Research on the Protection and Landscape Planning of Wetland Parks Based on Landscape Ecology

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Abstract: Wetland is one of the important ecosystems and plays an important role in regulating runoff, improving climate, and maintaining species diversity. To better complete the effective protection of wetlands, the construction of wetland parks not only has ecological value but can also create certain economic benefits and realize popular science education. A brief overview of the wetland park landscape planning, analysis of the sustainable development strategy of the wetland park, exploration of the basic principles and design concepts followed in the landscape planning and design of the wetland park, realization of functional zoning, landscape characteristic planning and road system planning, etc.,so that the wetland park can be effectively protected while achieving good planning and design.

1. Introduction

Wetland is known as the “kidney of the earth” and is one of the main ecosystems on the earth. From this we can see those wetlands play an important role in regulating climate, storing water and protecting the ecological environment. Due to the characteristics of cities, urban wetlands have greater value. With the continuous progress of society, the continuous development of the economy, the continuous increase of urban population, the occupation of large areas of urban land, and the severe damage to the urban ecological environment, it has reached the point where it needs to be dealt with urgently. The construction of urban wetland parks plays an important role in alleviating the pressure on the urban ecological environment. In the process of planning the landscape of the wetland park, it is necessary to combine the characteristics of the wetland and formulate a reasonable plan for each functional area to meet the construction needs of the wetland park and carry out scientific and reasonable planning.

2. A Brief Overview of Wetland Park Landscape Planning

Wetland parks refer to parks based on the complete wetland ecological environment and with diversified wetland landscapes. The main function of the park is not only to realize nature protection, but also has certain functions of popular science and publicity and education, which can develop tourism [1]. As a local pillar industry, the wetland park has multiple functions such as wetland utilization and protection, publicity and education, research, and tourism. Wetland parks are also an important part of China's wetland protection system and play an important and positive role in conserving water sources and maintaining species diversity.

The development of wetland parks is also an important measure in the national implementation of grading and classified protection. It can effectively mobilize social forces to actively participate in the protection and sustainable use of wetlands, and it can also develop multiple functions of wetlands to meet the public's needs for nature and social and economic development [1]. The wetland park landscape planning is to comprehensively consider the impact of all levels on wetland development and use advanced quantitative assessment indicators to scientifically plan and design various wetland landscapes to restore the natural ecosystem of the wetland and promote the ecology of the wetland. The system is well-developed, and coordinates the relationship between the ecology, space, and

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functions of the wetland park, so that it can generate a sustainable wetland ecological environment [2].

3. The Master Plan of the Plant Landscape of the Wetland Park

3.1 Planning and Design Principles

For urban wetland park plant landscape planning and design work, we must adhere to the viewpoint of adapting measures to local conditions, do a good job in environmental protection, and adhere to a unified and functional planning and design level. Analyze the landscape design of the urban wetland park from the aspects of soil conditions, weather, water source, etc., and select the landscape type and planning location. In the process of wetland park landscape planning, it is necessary to understand the relationship between things, comprehensively analyze the impact on ecological groups, adhere to the principle of protecting the ecological environment, and do a good job of planning [2]. In addition, in the process of vegetation landscape planning, we must adhere to the overall unity and avoid the phenomenon of landscape isolation, but we must strengthen the connection between vegetation and landscape, achieve mutual coordination and unity, give play to our own advantages, and realize the complementarity between vegetation [3]. Only by doing a scientific and reasonable plan can we meet the survival and development needs of nature and realize the goal of sustainable development.

3.2 Theoretical Guidance

In the process of landscape planning and design, it is necessary to adhere to the guidance of relevant theories to ensure the scientific nature of planning and design. For example, the theory of landscape ecology requires rich and diverse vegetation types, and the corresponding ecological integrity should be well coordinated in different landscape modeling processes. In vegetation landscape planning, it is necessary to comprehensively analyze soil fertility, select appropriate planting nutrients, and avoid the occurrence of wetland barrenness. Secondly, from the perspective of hardware facilities, scientific configuration must be done to effectively control the reception of tourists, avoid congestion, and exceed the capacity of the wetland park. Finally, we should adhere to the theory of garden aesthetics and emphasize beauty through the application of aesthetics, to enhance the aesthetics of wetland parks, thereby enhancing people's visual experience [3].

4. The Planning and Design Strategy of Wetland Park under the Concept of Ecological Planning

4.1 Adjust Measures to Local Conditions and Coordinate with Natural Conditions

As one of the important types of ecosystems, wetland parks must be constructed according to the principles of adapting to local actual conditions. First, natural conditions must be allowed, such as sufficient rainfall and abundant biological communities, which are important conditions for ensuring the sustainable development of wetland parks. Only on this basis can the sustainability of the development of wetland parks be effectively ensured, and the efficient construction of wetland parks can be effectively realized [4]. For example, Hangzhou Xiliu National Wetland Park, a modern wetland park, was built based on the local natural environment. It is precisely because of the good natural conditions that the wetland park can be established through a series of infrastructure construction and tourism development. Including urban wetlands, cultural wetlands, and agricultural wetlands [4]. Therefore, wetland development adapted to local natural conditions is the basis for sustainable development.

4.2 Effective Control of Manual Intervention

In order to better reflect the natural conditions of the wetland park during the construction of the wetland park, it is necessary to reduce the space division of the wetland park in the process of

landscape design and infrastructure construction, so that it can form an independent living ecosystem and relatively reduce artificial buildings. Human intervention on wetlands, especially those that affect the wetland environment. Due to the complexity of the wetland ecosystem, random intervention without scientific basis is likely to have a major impact on the wetland space, and even cause irreversible damage [5]. Therefore, it is necessary to strictly restrict manual and arbitrary intervention to establish a series of Industrial design plan for sustainable development.

5. Protection and Landscape Planning of Wetland Park Based on Landscape Ecology

5.1 Concepts and Methods of Wetland Park Landscape Planning

To make the landscape planning of the wetland park complete, it is necessary to take long-term development and wetland protection and restoration as the concept of landscape planning and design. Wetland ecological planning is combined with advanced wetland landscape planning methods, such as remote sensing and GIS. The technology is used for field surveys, and advanced equipment such as drones is used to supplement the detailed understanding of the overall layout of the wetland park and provide support for key data parameters [5]. By adopting the associations and differences between different parts to determine the functional area and its landscape, what the designer needs to do is to effectively plan an appropriate design plan according to the local situation and combine the different characteristics of each area to complete the preliminary landscape design plan, Figure 1.

Fig.1 Landscape Planning Has the Concept of Integrity

5.2 Functional Zoning and Characteristic Planning of Landscape

As the hydrological conditions of each part of the wetland park are different, the design principles should be based on optimizing the availability of functional areas, and reasonable choices should be made. It is also necessary to consider the relationship between part of the function and the overall function, so that they can be independent and interdependent to form a complete wetland park [6]. To realize the reasonable design and reasonable layout of each functional area. Generally, functional areas mainly include ecological protection areas and wetland science exhibition areas. These functional communities can be relatively independent and have a certain connection with each other, so as to realize the coordination between the whole and the part and realize the orderly function of the functional communities [6]. Secondly, the division and construction of functional areas should be planned according to the conditions of the wetland itself, as shown in Figure 2.

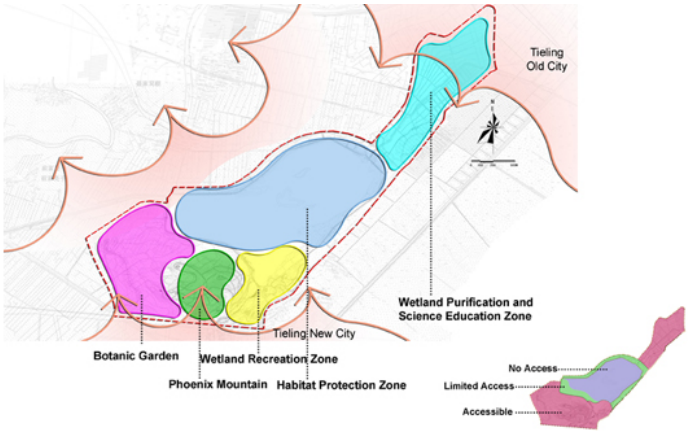

Fig.2 Partition Planning of Functions and Features

5.3 Planning and Design of Road System

Road facilities are an important element connecting the inside and outside of the park and connecting various functional areas. Appropriate classification should be carried out when designing to make the road design more complete [7]. For example, the roads connected between functional areas should be set as main roads, and the width of the road should meet the needs of most tourists, forming a circular route design, which is a scientific tour route. In addition, the design of secondary arterial roads and walking paths should be focused on meeting the needs of tourists. If you can't directly reach places with beautiful surroundings, you can also develop cable cars and cableways, so that tourists can fully explore the scenery of the wetland park, and the wetland park can be well protected, and the wetland will not be affected by too many road designs. ecosystem [7].

5.4 Water System Planning of Wetland Park

The water system planning of the wetland park should maintain the original natural water system planning as much as possible and ensure that its water cycle can be realized in each functional area and focus on some parts of the larger watershed area [8]. In addition, it is necessary to fully understand the wetland. The various slope and altitude data in the park enable the planning and design of the water system to be carried out since scientific data. In addition to considering the water cycle in the wetland, comprehensive consideration should be given to the surrounding environment of the wetland, such as the effective design of the water diversion area and drainage area, to realize the sustainability of the wetland water supply. At the same time, the Internet of Things technology must be used to dynamically monitor the water flow and velocity of each key node, and set certain warning values, and save the monitoring log, to fully monitor the water system of the entire wetland park to ensure that its planning has sustainability [8].

5.5 Effective Planning of Plant Landscape in Wetland Park

Wetland plants are the foundation of the wetland ecosystem and the basic part to ensure the material circulation and energy transfer of the ecosystem [9]. Therefore, the design of the plant landscape is directly related to the rationality of the ecological distribution of the wetland park. Therefore, in the process of plant landscape planning, based on keeping the original vegetation unchanged or local fine-tuning, it is necessary to combine the specific characteristics of each functional area to complete the effective planning of the vegetation, so that it can be compared with the current functional area. For example, in the wetland ecological conservation area, the integrity of the ecological structure of the area should be taken into consideration, to effectively ensure the number of key basic plants and meet the basic part of the ecological chain. The ecological function display area is mainly for popularizing science to tourists. Therefore, there are rich requirements for the types of wetland plants, so that it can truly achieve the purpose of science education [9]. Therefore, in the process of plant planning, full consideration of different functional areas should be considered.

Fig.3 Effective Planning of Plant Landscape in Wetland Park

5.6 Effective Design of Wetland Park Revetment

In the design of the revetment of the wetland park, the natural revetment should be the mainstay. Some soil and gravel that rises automatically in the wetland park should be used as much as possible, and transitional plants will be planted during the period to further enhance the design of the revetment [10]. It can also be used for some amphibians. Reptiles and birds provide good habitats and effectively promote the construction of biodiversity in wetland parks. In the design, trees, etc. can also be used for necessary dikes to enhance the stability of the revetment and make it a good landscape. In some places with turbulent water flow, in order to maintain the integrity of the revetment design, artificial masonry can also be used [10]. In addition, there is also a stepped revetment design to meet the waterfront conditions under different conditions.

6. Summary

With the continuous acceleration of urbanization and the continuous expansion of the scope of human activities, it has caused more and more serious damage to the ecological environment, even to an unrecoverable degree. Therefore, the construction of a wetland park can well protect the wetland resources, and it can also take certain transformation measures to make it have more abundant use functions. Faced with the earth on which everyone depends, environmental protection is what everyone should do. matter. Only with a harmonious ecological environment can people have a good life. Therefore, the construction of wetland parks is very important to protect the entire ecosystem.

References

[1] Y. Huang and D. Xie, Landscape Planning and Design of Zhuyehai Ecological Wetland Park, Jushe, vol.13(05), pp.94-95, 2018.

[2] L. D. Zhang and R. J. Li, Principles and Ideas of Wetland Park Ecological Landscape Planning and Design, Design, vol.19, pp.142-143,2017.

[3] X.M. Xu and L. Song, Analysis on the Landscape Planning and Design Methods of Urban Wetland Park, Modern Horticulture, vol.24, pp.88-91,2016.

[4] T. Li and L. Y. Tang, Discussion on Sustainability-Oriented Wetland Park Landscape Planning and Design, Agriculture and Technology, vol.35(14), pp.157-158, 2015.

[5] L. Yuan, Discussion on Urban Wetland Park Planning under the Concept of Ecological Planning, Global Market, vol.17, pp.57-60, 2016.

[6] Q. Liu, Planning and Application of Wetland Park Based on Ecological Concepts, Big Science and Technology, vol.5(32), pp.304-305, 2017.

[7] Sh. Y. Wu, Urban Wetland Park Planning under the Concept of Ecological Planning, Flowers, vol.10, pp.99-100, 2018.

[8] A.X. Chen, Preliminary Research on Landscape Ecology of Urban Wetland Parks, Theoretical Research on Urban Construction (electronic version), vol. (36), pp.33-34, 2015.

[9] J. Zhang, Exploration of Landscape Planning and Design of Wetland Park Based on Sustainability, Modern Horticulture, vol.11(09), pp.90-91, 2019.

[10] F. Tian, Wetland Park Landscape Ecological Protection Design Based on Ecological Concept, Overseas Abstracts (Academic), vol.16, pp.62-64, 2017.