

Analysis of Plant Landscaping of Urban Wetland Park Based on Ecological Concept——Take Wenzhou Sanyang Wetland as an Example

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Abstract

Taking Wenzhou Sanyang Wetland as an example, this paper explains the application of plant landscaping principles and method theories in the plant landscaping of wetland parks, and systematically analyzes plant landscaping aesthetics in combination with landscape types, seasonal changes and landscaping techniques three aspects, provides favorable references and bases for the ecological protection of Sanyang Wetland.

Keywords

Sanyang Wetland; Plant landscaping; Ecology; Aesthetics.

1. Overview

The so-called plant landscaping is to make arbor, shrub, vine, grass and other kinds of plants have a certain viewing effect by landscaping artistic techniques in combination with local geographical environment conditions, and shows the advantages of different plants in form, shape and color, etc. The plant landscapes that integrate functionality, ecology and artistry are created. It should be noted that when plant landscaping, it is necessary to make the plant's own habits consistent with people's sensory needs. Moreover, different plant landscapes can be reasonably matched with different plant varieties.

Plants are very important landscape elements in wetland parks, which are also functional carriers of wetland parks. People paid more attention to the impact of wetlands on sewage purification and maintenance of ecological diversity in past studies, and relatively paid less attention to the important role of plants in landscape construction and the realization of wetland functions. In order to maintain the stability of the wetland ecological environment and make the wetland animals have a good habitat, the wetland plants must maintain a good growth state. The plant landscaping of Wenzhou Sanyang Wetland Park has much improvement space in plant allocation, optimization of plant variety selection, and plant color richness, etc. So taking Wenzhou Sanyang Wetland as an example, it is necessary to discuss the plant landscaping in wetland parks.

The Sanyang Wetland (as shown in Fig.1) is densely covered with water networks, the villages are laid out along the river, the houses are built beside the water, and the natural scenery is beautiful and charming. Moreover, Wenzhou Sanyang Wetland is one of Wenzhou's nine strategic projects, protecting Wenzhou's "green heart" and "green lung" and maximizing ecology, society and economy three major benefits, and it is the need to build landscape, city, vitality, strength and harmonious Wenzhou.

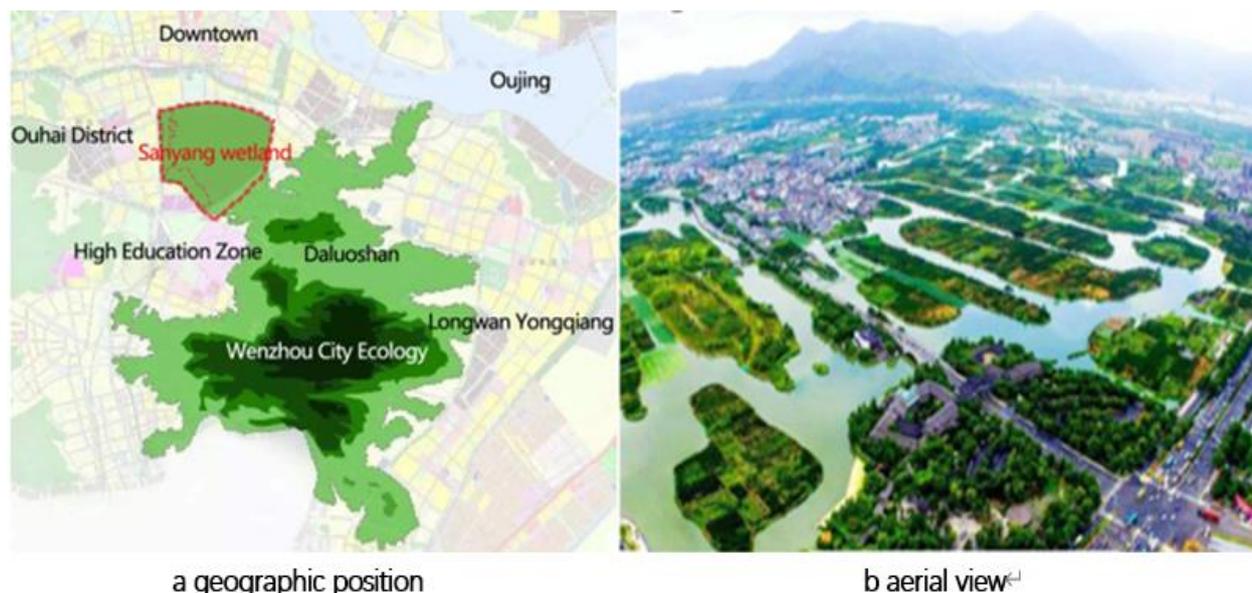


Fig.1 Wenzhou Sanyang Wetland Park

At present, there are not many analyses on the plant landscaping in Wenzhou Sanyang Wetland, For example, Wang Yongzhi[1] integrated the construction and protection of urban wetland parks, analyzed the artistic value of the wetland park plant landscape; Zhao Yufei and Wang Changsha [3] expounded the methods of plant landscaping in wetland parks, and proposed the development strategies of urban wetland park ecotourism; Fang Lei [5] put forward the main points of landscape design through the problems of park landscape design. In order to better protect the urban wetland environment, construct a stable wetland park ecological environment, taking Wenzhou Sanyang wetland as a sample, this paper studies the plant landscaping of wetland park from different aspects, by investigating the relationship between the wetland environment and wetland plants, this paper improves the theoretical system of plant landscape in Wenzhou Sanyang Wetland, provides favorable references and bases for the ecological protection of Sanyang Wetland, provides experience for the development and construction of urban wetland parks, and offers suggestions for the construction of an ecologically livable sponge city.

2. Principles and Methods of Plant Landscaping

In urban wetland parks, planting trees, planting flowers and grass is the only way to create a green life. Plants, as one of the basic elements of the garden landscape, are the most widely used and indispensable materials, plant landscaping has become the mainstream of garden construction, and its principles and methods are important technical means.

2.1 The principles of plant landscaping

(1) The principle of adaptation to local condition

adaptation to local condition is to choose the right plant for planting to ensure that the plant can grow normally when selecting the landscape of wetland park plants, according to different climates, regions, etc., combined with the actual conditions and resource conditions of wetlands, fully consider the ecological characteristics and growth rules of plants, and native plants should be the first choice, while playing an individual role, they should be integrated with populations and communities to form an ecosystem with a certain color, level and thickness. In the process of plant landscape design of urban wetland parks, the local natural resources should be used to the maximum, the traces of artificial carving should be as few as possible, so that the dual benefits of landscape and ecology can be maximized.

(2) The principle of ecological priority

The wetland itself is a micro-miniature ecosystem with self-regulating functions. The ecological principle is one of the important principles that we must follow when carrying out plant landscaping. It is the embodiment of the ecological function of the wetland park. In the process of plant landscaping, priority should be given to the ecology of the plant landscape, and the ecological benefits of the plant should be maximized through the rational use of plant ecological functions, such as the use of aquatic plants to purify the water body, and the plant root system to maintain the soil Etc., and comprehensively consider the connection with its surrounding environment, so as to ensure the stability of wetland development.

(3) Biodiversity principle

One of the important indicators for measuring the integrity of an ecosystem is the richness of its species, and biodiversity is the basis for ensuring the balanced development of communities. The ecosystem is changing all the time. For the plants in the wetland park, only by ensuring their diversity can their dynamic balance be maintained. As far as plant landscaping is concerned, attention should be paid to the selection of diverse species, on the one hand, enriching the types of plant communities, on the other hand, reflecting the diversity of plant landscapes. At the same time, diversified plants can also complement each other and better handle pollutants, thereby improving the wetland's own circulation capacity. Finally, build a healthy and harmonious plant ecosystem community.

(4) Aesthetic principles

The aesthetic principle means that when landscaping the plants in the wetland park, the beauty of the plant community should be fully considered, and the combination of different varieties should be harmonious, reflecting the artistry and science, so as to attract more people to visit And the tour can reflect the characteristics of the wetland park. Therefore, when plants are landscaping, some highly ornamental plants should be selected, and the aesthetic principles should be used to integrate the tourists' viewing interest, and the overall allocation of the plants should be well configured to create a dynamic plant landscape.

(5) Regional cultural principle

Urban wetlands play a very important role in the regulation and control of the urban environment. They are known as the "kidney of the city". Over time, wetlands also carry many cultures in the city. The culture of the plant and the region are connected to create a city wetland plant landscape community with rich cultural connotation.

2.2 The method of plant landscaping

(1) Allocation among plants

There are two common allocation forms: regular form, which includes column planting and planting. Column planting is the planting of plants in rows or in a straight line allocation, mostly used for street trees. Natural style, isolated planting, clumping planting, patch planting, group planting. Orphan planting is a single plant with good posture and appreciates the individual beauty of the plant; clump planting is the planting of plants of the same species or different species at different distances to appreciate the beauty of the combination of plants, and the canopy lines are connected to form an irregular shape; Planting is the same or two kinds of plants planted in pieces, only trees planted in pieces are forest planting, appreciate the beauty of the plant group; skirt planting is planted in groups of thirty or thirty or hundreds of arbor shrubs, appreciate the group beauty of plants.

(2) Matching modes of Plant Landscape

According to the types and characteristics of plants that can be used in wetland parks, the plant landscape allocation patterns of urban wetland parks can be divided into three main categories: arboreal, arboreal, arboreal, and arboreal land-based wetland plants. Landscape allocation mode; wet arbor type, wet arbor type and wet herb type landscape allocation mode of wet plants; mainly aquatic plants, supplemented by floating leaves and submerged plants . The three models enable plants to be

planted in multiple layers, enriching plant communities and forming a three-dimensional landscape effect.

(3) Application of artistic principles

The principle of unification, there must be certain differences and changes in the shape, color, line, texture and proportion of trees, showing diversity, but they must maintain a certain similarity between them, causing a sense of unity; the principle of harmony, when designing plants for landscape Pay attention to the mutual connection and cooperation, so that people have a soft, calm, comfortable and pleasant aesthetic feeling; the principle of balance, the plant species with different sizes and textures are arranged according to the principle of balance, the landscape is stable and pleasing to the eye; rhythm and rhythm In principle, a regular change in allocation will produce a sense of rhythm.

3. Analysis of Plant Landscaping in Wenzhou Sanyang Wetland

When shaping the plant landscape, combining the surrounding regional environment, drawing on the principles of painting and literary knowledge, the internal and external environments are related, cleverly using the plant's own color, shape, line, texture and rhythm to create, and through the changes of space and time series, a smart and lively picture is formed.

According to the field surveys of Wenzhou Sanyang Wetland Park in spring, summer, autumn and winter, about 167 species and 83 families of higher plants in Wenzhou Sanyang Wetland were recorded on site (as shown in Table 1), of which there are 106 woody plants. It is divided into three landscape types: terrestrial plant landscape, shoreline wet plant landscape and aquatic plant landscape.

Table.1 the number and proportion of plant varieties in Wenzhou Sanyang Wetland

plant classification	number of plants (species)	proportion(%)
evergreen arbor	35	20.96
deciduous arbor	30	17.96
evergreen shrub	29	17.37
deciduous shrub	12	7.19
vine	5	2.99
annual and biennial ground cover plants	11	6.59
perennial ground cover plants	9	5.39
bamboo	5	2.99
perennial flowers	4	2.39
emergent aquatic plant	17	10.18
floating leaf plant	5	2.99
floating plant	3	1.80
submerged plant	2	1.20

3.1 Landscape types of Wenzhou Sanyang Wetland

(1) Terrestrial plant landscape

The terrestrial plants in Wenzhou Sanyang Wetland Park are distributed in most areas of the park. They are mainly group planting, column planting and mixed planting. According to local conditions, they are mainly local tree species of Wenzhou, such as banyan, weeping willow, eucalyptus, white magnolia Camphor, loquat, rose, crape myrtle, cedar, plantain and other green ornamental plants. Most of them are shrubs and shrubs, and the number and type of plants are considered in their matching, highlighting that the backbone tree species form a distinct plant landscape. The background

trees are dominated by tall trees, and small trees are used as foreground trees to form a three-dimensional wetland landscape.



Fig.2 terrestrial plant landscape in Wenzhou Sanyang Wetland Park

(2) Hygrophyte landscape of bank line

The bank line wetland plant landscape is generally composed of plants planted beside the wetland waters and aquatic plants (as shown in Figure 3). It plays a transitional role in the wetland, such as: reeds, cattails, celandine, canna, regenerate flowers, reeds, esculent grass, dry parasol, iris and other fresh-leaved aquatic plants, along with trees on the shoreline For example, Guohuai, weeping willow, oleander and chicken claws form a transition zone, while beautifying the shoreline, and the combination of aquatic plants increases the three-dimensional sense of the shoreline landscape. According to the depth of different waters, choose the natural planting method of Zailihua in the shallow waters. The revetment treatment generally uses stones as embellishment, and plants with developed root systems can also be used for protection, which can form a sense of space and color change on the water surface.



Fig.3 hygrophyte landscape of Wenzhou Sanyang Wetland Park

(3) Aquatic plant landscape

The aquatic plants in Wenzhou Sanyang Wetland Park are mainly floating plants floating on the water surface and water. The color of the plants and the water surface form a changing landscape; the aquatic plants can form a good landscape effect with the water surface, increasing the color and layering of the water surface. Aquatic plants have strong purification ability, improve water quality, improve visibility, and at the same time provide food and oxygen for fish, greatly increasing biodiversity, enriching the creation of water bodies and adding a beautiful landscape. Wenzhou Sanyang Wetland mainly includes lotus, water onion, black algae, potamogeton crispus (as shown in Figure 4) and so on.



Fig.4 the aquatic plant landscape of Wenzhou Sanyang Wetland Park

3.2 Seasonal changes of plants in Wenzhou Sanyang Wetland

From the perspective of the whole wetland, the regional landscape seasonal changes (as shown in 5) of the plants in Wenzhou Sanyang Wetland are rare, and the combination of plants from water to land from high to low, the color of the plant itself, branches, leaves, fruits or seasonal changes Etc., will increase the landscape effect, form a layered landscape, and enhance the richness of the landscape. The plants in some areas of the park have different ornamental and seasonal characteristics throughout the year. Seasonal collocation fully considers the characteristics of the southern region, combining the local trees of Wenzhou, such as banyan, zelkova, tallow, weeping willow, seedless, structured tree, metasequoia, wetland pine, and other evergreens and deciduous leaves. The cedar, ancient banyan tree, zelkova, sand pueraria, and palm elm create rich layers, and the autumn tree species such as ancient banyan tree, ginkgo, red maple, zelkova, and sand pudding are used as spot trees. But from the point of view of the attractions, the seasonal changes are very lacking.



Fig.5 four-season landscape of Wenzhou Sanyang Wetland

3.3 Plant landscaping techniques of Wenzhou Sanyang Wetland

(1) Retain and restore wetland communities

After long-term development, a whole with a certain function and structure has been formed in the wetland. In the construction of plant communities, not only the preservation and restoration of the original plant communities but also the cultivation of different functions are considered, respecting nature will maximize its ecological benefits. The plant community in the garden builds a rich and varied community system based on the land plants arbor-shrub-cover-aquatic plants. On the basis of

the original plants, the island residents' living areas are also planted with magnolia, camphor, loquat, and rose, Crape myrtle, cedar, plantain and other green ornamental plants. At the same time, in order to enrich the park environment, weeping willow, dry willow, duli and other trees were added. The arrangement of plants with high and low levels and dense and dense vegetation is the landscaping feature of Wenzhou Sanyang Wetland. Most of the wetland plants are mainly clustered and patchy, forming a long, narrow, tortuous and deep landscape pattern. Pay attention to the change of height in the vertical direction, add aquatic plants, such as water chestnut, rice, reed, pampas grass, *Arundo donax*, etc., while increasing the diversity of aquatic plants, and exert the water purification function of aquatic plants. At the same time, it combines wild birds, wildflowers and big trees to simulate the natural environment of ecological recovery. The colors, aroma, appearance and charm reflected by the individual wetland plants have high ornamental value, thus forming a sharp contrast and a unified beauty.

(2) Divide the line of sight with the road

The core areas of Wenzhou Sanyang Wetland are Nanxian Mandi, Xingshui Sanyang Plaza, Wufuyuan, Banyan Garden, and the northern ecological leisure zone. Most waters are concentrated areas, and the roads are organized in an orderly spatial sequence, which makes the parks more scenic obvious. In the road planning and design of the park, the combination of scenic spots, surrounding environment and plant cultivation methods greatly improves the greening rate of the park, forms multiple green barriers, and maintains the ecological function of the entire park. The park road adopts the design method of combining points and lines. "Point" refers to the plant landscape node along the road. "Line" refers to the green belt system in the park formed by the road. Different types of roads are created according to the different functions used on both sides of the road. Plant community.

(3) Create landscapes of native plants

Every city has its own history and culture, which directly or indirectly affects its internal development. The plant landscape of Wenzhou Sanyang Wetland Park is based on its original native tree species, relying on the regional characteristics, and digging into Regional functions, using plant landscape to reflect Ouyue culture in Wenzhou, such as planting cash crops with Wenzhou Sanyang wetland characteristics (as shown in Figure 7) Ou mangrove forest, bayberry forest and water chestnut. The native tree species is a general term for the formation of complete and stable plants with specific local forms after a long period of time according to the local natural and climatic environment. Therefore, when planting landscapes in Sanyang Wetland, a large number of native tree species such as banyan trees were planted. For example, in the vicinity of villages and near temples (as shown in Figure 6), more attention was paid to local plant varieties. Trees such as eucalyptus and eucalyptus trees, especially banyan trees, are more than one hundred years old and have very important protection value. Not only can they quickly improve the diversity of garden species, but also provide convenience in the supply and adaptability of seedling breeding materials. Native plants can best reflect the characteristics of local plants, and a stable ecological environment can be formed through rational plant landscaping.



Fig.6 landscape of native plants



Fig.7 characteristic cash crops in Wenzhou Sanyang Wetland

4. Problems with Plant Landscaping in Wenzhou Sanyang Wetland

4.1 Creation techniques are single

Through the research and analysis of the plant landscape of the Sanyang Wetland in Wenzhou, due to the severe impact of human activities, the ecosystem is in a sub-health state, the plant species components are relatively simple, the age structure is single, especially the aquatic plant species are too few, lacking plants Landscape changes to create themed landscape nodes. It mainly adopts mixed trees, group plants, planting ginkgo, metasequoia, maple tree and other trees + lawn type allocation mode, lacking closed and semi-closed plant landscape space. The plant community structure is simple, deciduous tree species are large, evergreen tree species and vine plants are used less, and there is a dead branch in some areas in winter, and the plant landscape lacks vitality.

4.2 Lack of practicality

Designers tend to pay more attention to the clumps and sequence relationship of plants themselves, and do not combine the function of the area for landscaping, ignoring the echoing relationship between the sequence of tourists and plants. Some spaces even lack access to parks. In the process of landscaping, too much attention was paid to the clump and sequence relationship of the plant itself, and the echo relationship between the tourists and the plant sequence was ignored, and the area where tourists should participate was "no one cares."

4.3 Seasonal phase changes are not obvious

Like other park landscapes, there is a problem of lack of seasonal landscape changes in most areas of Sanyang Wetland Landscape. Because of the characteristics of the wetland itself, this phenomenon is particularly prominent in wetland parks. Compared with the plant landscapes of other types of parks, the plant species of wetland parks are relatively simple, which leads to the vigorous vegetation of wetland parks in the spring and summer seasons. In the autumn and winter seasons, a withered and decaying scene appears, resulting in the entire park In the autumn and winter season, it enters a "dormant" state, which greatly affects the ornamental nature of the entire park and greatly reduces the tourist experience.

4.4 Invasion of alien plant

Although alien invasive plants enrich the components of the ecosystem to a certain extent, they also cause damage and harm to the environment. In particular, some malignant alien invasive species, such as *Solidago canadensis*, *Eichhornia crassipes*, and small flying canopies, among which the *solidago canadensis* is rarely seen, but *Eichhornia crassipes* reproduces in most rivers in large areas. Because the water hyacinth reproduces quickly, it is easy to invade and block the river, causing great harm to the water body, aquatic animals and plants and the wetland ecological environment.

5. Conclusion

This paper explores the relationship among landscape types, seasonal changes, and landscaping techniques with urban wetland park plant landscaping by analyzing Wenzhou Sanyang Wetland plant landscaping, and combines the principles and methods used in the urban wetland park plant

landscaping process, finds the rules and deficiencies of plant landscaping, from the establishment of material space to the subjective experience of tourists and other levels, establishes a more systematic and perfect theoretical framework of urban wetland park plant landscape landscaping, and provides feasibility and suitability suggestions for urban wetland park plant landscaping.

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