integration.

Country parks, tourism agriculture, and golf courses were selected as representatives to conduct research for the following reasons: on the one hand, three are prevalent in the green open space of the fringe area and attract widespread attention; on the other hand, three have different market demands and consumption levels, which are representative in many project types. Country parks represent government-funded public welfare recreational projects led by government investment; tourism agriculture represents popular projects for multi-level consumer groups, which is a diversified investment subject; the golf course represents a niche project oriented towards high-end consumers led by corporate investment.

2. Correlation analysis with the level of urban economic development

2.1. Country parks
The generation of green open space country parks in the fringe area is directly related to the level of urban economic development. Relevant research shows that in the three cities of Shenzhen, Beijing, and Shanghai, where the country parks emerged earlier, developed faster, and matured, the country parks emerged during the period of economic prosperity in the middle stage of urbanization [3]. The per capita GDP of the city began to appear when it was close to 8,000 US dollars, and then it was fully developed under the guidance of the government (Figure 1). Take Beijing as an example. In 2007, the Beijing municipal government will be the construction of country parks as the government approval and personally catch personally do the important engineering projects. The construction of 15 country parks in the first green partition area was initiated with unprecedented investment, with a total area of 2604 ha. By 2012, a total of 75 sites are planned to be built, covering an area of 5,600 ha [4], but the overall level of construction management is in the initial exploration stage. After 10 to 20 years of development and construction, the country park system in Hong Kong and Shenzhen was gradually improved.
Figure 1. Per capita GDP and Car ownership per 100 people for the year when the country parks in 3 cities came into being. (Source: painted by the author)

2.2. Sightseeing Agriculture
The emergence and development of tourist agriculture in the green open space of urban fringe is closely related to the level of urban economic development. Related research believes that it has roughly experienced the three stages of "emergence of budding-primary management-mature industrialization" [5]. According to the statistical study of Shenzhen, Shanghai, Beijing and other cities [9], the development of tourism agriculture enters a new stage when the per capita GDP of cities reaches us $1,000, us $2,500 and nearly us $5,000 (Table 1).

Table 1. The relation between development stages of sightseeing agriculture and the urban economic development in China.

| Development stage         | Relevance of economic development(Per capita GDP, dollars) | Main form                                      | Mode of operation                                      |
|---------------------------|----------------------------------------------------------|------------------------------------------------|
| Embryonic stage           | 1000-2500                                                | Agritainment                                   | Spontaneously formed individual or small group operation|
| Primary management stage  | 2500- 5000                                              | Small-scale sightseeing picking garden         | Small and medium-sized travel agencies participate in operation|
| Mature industrialization stage | Close to 5000                                         | A modern agricultural sightseeing park with multiple functions of sightseeing, leisure and entertainment | Development and management of large enterprise groups |

Source: refer to Shu Boyang, 1997, self-drawn by the author

2.3. Golf course
The emergence and development of golf courses have obvious characteristics of urban economic orientation. After the reform and opening up, Chinese golf courses have roughly experienced three stages of development: "slow development-accelerated development-sustained and stable development". Slow development stage: About 1984-1995, the local government introduced Sino-foreign joint ventures and cooperation as the main way to improve the investment environment. It was concentrated in the Pearl River Delta region and Beijing where economic development was rapid at the time; Accelerated
development stage: about 1996- In 2001, diversified investment methods led to the independent development of the industry, concentrated in the Pearl River Delta, the Yangtze River Delta, and Beijing, with the per capita GDP of the relevant cities exceeded US $ 2,500; Booming development stage: about 2002 to present, the improvement of economic development level has brought strong market demand momentum, and the development speed has risen instead of slowed down under the influence of strict restrictive policies [6]. Taking Beijing as an example, the per capita GDP of the cities at the three time nodes of golf course development in the green open space of the fringe area is about US $ 800, US $ 2,000, and US $ 4,000.

2.4. Comparison of the Development and Evolution of different Recreation projects

Through the summary and comparison of the correlation between the development stages of the above three representative recreation projects and the urban economy, the three representative recreation projects have basically gone through the "embryonic stage-accelerated development / upgrading transformation stage-sustained and stable development stage ", as well as the different development stages of the three kinds of projects are related to some specific nodes of urban per capita GDP.(Figure 2)

![Figure 2](Image)

*Figure 2. The economic relevance of Country Park, sightseeing agriculture, golf development. (Source: painted by the author)*

3. Analysis of ideal spatial distribution law of recreational projects based on demand

3.1. Space and transportation location

Related research shows that most of the plain city country parks are centered on the central city and are located in a certain radius. For example, the country park ring in the first green isolation area in Beijing is about 10-15km away from the city center. The transportation time that citizens are willing to spend from urban areas to country parks should be controlled within half an hour, and should not exceed one hour [3], therefore, convenient and mass-transit public transportation is needed, and the proximity to urban expressways and highways is conducive for citizens to drive by themselves. One of the important experiences of the development of country parks in Hong Kong is the full integration with the public transport system.

Sightseeing agriculture is most densely distributed in an area about 20 kilometers from the city center [7], and is not close to the central city. As self-driving lines, bus lines, rail transit, and tourist dedicated
lines have a preference for absorbing consumer groups with different consumption capabilities and travel preferences, transportation locations are very important for the layout of tourism agriculture. According to relevant research on the distribution of golf courses in Shenzhen, golf courses are most concentrated in the space area 15-30km away from the city center [8], while there are currently at least 15 golf courses with more than 9 holes in the first green isolation zone in Beijing. The golf courses in urban fringe areas are mostly within an hour's drive of the city center, and close to the rapid traffic line, especially in Beijing and Shanghai.

3.2. Location of featured resources
Good landscape resources and ecological conditions are the decisive factors for the location of country parks. The mountain city country park's location preferences in the mountain and the surrounding areas, the types of flora and fauna and landscape elements in such areas are relatively abundant, such as in Hong Kong and Shenzhen. The plains city country park's location preferences in river, lake and nursery land, such as Beijing, Shanghai country parks. Sightseeing agriculture usually relies on the layout of characteristic agricultural production areas such as livestock, aquatic products, fruits, and vegetables, etc. At the same time, the landscape resources close to the mountain and the water are the important supporting factors for the transformation to high-end leisure and vacation projects. The beautiful natural scenery is an important factor affecting the golf course site selection. At the same time, it is important to consider the current construction requirements of land use types, terrain, soil suitability, and vegetation and water sources. (Table 2)

| Table 2. Ideal spatial location request research of three types of recreational programs. |
|---------------------------------|---------------------------------|---------------------------------|--------------------------|
| Project Type                    | Spatial correlation factors     | Country park                    | Sightseeing agriculture  | Golf Course             |
| Conventional scale             | about 3,000ha                   | Indefinite                      | about 70 ha (18 holes)   |
| Most concentrated distribution area | about 15 kilometers from 10 to 15 kilometers | about 20 kilometers             | within 30 kilometers of 10mi |
| Traffic requirements           | Large volume of public transport and convenient self-driving lines | Diversified modes of transportation | Convenient self-driving traffic |
| Landscape and ecological resources demand. | Necessity | General preference | Strong preference |
| Other requirements             | Historical and human resources, etc. | Characteristic agricultural tradition | Engineering utilization condition |

(Source: painted by the author)

4. Conclusion

4.1. Basic conclusion
On the one hand, the development of urban economy has greatly increased the leisure and recreation demand of citizens, on the other hand, it has provided more market operating capital and urban financial investment for the development of recreation industry, and the two aspects have jointly promoted the
vigorous development of recreation industry in urban fringe. The specific manifestations are as follows: The types of recreation projects are becoming more and more abundant, gradually changing from sightseeing type to sightseeing type, leisure type and experience type "troika" which is jointly driven by. The upgrading of the same type of recreation products shows the characteristics of development from low-end to high-end. The service object has also changed from part of the population to the general public covering all levels of consumption. Therefore, the requirements of urban economic development and the level of urban economic development are the fundamental driving force to promote the production and development of recreation projects in urban fringe. The development of fringe recreation projects has gradually shifted from small-scale individual operation and enterprise management to large-scale enterprise capital investment and government financial investment.

From the comparison of the correlation between the development stages of three kinds of recreation projects and urban economy, the higher the degree of public welfare of the type of recreation project, the later the start and development, and vice versa. The emergence of golf courses is earlier than that of sightseeing agriculture, while the emergence of country parks is much later than both. At the same time, the non-public welfare recreation projects driven by market capital obviously have a more sustainable and strong development power than the public welfare recreation projects led by government investment.

The three types of recreation projects are consistent in the location of space, transportation and scenic resources, and are bound to face fierce spatial competition in the limited urban fringe of megalopolis.

4.2. Policy suggestion

(a) Strengthen the development guidance of recreational projects

In-depth study of the development and evolution of various types of recreational projects, from the ability to serve the public, the development of the timing law, the impact of ecological environment, the promotion of urban economic development and the improvement of people's livelihood and other perspectives to formulate the development policy of recreation projects. Adopt administrative approval, economic regulation, and financial support to promote the rational development of various recreational projects. Great efforts should be made to develop the types of recreational projects that serve the whole people, such as country parks; vigorously support and reasonably guide tourist agriculture, theme parks, and other recreational project types that can provide a wide range of recreational classes to a wide range of citizens; The types of recreation projects with narrow service scope and low ecological benefits, such as golf courses, are strictly restricted.

(b) Gradually optimize the spatial layout of recreational projects

Under the background of the transformation of urban economic development and transformation and the gradual withdrawal of traditional agriculture and nursery stock industry from the green open space in the urban fringe, combined with urbanization development stages and urban spatial structure characteristics, prospective overall planning and guidance for various recreational projects in the fringe area green Reasonable layout in open space. On the basis of studying the distribution law of a single project type on spatial location, traffic location and characteristic resource location, it is also necessary to focus on the needs of citizens for recreation in the countryside and the public service capabilities of recreation projects, and then through the preparation of relevant plans to optimize the space of recreation projects Bit.

(c) Optimize the allocation of transportation infrastructure

China is in the stage of rapid urbanization, and the transportation system of most megabities is not perfect, which is one of the bottlenecks in the development of the recreation industry. The optimized allocation of transportation facilities is of strategic significance to promote the development of recreation in this area. First of all, to optimize the mass transit lines and station settings: The planning and construction of subways, light rails, and BRT should consider the development demands of public welfare recreational projects, improve accessibility, optimize routes, and add branches and stations. Secondly, build a fast urban road network in the fringe area: effectively connect the expressway and urban expressway, speed up the transformation and upgrading of suburban counties and rural roads, and provide comprehensive guidance and parking services, which will effectively improve the accessibility
of self-driving recreation projects such as agricultural tourism. In addition, the tourism line is of great significance to the promotion of the passenger flow of the popular and profitable recreation projects.

**Acknowledgments**
This work was financially supported by Youth Science fund of Beijing University of Agriculture.

**References**
[1] Gu Chaolin, Urban geography of China, The Commercial Press, Beijing, 1999, pp.505.
[2] Li Min, Modern urban green space system planning, China Architecture & Building Press, Beijing, 2002, pp.5.
[3] Zhu Jiang, Study on country Park Planning in China-A case study of country Parks in Hong Kong, Shenzhen, Beijing and Shanghai, China Academy of Urban Planning & Design, Beijing, 2010, pp.13 - 107.
[4] Xu Bo, Guo Zhumei, Moving forward in the Glue between ideal and reality-- Reflections on the Planning and Construction of "Park Ring" in the Greening and isolation area of Beijing, Landscape architect: Chinese Landscape Architecture Planning and Design Collection (11), China Architecture & Building Press, Beijing, 2012, pp.1 - 3.
[5] Su Boyang, Current situation Analysis and Prospect of sightseeing Agricultural Tourism in China submitted to Journal of Materials Research, Tourism Tribune, 1997 (5), pp.31 - 43.
[6] Liu Zongxian, Analysis of Golf Industry in China, Chinese Academy of Agricultural Sciences, Beijing, 2009, pp.11 - 26.
[7] Wu Bihu, Huang Zhouwei, Ma Xiaomeng, Spatial structure of rural tourism destinations around Chinese cities, 2004, (6), pp.757 - 762.
[8] Huang Liang, Hu hui, Economic Analysis of Golf course in China, Contemporary Manager, 2006, (9), pp.146 - 147.
[9] Information on: A Summary of the Development of Tourism and Leisure Agriculture in Beijing, An investigation report on Agricultural Tourism in Shanghai, Shenzhen Statistical Yearbook 1989, Beijing Statistical Yearbook 1999, Shanghai Statistical Yearbook 1994, Guangzhou Statistical Yearbook 1997.