Discussion and Research on Ecological Planning of Wetland Park in Urban Areas

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Abstract. Wetland is the most productive ecological system in the world, and the production and life of human being can’t be separated from its service functions. However, because of the overexploitation of wetland, the area and quantity of wetland have decreased greatly, which has caused many serious problems regarding to environment and sustainable development. Therefore, how to develop and utilize wetland scientifically and solve the contradiction between resource development and environmental protection are hot topics for the research on wetland. In this paper, it discusses the great significance that the construction of wetland part in urban areas has on the protection of urban green system. Besides, it analyzes the objectives and principles for the planning of wetland part from the perspective of ecological planning and illustrates the contents and methods of ecological planning of wetland from the perspectives of sub-region planning, topographical reform, water system planning, road system, planting design and building facilities etc, so as to form a frame for the ecological design and planning of wetland parks in urban areas.

Introduction

Wetland refers to some places where water areas and lands are joined, including some low-lying areas and flood plains, as well as places covered by freshwater or salt water. It is the most important ecological system on earth. Wetland has powerful ecological functions and efficiencies, particularly urban wetlands that are closest to human, where not only has abundant resources, but has powerful functions in environmental conditioning, landscaping and eco-efficiency[1]. In recent years, as the increase of the development and construction of wetland parks, “wetland” nearly becomes a fashion noun. Certainly, there are many successful projects of wetland parks. However, as the cognition and research on wetlands and wetland parks are at an initial stage, some concepts and understandings are still immature[2]. In this paper, by analyzing the concepts of ecological design of Wetland Park in Yun Town, it is expected to provide certain references for the design and protection of wetlands in urban areas of China[3].

General Information of the Wetland Park

Jinghong City locates in the south of Yunnan, where is in the middle of Dai autonomous prefecture of Xishuangbanna. It crosses the east longitude 100°25’~101°31’ to the north longitude 21°27’~22°36’. Jiangcheng, Mengla to the east, Lancang, Menghai to the west, Pu’er to the north, and Myanmar borders on the south. It is close to Laos and Tailand. The boundary line is 112.39km. Jinghong city is located on the joint area of Lantsang and Liu Shahe. Lantsang acrosses this area from the north to the south, Kunluo road passes this area from the east to the west out of the boundary.
The wetland park in the planning is located in Yun town of Jinghong, and it is next to Lantsang and Liushahe, which makes it a natural wetland, and has certain resources of wetlands. As the continuous development of social economy and project construction, the influences of human activities are intensified. Particularly, the immoderate mining and sand excavation lead to the serious damage of wetland resources in the project site. The dump of construction materials and household refuses and earth excavation has led to the serious damage of wetland resource in the project area. The urban landscape has brought inconvenience to the life of urban citizens.

In order to reduce the interference and damage of urban development on wetland environment, improve the urban landscape and the utilization rate of wetland and its surrounding areas. Therefore, it is very necessary to construct wetland part in Yun town of Jianghong city, so as to provide better ecological environment for the development of social economy and meet the increasingly demands of citizens for getting close to the nature.

**Sectorization and Construction Layout of Wetland Park**

**Planning Area**

The wetland park in Yun Town of Jinghong city is located in Yunzhen, Jinghong, which is the bottomland on the right bank of Lantsang, from the 1200meters distance of the downstream of Xishuangbanna on the north to the 500meters distance of the upstream of Liushahe on the south. It is close to Qinmin Road on the west and reaches to the water areas of Lantsang on the east. The wetland park covers an area of 168,000 square meters in total.

**Planning Principles**

The project is carried out based on the principles of “environmental protection, scientific restoration and utilization as well as sustainable development”. The purpose of the project construction is to restore the damages on landscape caused by quarrying and sand excavation, to construct a diversified landscape, recover the vegetational cover and form a complete ecological system of wetland, as well as the buffering function of ecological protection of riparian zone. Meanwhile, considering of the ecological carrying capacity, it stresses on the scientific development and utilization of wetland resource for tourism, and the zoning plan, which not only protects the ecological and sustainable development of wetland, but also meets the demands of the public for entertainment and relaxation.

**Function Division**

According to the principles of project planning, the wetland park can be divided into three function divisions, namely, reconversion area, management and service area, and the area for scientific utilization.

**Reconversion Area:** To reconstruct the ecological system of wetland in the project site, including the central lake, the viewing area of aquatic plant and the wetland landscape that planted many reeds and other plants, so as to create a natural, ecological and interesting landscape.

**Management and Service Area:** It includes service center, cultural plaza and ecological parking area etc. The main function of this area is to make it convenient for tourists gathering and distribution, the management of wetland and logistical support.
**Scientific Utilization Area:** This area consists of subarea for diet culture, subarea for entertainment and subarea for entertainment in waterfront area. The main purpose is to help tourists to understand wetland culture and experience the traditions and customs through ecological tourism and entertainment. See Sketch map of function division

**Construction Layout**

The wetland park is divided into three function divisions and several sub-divisions based on the project planning. Considering of the ecological water requirement of wetland, a certain riverbank and bottomland are confirmed based on the existing terrain in the park. To reserve a part of wetland in the dry season, so as to store water and drainage water during the water season. Moreover, it can also ensure the safety of draining floodwater. The green area of Wetland Park is about 90,000 square meters, which mainly consists of artificial plantation and natural recovery.

![Figure 1. Functional area and construction layout.](image)

**The Recovery and Restoration Area:** In order to protect the ecological environment and create better wetland landscape, a recovery and restoration area is included, which mainly is used to reconstruct and recover the ecological system of the wetland. It covers an area of 320,000 square meters in total, including an area of wetland landscape that covers 110,000 square meters and an area of aquatic plant that takes central lake as the center and covers 210,000 square meters. The area of wetland landscape is close to Lantsang, and the plantations planted on the design elevation mainly are emergent aquatic plants like reeds, the viewing zone of aquatic plants mainly consist of artificial plantation and natural recovery. To make it more convenient for tourists, wooden pavilion and viewing platforms are designed.

**Management and Service Area:** service center: the ground elevation of the service center is 540.5 meters, and it covers an area of 500 square meters. It is a one-floor area, which is 3 meters in height. In structure, it is a wooden stilted building, which makes it easy to disassemble it during the flood period, and ensure the safety of flood drainage. There are office, toilet and cloakroom in the service center, and the main functions of the service area are providing reception, consulting, travel guidance, room for changing clothes, storage, as well as some services offered for special tourist groups.

**Cultural Plaza:** It consists of the gate, entrance and cultural corridor, and this is a main place with most tourists for entering the zone. The ground elevation is 540.5 meters, and it covers an area of 2400 square meters. The entrance is on the southwest, the design has combined the modern art design with the construction design of Thailand building, which makes the entrance gate beautiful scenery instead of a gate only. The
cultural plaza is paved with marbles, and benches are placed in the plaza for tourists to have rests. This plaza can meet the demands of the audience to take exercise in the morning or attend square dance, so as to strengthen their physical health. The cultural corridor spreads knowledge about wetland and local cultures among tourists through fresco, panel, pictures and letters. Meanwhile, it also provide a platform for enthusiasts who are interested in history, literature, archaeology or photographing to communicate with others based on the theme of wetland culture through literature works and artistic works etc.

**Ecological Parking Area:** It is close to Qinmin Road, the scale of each parking space is defined based on the standard of 0.11/100 m$^2$, and there are around 190 parking spaces in total. Parking area is about 150 meters in length and 80 meters in width, and it occupies an area of 12000 square meters in total. The elevation is about 540.5 meters. The parking area is paved with permeable green plants, which matches with the entrance of cultural plaza quite well. Besides, with a comprehensive consideration of ecological and suitable development, and the safety of flood drainage, trees with local features are selected and then planted with a space of 4 meters, which has divided the parking space naturally.

The left side of main entrance of the park is near to Qinmin road and parking area. Besides, parking shed for bicycle is designed, so as to make it convenient for tourists to park their bicycles, electro-mobile and tour bicycles that they rent.

**The Division of Scientific Utilization:** sub-division of diet culture: the elevation of the central area is 540.0 meters; the building consists of trestle, pavilion and special restaurant etc, all these are constructed on the reinforced concrete piles. A Thailand style of building is adopted, the foundation of the building is 0.5~1.0m above the ground, and the building covers an area about 1200 square meters. Meanwhile, plantations or grasses with local features are planted, which not only reflected the local features and have not influences on the flood drainage, but also ensures the safety of the building during the flood period.

**Sub-division for Entertainment and Recreation:** the elevation of the central region is 540.0m; the building covers an area of 800 square meters, and consists of oxygen bar, tea bar and café. Besides, there are facilities like trestle, pavilion, bar, fishing area, small garden ornaments and swings etc. This is a kind of building with Thailand style constructed on reinforced concrete piles, he foundation of the building is 0.5~1.0m above the ground. Plants or turf with local features are planted, it stresses on the harmony between man and the nature, and aims to create a peaceful and pleasant environment for recreation.

**Sub-division for Recreation:** Basically, it is an artificial beach; the elevation varies from 529.0 to 540.0 meters. As the change of water level of Lantsang, some parts of the beach are out of the water, the slope ratio is about 1:12, the radius of the circular arc is 330meters, and the arc length is 310 meters, while the central angle is about 54°. This not only meets the demands of landscape, but also meets the requirement of natural balance of water front. The mean grain size of the beach is at 0.18 -0.7mm for best, while the best sorting shall be less than 1.0. The average seabeach sand is 20 cm in thickness. What below is the mix layer of gravel with a thickness of 20cm, so as to ensure the cleanness of the sand beach. There are facilities as water bar, sunbath chair, volleyball court and watering area in this sub-division.
Conclusions
Through a detailed analysis of environmental protection, sustainable development and the design idea of harmonious co-existence, the design idea of ecological wetland park has been analyzed. It can be seen that the protection of wetland in urban area doesn’t mean we need to isolate it, as we can realize multiple goals, such as the protection of wetland, the development of tourism resource, scientific education and recreation at the same time through scientific and elaborate design and planning with certain technical supports. The design idea of Wetland Park in Yun town has been used in the entire design process, and it has handled all possible conflicts of each goal. The constructed wetland park is not only a simplex scenic spot, more importantly, it stresses on the protection of ecological environment, education and recreation resources. It is expected to provide certain references for the protection and development of urban wetlands in China through the research on the design idea of Wetland Park in Yun town.

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References