

# Research on Chinese Landscape Design and Planning Based on Ecology

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**Abstract:** Ecology occupies the position in garden planning and design, this paper analyzes the design principles of ecology, and expounds the relationship between ecology and garden design and planning, as well as its influence on it, and explains the necessity of urban ecology and urban construction and development. Through the analysis and discussion of Chinese landscape design and planning based on ecology, this paper discusses how to integrate the concept and concept of ecology into the urban landscape design and planning, and briefly analyzes the application of ecology concept in modern landscape architecture design, combined with specific projects.

**Keywords:** ecology; China landscape; Landscape design; Landscape planning

## 1 Introduce

In recent years, the planning and design of Chinese gardens about ecology has attracted more and more attention from designers. The construction of landscape architecture is very important to the ecological construction. <sup>[1]</sup>With the expansion of the scale of Chinese landscape architecture construction, further management and service of landscape architecture are needed. Strengthening the construction of landscape architecture can not only beautify the garden environment, but also can better balance its relationship with the ecology.<sup>[2]</sup> Make the garden in the basis of mutually beneficial symbiosis, better serve people. Therefore, it is necessary to strengthen the research of landscape ecology, use ecology to guide the design and planning of gardens, enrich and improve the scientificity and beauty of garden design, fully highlight the characteristics of gardens, and let ecology play its maximum value in garden design.<sup>[3]</sup>

At present, landscape ecology is widely used theories such as the theory of landscape heterogeneity, the theory of biological evolution and succession, the theory of island biogeography, etc., but the theories in the application of the practice process are more fragmented and difficult to understand.<sup>[4]</sup> Therefore, the author mainly combines relevant information to analyze the application of landscape ecology in landscape garden planning and design, aiming to build a bridge between the basic theory and practice, and to provide reference for landscape gardeners in practice how to apply the basic theory of landscape ecology in a more scientific and reasonable way.<sup>[5]</sup>

## **2 The concept and connotation of ecology**

Ecology is a discipline that studies the interaction, structure, function, and evolutionary relationships between organisms and the environment. <sup>[6]</sup>The objects of ecological research are natural ecosystems, including species, communities, ecological niche, ecosystems, ecological processes, etc. The basic idea of ecology is biodiversity, ecological balance and sustainable development.

## **3 Chinese garden design and planning based on ecology**

### **3.1 Ecological landscape design**

Ecological landscape design is a method to integrate the basic concept of ecology into the garden design. The goal of eco-landscape design is to construct a sustainable ecosystem to optimize the relationship between the natural environment, social environment and economic benefits. <sup>[7]</sup>The ecological landscape design emphasizes the function of the ecosystem, including water, soil, air, plants and animals.

### **3.2 Ecosystem planning**

Ecosystem planning is a method to apply the concept of ecology to urban planning. The goal of ecosystem planning is to achieve the environmental protection and sustainable development of the ecosystem. <sup>[8]</sup>Ecosystem planning needs to view the city as an ecosystem, so as to connect the various parts of the city with the natural system, and create a city with complete ecosystem functions.

### **3.3 Ecological concept in landscape design**

Landscape design should take into account its functional needs, and we need to integrate aesthetics, art, ecology and other concepts into it, so as to reflect the respect for nature. The introduction of ecology concept into garden design can adapt to the development need <sup>[9]</sup>s of society and natural ecology, and organically combine garden design and ecology, which can be reflected from the following aspects.<sup>[10]</sup>

#### **3.3.1 Adjust measures to local conditions, starting from the local ecological reality.**

Due to the regional differences, culture, customs, economy and other aspects, so the garden design should proceed from the actual, combined with the local natural ecological situation and folk customs, according to local conditions, scientific and reasonable design, not only can maintain the local ecological characteristics, but also adapt to the functional needs of the garden.<sup>[11]</sup>

#### **3.3.2 Respect for nature and reflect the concept of sustainable development.**

To realize the harmonious coexistence between man and nature, and to take the concept of sustainable development as an important basis for modern garden design.<sup>[12]</sup> Especially in the process of garden design, in view of the specific natural environment problems, combined with ecological concepts, the effective use of modern technology, to realize the sustainable

application of natural environment and landscape resources, and promote the common development of ecological resources and social economy.<sup>[13]</sup>

## 4 Application of ecological theory in garden engineering

### 4.1 Taishan Street important node restoration project

#### 4.1.1 Basic information of Taishan Street.

For the environmental improvement project of important nodes of Taishan Street, according to the road facilities, accessibility and functions, it can usually be divided into two major types, among which Daqiao Road, Torch Road, Spark Road, PuZhu Road are important urban roads, undertaking the use function of regional traffic, and are suitable as the window of urban landscape image display. <sup>[14]</sup>Kaiyuan Road, PuYuan Road, Taida Road, and Lidao Road are regional roads, highlighting the characteristics of leisure life and livable enjoyment. In the specific construction and operation process of the environmental remediation project of important nodes in Taishan Street, the 10 nodes involved are divided into 5 image display nodes (no. 1~5) and 5 livable nodes (No.6~10). The details are as follows.

**Table 1** Basic information distribution of construction and processing nodes of environmental remediation projects of important nodes in Taishan Street

order number	Node name	Construction node	floor space /m <sup>2</sup>	remarks
1	Node 1	Bridge Road and Liuzhou Road intersection position	4805.00	Crossing location landscape improvement construction
2	Node 2	South side of Torch Road	5673.00	Crossing location landscape improvement construction
3	Node 3	Torch Road and Liuzhou Road intersection position	2347.00	Crossing location landscape improvement construction
4	Node 4	Puyuan Road and Liuzhou Road intersection location	1471.00	Crossing location landscape improvement construction
5	Node 5	Teda Road and Liuzhou Road intersection position	2067.00	Crossing location landscape improvement construction
6	Node 6	Location of Lidao Road and Liuzhou Road	1107.00	Crossing location landscape improvement construction
7	Node 7	Location of the intersection of Xinghuo Road and Liuzhou Road	1671.00	Crossing location landscape improvement construction
8	Node 8	Location of the intersection of Puzhu Road and Liuzhou Road	4439.00	Crossing location landscape improvement construction
9	Node 9	Location of the intersection of Xinghuo Road and Puyuan Road	2644.00	Crossing location landscape improvement construction
10	Node 10	Location of the intersection of Kaiyuan Road and Xinghuo Road	325.00	Crossing location landscape improvement construction

#### 4.1.2 Specific renovation measures of the environmental renovation project of important nodes of Taishan Street

Node 1:Daqiao Road, connected to the Yangtze River Bridge, is an important gateway to Taishan Street, and also one of the main nodes to show the image of Taishan Street. The design scheme of this project uses the idle green space on the north side of Daqiao Road to build the characteristic landscape wall, and takes the elements of the Yangtze River wave as the artistic expression to show the features of the Yangtze River. The rest of the land ——

Impression Hui Commercial Square and sales office and the green space on the south side of Daqiao Road (with police kiosks) have been basically completed, so the design is mainly based on greening improvement, combined with sponge city design, Includes integrated layout, rainwater collection and recycling. <sup>[15]</sup>The integrated layout is mainly based on the concave green space design under the site terrain design, permeable pavement, rainwater collection, multi-layer filtration and other ways to supplement groundwater, secondary collection and filtration, and recycling as landscape irrigation water. Rainwater collection is mainly collected through concave green space, permeable materials, building drainage, etc. Then collect the reservoir to save resources and soil. Recycling is mainly through the integration of rainwater storage reservoir, simple purification treatment, for plant irrigation, landscape water, etc., so as to achieve recycling, to improve the ecosystem.

Node 2 and node 3. This project design, for node 2 and node 3 design process, node 2 railway line facilities, the west location for the substation, and is to Liuzhou small garden, so give priority to with green, the east position and node 2 connection, but because of the hinterland is relatively narrow, so is given priority to with linear space design, provide rest communication for surrounding residents, also as a supplement to Liuzhou small garden in use functional level. Node 3 is designed and expressed with the mountain as the element, and the leisure square is mainly connected with the second node on the west side. A children's playground can be added near the leisure square, so that residents can also play with their children at rest. The design of the place can be simple and safe. The green space is treated as a lawn, laying sand pit, slide, etc. The connection between sand pit and lawn can be slightly undulating to provide for rainwater leakage. The accumulated shallow water is also available for children to play. Its effect is shown in Figure 1. In the north and south, there are propaganda boards and party and government billboards, so the greening is mainly promoted to coordinate the structures with the surrounding environment. In the east is the construction site, and the construction space is reserved for the greening design.



**Figure 1** Renderings of the children's amusement ground

Node 4. In the north side of the node, and Liuzhou road on both sides of each set a publicity column, in relatively isolated state, and the lack of organic link between the surrounding space environment, design is given priority to with greening, southwest location for the new garden, but the lack of management maintenance, design is given priority to with ecological

restoration, southeast location greening facilities distribution state is clutter, and bare weak electric box seriously affect the node of landscape status, design work in the process to the basic status of design work process, the pursuit of continuous improvement landscape effect.

Node 5. Puzhu Road connects Taishan Community and the center of Pukou District, and is an important urban road traffic infrastructure. In the process of design work, the idle green space in the northwest corner of the site should be used to design urban silhouette wall facilities to show the historical changes in the process of urban development. The two commercial squares on the south side of the site will be renovated, and the green area will be increased and expanded to improve the overall quality of the ecological environment. Promote the greening promotion link of the greening group area at the northeast corner of the site,As shown in Table 1, the planting of Tarzan Street has improved significantly.

**Table 1.** Taishan Street before and after design

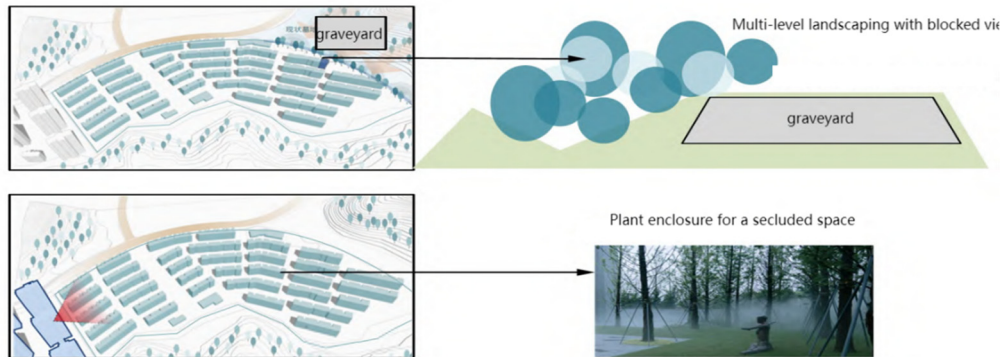
Design situation	Trees/tree	Shrub/tree	hedges/m <sup>2</sup>	green ratio/%
beforehand	112	80	0	7
beyond	290	336	1872	18

In taishan street important node environmental renovation project concrete implementation process, the comprehensive investigation to understand the basic status of the area condition, through the ecological restoration technology and the use of green landscape construction technology, to ensure that the regional landscape facilities significantly improved conditions. In the greening of the project, the selected plants should have a sense of nature, ritual and space. According to the nature of the site, the project selects the varieties of different themes. The public space is mainly tree-lined trees, following the principle of adapting measures to local conditions, and also is beautiful. It can effectively use the local native tree species and improve the quality of residents' living environment. Using and middle arbor combined with multi-level sight isolation and space conversion, to achieve the effect of moving and different scenery.

#### **4.2 Landscape design of a certain garden in Wuhan**

In the ecological design of the garden landscape, we should respect the local characteristics, combine with the local humanities and art, reasonably plan the internal space of the garden, and rationally allocate them with the help of plants and rockery. Here are the landscape and landscape design strategies.

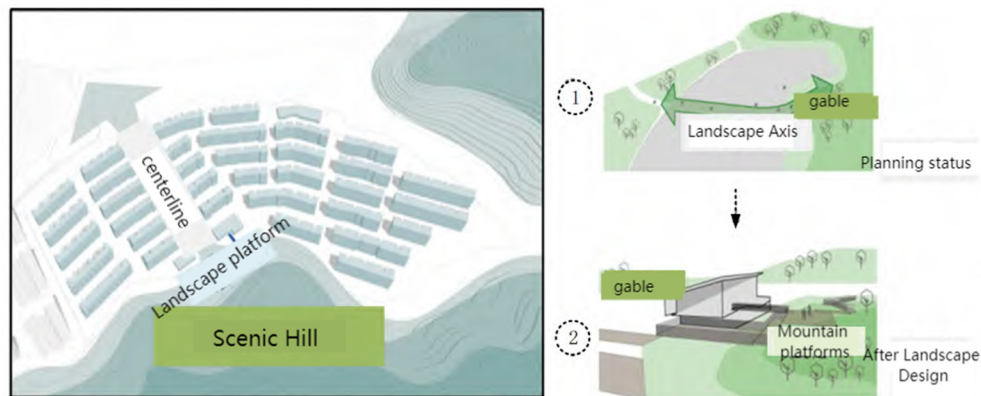
The landscape strategy of this project meets the garden landscape design principles based on the ecological concept. The greening concept has the unique memory implantation of the place, and the whole design has "mountains, rivers, forests and fields", bringing the residents a comfortable, natural and leisurely aesthetic enjoyment, and satisfying the principle of beauty and practicality. In the specific design, the adverse factors of the boundary are dealt with. As shown in Figure 2.



**Figure 2.** The boundary design

For the shielding of the high-rise building on the west side, in order to weaken the sense of oppression and increase the privacy, this project adopts the way of plant enclosure to create a secret living environment, so that the building is in it. This design not only increases the privacy of the residents, but also guarantees the green area. For the cemetery on the east side affecting customers to buy houses, a similar approach was adopted through multi-layer greening on the east boundary to form a barrier to isolate the influence of external adverse factors. The above two designs use the way of green plants, which not only solves the problem, but also integrates the ecological concept and increases the green area, which not only conforms to the principle of aesthetics and practicality, but also meets the principle of resource saving.

The boundary treatment for the mountain mountain is shown in Figure 3.



**Figure 3.** Mountain boundary treatment

In order to enhance the value of the mountain, a coherent central axis landscape can be created with the help of the mountain. The landscape platform is set up at the connection between the south side and the mountain to build the mountain landscape forest relying on the potential to drive the mountain experience activity belt. This design is in line with the principle of adjusting measures to local conditions, and on the basis of protecting the local natural features,

it can also bring economic benefits.Planning of Humanistic Ecological Landscape in Urban Waterfront Area

## 5 Conclusion

Comprehensive combing existing research results can know, the ecological ideas in the process of landscape design work of fusion, to ensure that the actual landscape project design, more diversified characteristics of ecological characteristics, improve landscape landscape actual artistic atmosphere, play a role of showing its degree of ecological protection. In the future historical period, the introduction and application of ecological ideas can support the garden engineering project in the process of gradually restoring the natural ecological environment, showing a diversified aesthetic view, and finally help China's modern landscape architecture construction to maintain a healthy, stable and orderly historical development trend.Figure 4 shows the green space area and growth rate of urban parks in China.

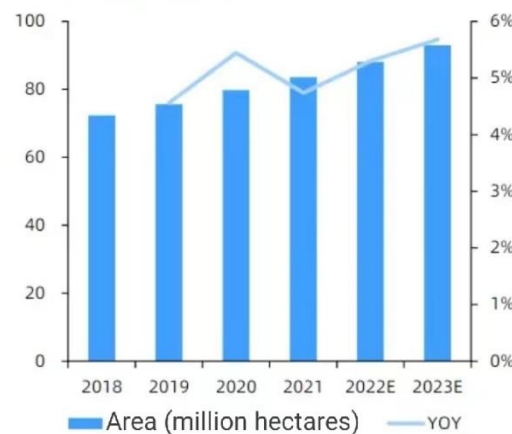


Figure 4. Green space area and growth rate of urban parks in China (10,000 ha)

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