

# The Research on the Planning and Design of Urban Forest Parks under the Concept of Ecological Civilization

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## **Abstract:**

The construction of urban forest park is the main practical way to realize urban green development and sustainable development in the new period of ecological civilization construction. To enhance the scientific and rational construction of urban forest park can not only effectively improve the ecological environment of the city, but also truly realize the coordinated development of modern city between human and nature. This paper expounds the connection between urban forest and park forest, introduces the characteristics of the park, and then describes the design principles of urban forest, and discusses the planning and design of urban forest park construction under the background of ecological civilization.

**Keywords:** *Ecological civilization, Plants and environment, Urban forest, Forest park, Planning and design.*

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## I. INTRODUCTION

At present, China's urbanization rate is continuously increasing, the scale and number of cities are increasing year by year, and the level of urban construction and planning is getting higher and higher. In the process of urban development, certain natural resources, such as land resources and forest resources, will inevitably be occupied, which will inevitably cause damage to the ecosystem, make ecological and environmental problems increasingly prominent, and gradually become an important factor restricting the sustainable development of China's social economy [1]. The country has put forward the concept of green economic development. In addition to changing the traditional and extensive economic development methods in the past, it is also necessary to promote the construction of ecological civilization continuously and deeply, placing the construction of ecological civilization in a more prominent position [1]. To achieve the coordinated development between urban construction and ecological environment, we vigorously advocate the construction of urban forest parks, adhere to the concept of green city construction, and build a more complete forest ecological system in combination with local regional characteristics to promote the healthy and harmonious development of the city. This paper mainly starts from analyzing the construction principles of urban forest parks, discusses the current deficiencies in the construction of urban forest parks, and then proposes optimal construction strategies.

## **II. THE DIFFERENCE AND CONNECTION BETWEEN FOREST PARK AND CITY PARK**

### 2.1 A Review of Related Concepts

Park green space is open to the public in the city, with recreation as the main function, there are certain recreational facilities and service facilities, and at the same time, it also has comprehensive functions such as improving the ecology, beautifying the landscape, and preventing and reducing disasters [1]. It is an important part of urban construction land, urban green space system and urban municipal public facilities, and is an important indicator of the overall environmental level of the city and the quality of life of residents. It can be seen that urban parks contain the following connotations: firstly, urban parks are a type of urban public green space; secondly, urban parks mainly serve urban residents, but with the development of urban tourism and urban tourism destinations the formation of urban parks will not only serve the citizens, but also serve tourists; thirdly, the main functions of urban parks are leisure, recreation and entertainment, and with the development of the city itself and the external needs of citizens and tourists driven by the pull of the city park, more leisure, recreation, entertainment and other themed products will be added [2].

### 2.2 Differences and Connections Between Forest Park and City Park

#### 2.2.1 Different geographical locations

City parks are in urban built-up areas. The forest park may be in the built-up area of the city or near the suburbs, such as Shanghai Gongqing Forest Park; it may also be located in the suburbs of the city (1.5-3.0 hours away from the city), such as Xi'an Suzaku Forest Park; or it may be far away from urban residential areas, large independent forest parks [2].

#### 2.2.2 Different ecological structures

Urban parks are mainly ornamental plants and artificial maintenance, with high investment in maintenance and management, and low biodiversity and ecological stability [3]. The forest park is mainly composed of natural community plants and natural succession, with a sound ecology and high resistance to stress.

#### 2.2.3 Different space functions carried

Urban parks take artificial or semi-artificial environments as the main body, and meet people's different experience requirements for leisure, recreation, and entertainment by creating a good environment for rest and entertainment [2]. The forest park takes the natural habitat as the main body. Based on meeting the basic requirements of ecological protection, it fulfills the different experience requirements of the residents to get close to nature through nature tours, ecological experiences and leisure and recreation [3].

### 2.2.4 Complementary tour experience

With the development of "holiday economy", "holiday travel" has increasingly become a new lifestyle for urban residents [3]. As an organic supplement to urban parks, the beautiful natural scenery of Forest Park is different from the ecological experience of the city and will undoubtedly bring urban residents a richer spatial and psychological experience.

## III. CONCEPT AND CHARACTERISTICS OF URBAN FOREST PARK

### 3.1 The Concept of Urban Forest Park

From the perspective of the layout relationship between the forest and the city, it can be roughly divided into three types: "the forest is outside the city, the forest is on the edge of the city, and the forest is in the city". The urban forest park should be a collective name for the two types of forest parks, "the forest is on the edge of the city, and the forest is in the city". Different scholars have different opinions on the concept of urban forest park [4]. For example, "there are large areas of mountains, water, and forests in the city, which meet the daily requirements of urban residents for sightseeing, vacation, leisure, etc."; "landscape"; and "urban public green space located in the city and dominated by extensive forest landscapes, while providing citizens with recreational and leisure places featuring forest landscapes", etc., as shown in Figure 1. Among them, the more accurate concept is the one proposed by Huang Maoling in her paper, that is, "located in the city or suburban area, with a certain area and good natural forest landscape, and at the same time providing a forest ecological process that meets the needs of citizens' daily leisure, fitness, entertainment, ecological experience and other activities of the composite ecosystem" [4].

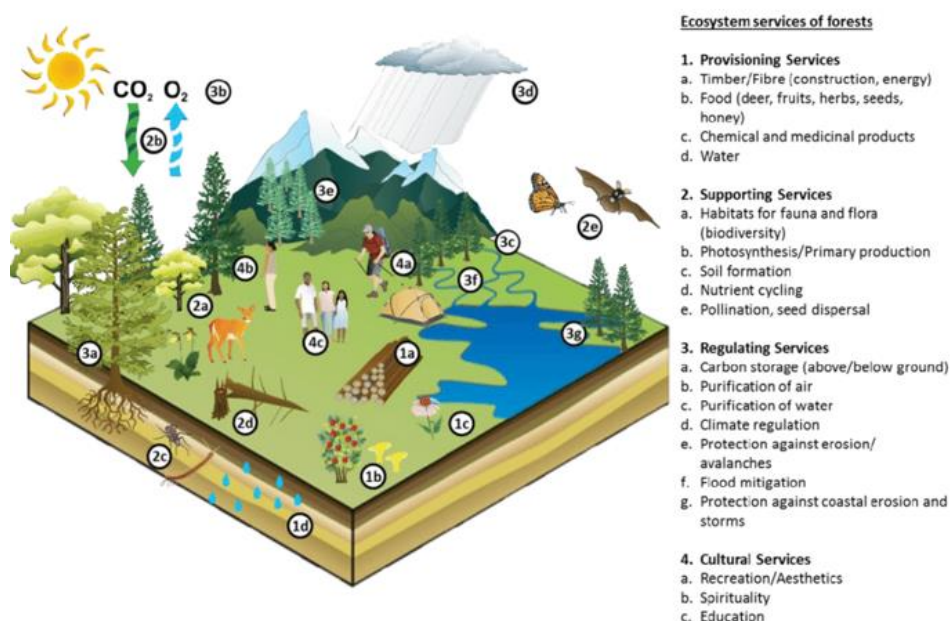


Fig.1 Concept of urban forest park

## 3.2 Characteristics of Urban Forest Parks

### 3.2.1 Complex and stable forest ecological benefits

Forest ecosystem is an ecosystem composed of arbor-based biological community (including plants, animals and microorganisms) and its abiotic environment (light, heat, water, air, soil, etc.); it is the largest ecosystem on land; It has the most complex composition, the most complete structure, the most vigorous energy conversion and material circulation, and the strongest ecological effect [5]. As the green heart of the city, the urban forest park has obvious benefits in regulating the microclimate, alleviating the heat island effect, providing oxygen sources, and purifying the air.

### 3.2.2 An open and interactive park recreation experience

Because of its close relationship with the city (near the city or located in the city), in addition to its convenient transportation conditions and good basic facilities, the urban forest park is also one of the important places for urban residents' daily leisure and recreation [5]. Therefore, there will be more requirements for its tourism and function that are different from general forest parks, and the interaction with residents will be stronger.

### 3.2.3 Unique and profound urban landscape

In the traditional Chinese urban pattern, landscapes are often used as the elements of urban composition, and water and the city are integrated, which is a unique feature. As a green forest embedded in the urban forest densely populated by modern high-rise buildings, the urban forest park will undoubtedly play a positive role in shaping the urban landscape and the formation of urban characteristics [4-5].

## **IV. PRINCIPLES OF PLANNING AND DESIGN OF URBAN FOREST PARKS**

To vigorously develop the construction of urban forest parks under the background of ecological civilization, it is necessary to clarify the constituent elements of urban forest parks [6]. From the literal meaning and definition, it is not difficult to see that the urban forest park mainly includes three elements: city, forest, and park, so we should analyze its construction principles from these three aspects.

### 4.1 The Principle of Urbanity

In the design and construction of urban forest parks, the principles of urbanity should be considered. Different from other greening projects, urban forest parks have certain scope and scale limitations in the construction area, that is, the construction of urban forest parks must be integrated into the overall planning of the city, coordinated with other infrastructure projects in the city, and the city must be considered [6]. The geographical location is determined by factors such as population density and production development

layout.

#### 4.2 Ecological Principles

The most important thing in the construction of urban forest parks under the background of ecological civilization is to highlight its ecological value, and to be as close as possible to the word "forest" in terms of landscape shaping, vegetation selection, maintenance, and management, etc. [7]. Artificial shaping and imitation make the forest park function as a natural forest ecosystem, which plays an ecological role in improving urban air quality, adjusting carbon and oxygen balance, and conserving water sources.

#### 4.3 Comprehensive Principles

The construction of urban forest parks must follow the principle of comprehensiveness, which can also be called functional principle, that is, after the completion of the construction of urban forest parks, it can not only play a role in regulating the ecological environment, but also consider the element of "park" to provide urban residents with providing corresponding leisure places to make it have entertainment functions can better achieve the purpose of allowing people to get close to nature and protect nature [3].

### **V. CURRENT SHORTCOMINGS IN THE CONSTRUCTION OF URBAN FOREST PARKS**

#### 5.1 Infrastructure Construction Lags Behind

Most of the urban forest parks are located at the junction of the suburbs, and the infrastructure facilities are not comparable to those of urban parks. In addition to water, electricity, communication and other infrastructure, there is a lack of supporting facilities such as water supply and drainage, toilets, garbage cans, sewage purification tanks, and many without systematic planning [7]. Entrance and scenic spots in the area are mostly disordered and unreasonable. It is necessary to increase efforts to improve infrastructure and invest in ecological facility construction.

#### 5.2 The Ecological Pattern of Urban Forest Parks Needs to be Improved

At present, the ecological pattern of urban forest parks in the construction process still needs to be improved. The so-called ecological pattern mainly refers to the influence scope of the ecological value that urban forest parks can exert. At present, many forest park projects often only consider the impact on a certain area in the planning and design process, and the construction of forest parks is mostly carried out in conjunction with urban landscaping projects [8]. There are certain deficiencies in the scale and integrity of the construction, and it is impossible to truly establish perfect forest ecosystem.

#### 5.3 The Overall Design of the Urban Forest Park is too Simple

There is a problem that the overall design of the urban forest park is too single in the construction

process. First, the selection of vegetation tree species does not fully consider the connection between local plants and the environment and between various biological species, and there is a problem of lack of biodiversity. Secondly, the design styles of urban forest parks are too simple, usually copying foreign design styles, and there is a problem of being the same [8]. Finally, the construction process of the forest park has not been comprehensively considered in combination with the local regional culture and cannot show the uniqueness of the urban forest park.

#### 5.4 Lack of a Sound Construction Guidance and Evaluation Mechanism

In the process of urban forest park construction, there is a general problem of lack of a sound construction guidance and evaluation mechanism. Due to the late start of the construction of urban forest parks in China, there may be problems such as lack of experience and lack of links in planning and design, and it is often confused with ordinary landscape architecture engineering design. Therefore, it is necessary to establish a corresponding guidance and evaluation mechanism, and comprehensively analyze the project construction [7]. The overall ecological benefits, the status of natural communities and the optimal allocation of species and formulate scientific construction plans.

## **VI. SUGGESTIONS ON THE PLANNING AND DESIGN OF URBAN FOREST PARKS UNDER THE BACKGROUND OF ECOLOGICAL CIVILIZATION**

### 6.1 Realize the Systematic Construction of Urban Forest Parks

To further improve the construction quality and construction level of urban forest parks under the background of ecological civilization, it is necessary to improve the ecological pattern of forest park construction and realize the systematic construction of urban forest parks [9]. Urban forest parks can be combined with local greening projects, but the value and content of forest parks are by no means limited to greening and should also consider the connection between urban areas and surrounding areas more comprehensively and systematically. For example, the combination of urban forest park and sponge city construction can alleviate urban waterlogging [4]. Expand the coverage of urban forest parks as much as possible, fully combine the internal structure of the city and future planning directions and build forest parks into an ecosystem that can be linked, as shown in Figure 2.

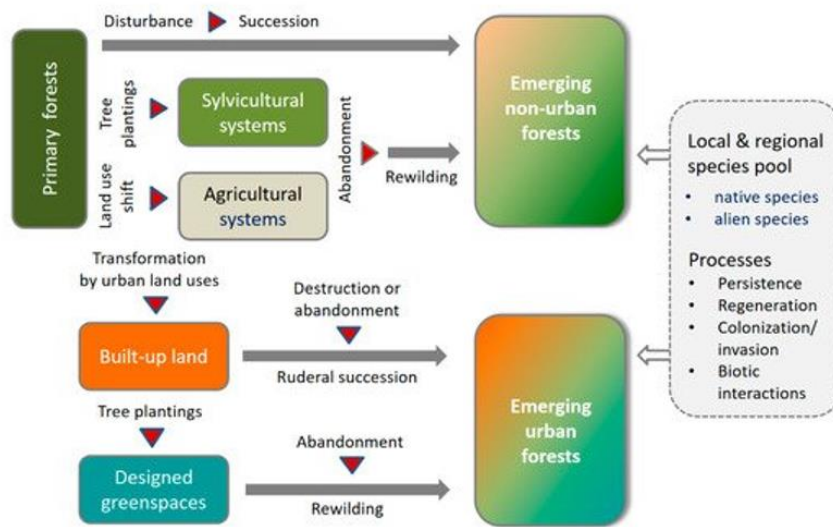


Fig.2 Systematic construction of urban forest parks

## 6.2 Establish a Complete Evaluation Mechanism for the Construction of Forest Parks

In the process of urban forest park construction, it is necessary to establish and improve the corresponding forest park evaluation mechanism. In the early stage of construction, designers must connect with relevant experts and scholars, comprehensively analyze the ecological value of the forest park, plant selection and other related issues, and give guidance and suggestions for the construction of the forest park [9]. After the completion of the construction of the forest park, there must be a follow-up evaluation mechanism to dynamically collect and sort out the comprehensive benefit index of the forest park, to better feedback and summarize, so as to continuously improve the theoretical system of the construction of the urban forest park, as shown in Figure 3 example of a park construction evaluation mechanism.

Target layer	Criterion layer	Index layer	Weight	directionality
Land ecological security	pressure	The population density	0.101	-
		Wastewater discharge	0.114	-
		Solid waste discharge	0.053	-
		Soil erosion area	0.059	-
		Construction land development intensity	0.081	-
	state	Road network density	0.133	-
		Land reclamation rate	0.052	+
		Grain yield per unit area	0.057	+
		Forest cover rate	0.075	+
		Soil and water coordination	0.052	+
		Soil erosion control rate	0.070	+
		Harmless treatment rate of domestic garbage	0.025	+
	response	Comprehensive utilization rate of industrial solid waste	0.033	+
		Urban sewage treatment rate	0.065	+
		Park green area	0.031	+

Fig.3 Evaluation index system of land ecological security

### 6.3 Emphasize the Diversified Design of Urban Forest Parks

The construction of urban forest park system should emphasize diversified design. In the selection of forest plants, it is necessary to highlight the local planting characteristics, adhere to the principle of closeness to nature to create a forest plant landscape, and pay attention to the diverse configuration of plants. The multi-layer mixed mode and the design of the internal circulation system can be used to achieve the self-replacement of the forest park. self-regulation [10]. In the design process of urban forest parks, it is necessary to refer to design, aesthetics, biology, environmental science, and other disciplines for style planning, to enhance the ornamental value, and at the same time, it is necessary to combine local regional culture and regional characteristics to form a unique forest culture, to achieve the integration of humanities and nature, to avoid stereotypes.

### 6.4 Standardized Management of the Park Management System

In the construction and management of urban forest parks, it is necessary to establish a corresponding standardized management system, set up corresponding management departments, carry out unified leadership, and cooperate with other urban development departments. It is necessary to strengthen the later management of urban forest parks, set up a professional maintenance team responsible for management, record the development and changes of urban forest parks during the maintenance process, and publicize the ecological and social functions of urban forest parks, so that people and nature can coexist harmoniously [10]. Figure 4 is an example of a park's normative management process.

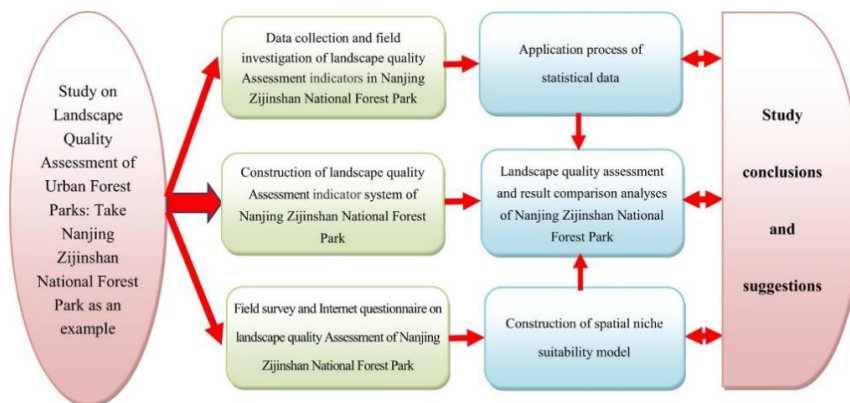


Fig.4 Management evaluation process of the park

## VII. SUMMARY

The construction of urban forest park is not only the product of human civilization development, but also the necessary way of ecological civilization construction. This paper studies the planning and design of city forest park. In addition, many areas have carried out a large number of research and construction, there are worthy of learning and reference, but there are also some problems, in the future construction need to sum up experience, continuous improvement, continuous optimization, present the optimal urban



forest park construction plan, promote the construction of ecological civilization stride forward.

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