HUNGARIAN UNIVERSITY OF AGRICULTURE AND LIFE SCIENCES

INSTITUTE OF LANDSCAPE ARCHITECTURE, URBAN PLANNING AND GARDEN ART

BUDAPEST

MASTER OF ARTS IN LANDSCAPE ARCHITECTURE AND GARDEN ART

Yellow River Wetland Landscape Design

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MATE Organizational and Operational Regulations
III. Requirements for Students
III.1. Study and Examination Regulations
Appendix 6.13: The MATE Uniform Thesis / thesis / final thesis / portfolio guidelines
Annex 4.1: Consultancy statement

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CONTENT

Ⅰ INTRODUCTION

Wetlands have the functions of purifying air, protecting plant and animal resources, maintaining biodiversity, regulating climate, storing water and preventing drought. With the rapid development of urbanization and human interference and destruction, wetlands are facing serious problems such as ecological damage and degradation of ecological functions. In order to solve the dilemmas of wetland ecosystem disorder and ecological function degradation, the state and the government attach great importance to wetland protection, and have taken a series of important measures to strengthen wetland protection, and to promote the ecological environment protection and restoration of wetland in various places, which provides a good guarantee for the protection and sustainable development of wetland ecology.

Zhengzhou Yellow River National Wetland Park in Henan Province, an urban special wetland, is selected as the main research object, taking wetland ecological protection and restoration as the starting point, guided by the theory of sustainable development theory, and summarizing the laws and methods of excellent wetland ecological planning and design cases at home and abroad. Through literature reading, image interpretation and field research, the ecological and cultural resources, topographic features, current problems, spatial morphology, ecological characteristics and functional roles of the Yellow River National Wetland Park in Zhengzhou, Henan Province are summarized, focusing on the ecological problems of the Yellow River Wetland Nature Reserve, such as the Yellow River Wetland has been over-cultivated, ecological environment damage, serious landscape fragmentation, and the reduction of the ecological function, etc., and the analysis of its causes are analyzed. Based on the previous research and analysis summary, under the premise of exploring how to restore the ecological environment of the Yellow

River Wetland, starting from the resource environment of the Yellow River Wetland, and based on the principles of ecological priority protection, coordinated sustainable development, and coordinated planning and zoning protection, the natural ecological environment of the Wetland is restored, and the characteristics of the resources of different areas are collected, so as to make it form a natural ecological conservation barrier and a charming place for the display of featured cultures, recreation, science polarization education, etc., in the edge area of Zhengzhou.

1.1 Background

1.1.1 Environmental background

Wetland environment is a unique composite ecosystem formed by the interaction of water and land, which has the functions of purifying air, protecting plant and animal resources, maintaining biodiversity, regulating climate, and storing water for drought prevention. Wetland ecological problems have always been a hot issue in ecological environment research. With the progress of science and technology and the continuous development of resource economy, the wetland environment has been threatened and pressured by urban development and man-made disturbances and damages, and a series of problems such as ecological environment damage, decline of biodiversity, gradual loss of natural purification and storage capacity, and reduction of wetland area have appeared. Urbanization has a great impact on the ecology of urban rivers and wetlands, and the encroachment on the ecological environment violates the requirements for the construction of urban ecological civilization, and the ecological environment has become a strategic priority for international security.

People all over the world have begun to pay more and more attention to the

protection and restoration of wetlands and the rational use of wetland resources, elevating wetland protection and ecological restoration to a certain level. Wetland protected areas have the roles of providing aquatic products for human beings and optimizing landscapes in addition to their ecological functions. The expanding impact of urbanization development has threatened the protected areas with potential economic benefits driven by people's development of tourism projects in the wetland protected areas, encroachment of farmland and buildings, and the development of fishpond industry, all of which have led to the continuous compression of wetland space, making the wetland buffer zone progressively narrower. Zhengzhou's cross-river development trend will also bring certain ecological damage to the Yellow River wetlands, bringing negative impacts on the habitat of plants and animals. How to adjust the ecological environment between urban development and wetland reserve has become a new demand of wetland ecological planning.

1.1.2 Government policy direction

Under the general trend of rapid deterioration of global ecosystems, to achieve the goal of building an ecological civilization of "Beautiful China", it is necessary to guide the sustainable development of modernization processes with the scientific concept of ecological civilization. The state attaches great importance to the ecological protection of wetlands, and since China joined the Convention on Wetlands in 1992, it has taken a series of important measures to strengthen the protection and restoration of wetlands; in September 2003, the State Council approved the "National Wetland Conservation Project Plan (2002-2030)", which clearly defined the objectives of wetland protection in China. In 2012, the 18th CPC National Congress pointed out the direction of wetland work, and in 2013, the first national wetland protection and management regulation, the Provisions on Wetland Protection and Management, was promulgated by the State Council. 2016, the State Council

issued the Programme on Wetland Protection and Restoration System; in 2017, the General Office of the Central Committee and the General Office of the State Council issued the Several Opinions on the Delimitation of, and Strictly Abiding by, the Red Line of Ecological Protection Red Line", which clearly requires that ecological space with special important ecological functions such as forests, grasslands, wetlands, and oceans must be strictly and compulsorily protected.In March 2017, the Ministry of Housing and Urban-Rural Development (MOHURD) issued the "Guiding Intentions of the Ministry of Housing and Urban-Rural Development on Strengthening Ecological Rehabilitation and Urban Repair Work (Construction Regulation [2017] No. 59)", which put forward specific requirements for water ecological rehabilitation ; In October 2017, the 19th National Congress of the country advocated the construction of ecological civilization, proposing the protection and repair of important ecological projects and the optimization of the ecological security barrier system.(INT-01)

Fig. 1-1 .Wetland-related policies issued by the Chinese Government

1.2 Significance and goal

As an important wetland ecological environment and an important part of the city, analyses specific Henan Zhengzhou Yellow River National Wetland Park problems and carries out overall ecological protection, key project restoration planning and landscape optimization and enhancement, with a view to improving the ecological environment of the Yellow River Wetland, restoring the wetland ecological function and optimizing the landscape style.

Through the reasonable restoration and protection planning of the wetland reserve can comply with the urban development trend, coordinate the contradiction between the wetland status quo and urban development, keep the wetland in a better habitat, so that it can play the role of ecological service of the Yellow River Wetland Nature Reserve, better serve the development of the neighbouring cities, and provide guarantee for the ecosystem construction of Zhengzhou city, which is more conducive to guiding the construction of the national central city of Zhengzhou.

Goal: This Master thesis summarizes the research progress of wetland protection at home and abroad, the research dynamics and trends in the Yellow River basin, and analyses the relevant cases.

By summarizing the progress of wetland protection research at home and abroad, the dynamics and trends of research in the Yellow River Basin, and analyzing relevant cases, this paper takes Zhengzhou Yellow River Wetland Nature Reserve as the research object to carry out planning and design practice. The causes of ecological problems in the study area are analysed, and the internal and external water systems and green areas of the Yellow River Wetland are connected to provide habitats for animals and plants; characteristic experience areas, animal protection corridors and green

corridors are planned as ecological links, and combined with the planning of characteristic attractions, they form a wetland ecosystem network to improve the wetland ecosystem. Wetland protection and key project restoration strategies are proposed from the aspects of landscape ecology, history and humanities, economic construction, etc., and ecological landscape optimization and enhancement suggestions are made to maximize the function of urban wetlands and guide the planning and construction of urban ecosystems.

(1) Ecological principle

In the landscape design of the Yellow River wetland, the principle of ecology should be considered as a key point, starting from the natural ecology in the wetland and thinking about the ecological components. In the landscape design planning, the habitat of animals and the needs of human activities will be treated equally, balancing the relationship between ecological protection and utilization.

(2) Principle of sustainability

In the landscape design of the Yellow River wetland, the sustainability of the development of the region should be considered. Humans should not sacrifice the quality ecological environment as a price while asking for and developing the natural ecology. In the design, the control of human intervention, the protection of wetland resources, and the protection of the environment will be put in an important position, so as to make the space for animal survival activities and the space for human activities coordinate, optimize the landscape environment of the Yellow River Wetland, and satisfy the needs of both at the same time, so as to achieve a virtuous cycle and provide more possibilities for the future development of the region[7].

(3) Low human intervention principle

The principle of low human intervention refers to minimizing human interference in the ecological environment in the landscape design of the Yellow River wetland, improving the recycling of various organisms and substances in the ecosystem through ecological landscape creation, maintaining the originality of the ecological pattern in the region to achieve the natural evolution of ecological processes, and thus improving the biodiversity in the region[10].

In our common wetland landscape design programme, human participation often accounts for a large proportion of those complicated designs usually need to rely on human activities to maintain, so everywhere is full of human will, so in our design would like to try our best to change this point. By understanding the different types of natural landscapes in wetlands, we make rational use of landscape resources, and through the plans we make, we gradually improve the wetland system and restore a good environment.

1.3 Introduction of the site

1.3.1 Definition and history of wetland parks

Wetland parks, as theme parks integrating ecological protection, popular science education and recreation, can be formed either naturally or artificially. Such parks not only possess the unique ecological functions and typical features of wetlands, but also realize the sustainable use of wetland resources through scientific planning and management based on the good ecological environment and diversified landscape resources of wetlands(INT-01).

Wetland parks occupy a pivotal position in the wetland protection system, which together with wetland nature reserves, conservation districts and wetland wildlife protection habitats constitute a complete wetland protection network. Through the development and construction of wetland parks, we can

effectively implement the national wetland classification and management strategy, so as to maintain and expand the protection area of wetlands. This initiative is not only conducive to the mobilization of social forces to participate in the conservation and sustainable use of wetlands, but also gives full play to the multiple benefits of wetlands in terms of ecology, economy and society.

The construction of wetland parks not only satisfies the public's desire for natural environment and leisure needs, but also meets the objective requirements of social and economic development. Through scientific management and public participation, wetland parks not only protect the integrity and stability of wetland ecosystems, but also ensure the sustainable use of wetland resources and maximize benefits.

In addition, wetland parks play an irreplaceable role in improving regional ecological conditions, promoting sustainable economic and social development, and realizing harmonious coexistence between human beings and nature. Therefore, we should further strengthen the construction and management of wetland parks and promote their greater role in the cause of wetland protection, so as to make positive contributions to the construction of a beautiful China and the realization of sustainable development goals.

1.3.2 Introduction of Zhengzhou city

Zhengzhou City, a city with a long history, is known as "the centre of heaven and earth", anciently known as the capital of commerce and now known as the Green City. As the capital city of Henan Province and a mega-city, Zhengzhou is explicitly supported as a national central city in the "13th Five-Year Plan for the Rise of Central China", and its position in regional development is self-evident.

Zhengzhou is located in the north-central part of Henan Province, at the border between the middle and lower reaches of the Yellow River, and is blessed with a unique geographical location. Its topography is high in the southwest and low in the northeast, belonging to the temperate continental monsoon climate, with rivers running across the Yellow River and Huaihe River basins, covering a total area of 7,567 square kilometers. Such a natural geographical environment provides superior conditions for the rich ecological and agricultural development of Zhengzhou. Since the government of Henan Province moved to Zhengzhou in 1954, the city has become the political, economic and cultural centre of Henan Province. As one of the major birthplaces of Chinese civilization, Zhengzhou has a rich historical and cultural heritage. As of the end of 2021, Zhengzhou has numerous national key cultural relics protection units, provincial cultural relics protection units, and municipal cultural relics protection units, all of which bear witness to Zhengzhou's long history and deep cultural heritage.

In addition, Zhengzhou is also a national transport hub with both public, railway, aviation and mail, and its transport network is well-developed, convenient and efficient. Whether it is railway, road or air transport, Zhengzhou has a strong transport capacity. Up to now, Zhengzhou has a number of railway stations, railway lines, high-speed railway lines and underground lines, forming a three-dimensional transport network that provides citizens and travelers with convenient ways to travel. Meanwhile, Zhengzhou has also made remarkable achievements in economic development. As the economic centre of Henan Province, Zhengzhou is home to many well-known enterprises and industries, which provide a strong impetus to the city's economic growth. In addition, Zhengzhou also pays attention to the protection and construction of the ecological environment, and is committed to creating a modern city that is pleasant to live in, pleasant to work in and pleasant to visit.(INT-01)

With its long history and culture, convenient transport network and strong economic power, Zhengzhou has become an important city in Henan Province and even in the central region. In the future, with the continuous development and progress of the city, it is believed that Zhengzhou will usher in a better tomorrow.

1.3.3 Introduction of Zhengzhou Yellow River National Wetland Park, Henan

The Yellow River is the second largest river in China, and the Yellow River Wetland is an important part of China's wetlands, while Zhengzhou Yellow River Wetland is one of the most representative areas. Zhengzhou Yellow River National Wetland Park is located in the north of Huiji District of Zhengzhou City, on the south bank of the Yellow River between the Yellow River Floating Bridge and the Yellow River Highway Bridge, and is closely connected with many villages such as Baohezhai Village, Niuzhuang Village, and Qianliu Village, etc., and to the east, it is adjacent to the Dahe Road Office, Lixihe Village, and Huayuankou Village. This green wetland park, covering an area of 100 hectares, not only provides the public with a good place for leisure and recreation, but also is an important window to show the ecological function and typical characteristics of the Yellow River wetland(INT-01).

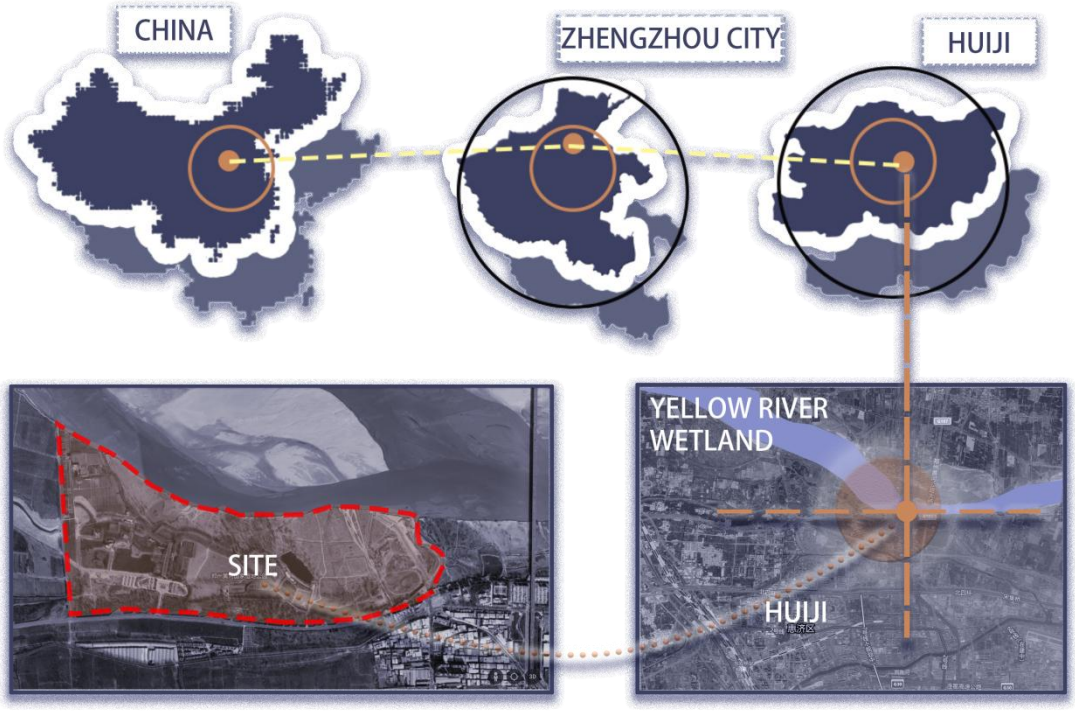


Fig.1-2 .Zhengzhou Yellow River National Wetland Park Location

Zhengzhou Yellow River National Wetland Park has planned six functional areas(Science popularization and education zone, leisure and recreation zone, beach exploration zone, ecological conservation zone, Yellow River farming culture zone and comprehensive service zone.), and each area has its unique charm and function. Science popularization and education area, through rich display and interactive experience, allows visitors to deeply understand the mystery of the wetland ecosystem; leisure and entertainment area, provides a wealth of leisure activities for the public, so that people can feel the charm of nature in a relaxing and pleasant atmosphere; the beach exploration area, is a land full of mysteries and unknowns, waiting for the brave to come to explore; the ecological conservation area, is committed to protecting the ecological balance of the wetland, and letting the The ecological conservation area is dedicated to protecting the ecological balance of the wetland and letting the greenery last forever; the Yellow River Farming Culture Area demonstrates the long farming history and rich cultural connotation of the Yellow River Basin; and the Comprehensive Service Area provides tourists with perfect service facilities, making people's wetland trip more convenient and comfortable(INT-01).

The original site was approved for construction by the National Garden Bureau, and planning and design is relatively reasonable, but due to negligent management, the existing landscape has a certain gap with the expected. The zoning of the site is not clear, and some of the existing fish ponds and arable land occupy some of the functional areas (the fish ponds are artificial fish ponds with profit-making purpose; the main crops of the arable land are wheat and corn rotational farming). Existing functional areas include a science education area, an ecological monitoring station, and a viewing trail, but their functions are not well defined. The roads are fragmented and do not fully connect the various functional areas. In winter, due to the lack of water and the high number of beaches, soil erosion is serious and people cannot reach the shore(INT-05).

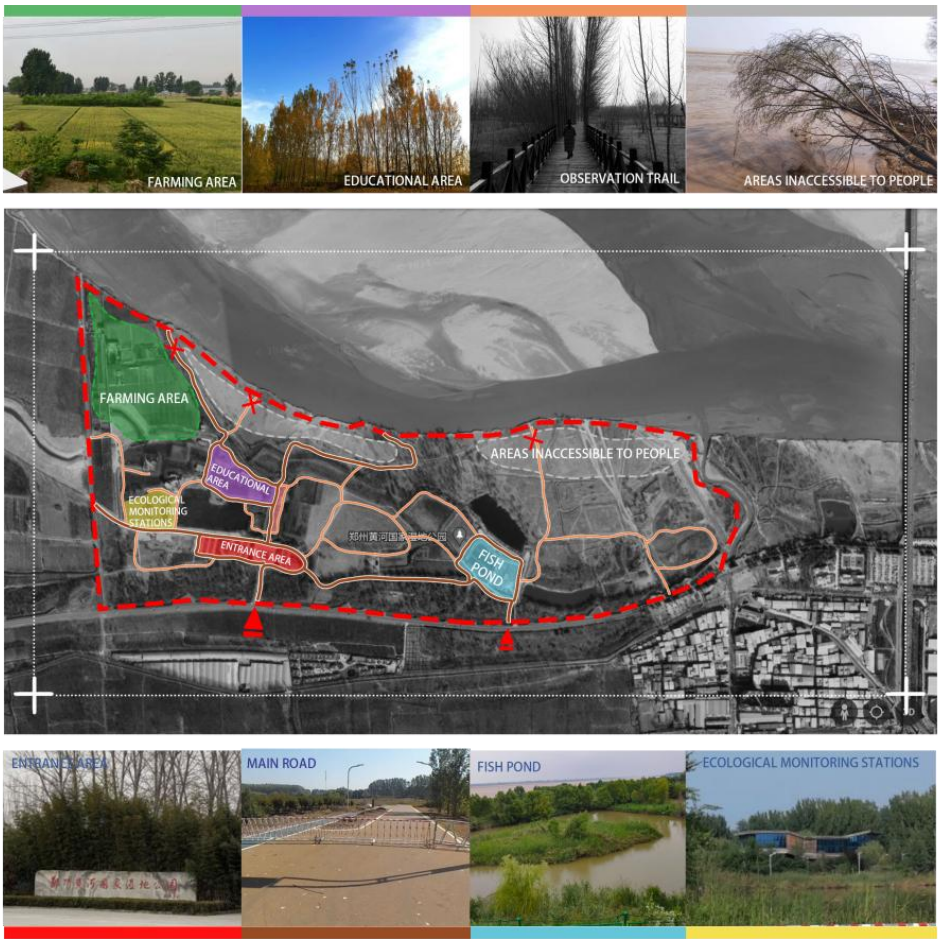


Fig.1-3 .Site condition and photos

Ⅱ METHODOLOGY

(1) Literature Reading Method

According to the research topic targeted data collection and literature review, to understand the current situation and trend of wetland development at home and abroad, to systematically summarize the relevant theories and methods, to analyse the research progress of the Yellow River wetland and research trends, to provide certain theoretical reference and guidance for the in-depth study of the thesis.

(2) Case Study Method

The thesis analyses the wetland ecological restoration cases at home and abroad to summarize the experience and provide reference for the ecological planning and design of the whole study area. At the same time, the ecological function of wetlands is analyzed in the light of the current situation and problems of the wetland space in Zhengzhou City, so as to enhance the comprehension of the thesis and the practicality of the research.

(3) Field Research Method

Through field research, in-depth understanding of the environmental status of the Yellow River wetlands, distribution of the water system, geomorphological features, wetland habitats and other practical situations. A preliminary summary is made for the problems, driving force analysis and how to plan the ecological space of the Yellow River wetland along the Yellow River beach-land and the Yellow River wetland territorial space status quo.

Time: 20 January 2023

Place: Zhengzhou Yellow River Wetland

Research content: after arriving at the designated area, take the cable car to

browse the whole area and take photos and records. Organise the path and analyse the condition of the site.

(4) Software-assisted method

Taking Google satellite images as the information source, with the support of GIS technology, the current land use status of the design site is interpreted, and at the same time combining with Google Earth, AutoCAD, sketching, ps and other software to carry out modelling and planning and design of the site.

Ⅲ CASE STUDIES

3.1 Xixi National Wetland Park, Hangzhou

3.1.1 Project overview

Hangzhou Xixi National Wetland Park is located in the western part of Hangzhou, with a favourable geographical position and good ecological resources, and is one of the famous wetlands in China.

One of the famous wetlands in China, it is the first national wetland park integrating urban wetland, agricultural wetland and cultural wetland(INT-03).

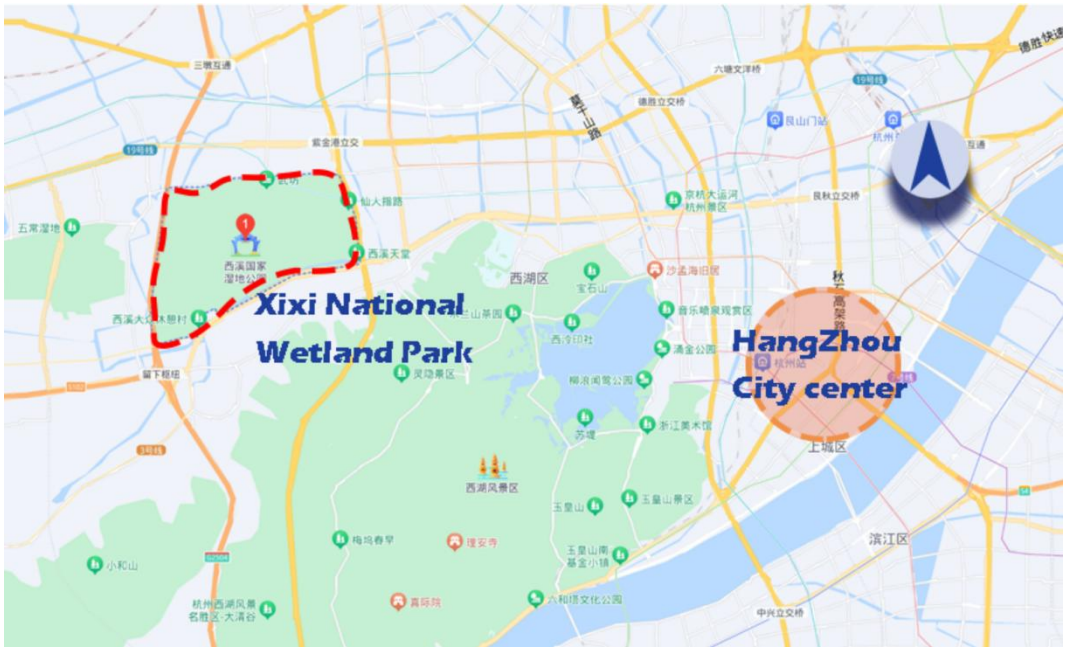


Fig.3-1 .Geographic location map

Photo source：https://map.baidu.com/search

3.1.2 Overall layout

The overall layout of the park is "three zones, one corridor and three belts", with "one corridor" being a 50-metre wide multi-layered landscape corridor on the periphery of the protected area; "three zones" are the eastern ecological conservation zone, with the main purpose of conserving and restoring the diversity of species through conservation and restoration. One corridor is a 50-metre wide multi-layered landscape corridor at the periphery of the protected area; the three zones are the eastern ecological conservation zone, which mainly aims at conserving and restoring the diversity of species. The "three zones" are the eastern ecological conservation zone, the main purpose of which is the conservation and restoration of diverse species. "The "three zones" are the eastern ecological protection and cultivation zone, the central ecological recreation zone, and the western ecological closure zone. Zijingang Road, the "City Forest Shady Scenery Belt", the "Waterfront Wetland Landscape Belt" along the Shanhe River and the "Canal Rural Scenery Belt" at Wuchang Harbour make up the "Three Belts" scenic layout. The layout of the landscape.

Fig.3-2.Aerial view of Xixi National Park

Photo source：https://www.yunjingdian.net/

3.1.3 Planning Features

(1) Design of water system fishponds: Part of the original fishpond form is retained, and Sangji fishpond and Persimmon fishpond are featured to create a secondary wetland landscape.

The secondary wetland landscape is created, and the diversity of wetland forms is demonstrated through water system connection, road design, building demolition and relocation; the rich water resources are utilized to combine ecological protection with water-themed tourism, and the landscape is landscaped along the river.

Using the rich water resources, combining ecological protection with water theme tourism, landscape arrangement and tourist attraction design are carried out along the river.

(2) Plant design: the landscape promenade consists of a multi-layer through the reasonable combination of Terrestrial tree species and wetland plants, ornamental green corridor with functions such as guiding routes, etc.; with

Plants suitable for wetlands as the main focus, the design of characteristic landscape forests such as persimmon forests, plum forests

The plants on both sides of the river are mainly protected, and the environment of Xixi Wetland is protected in the areas that are seriously disturbed and damaged by man.

The plants on both sides of the river are mainly protected, and in the areas with serious human interference and damage, the original plant communities in the Xixi Wetland environment and the plant communities in the similar wetland environment are configured.

(3) Eco-agriculture planning: Xixi Wetland has large agricultural resources and rich natural landscape resources.

integration of farming resources and ecological environment to create an ecological leisure recreation area featuring farming, fishing and cultural experience.

(4) Cultural Recreation Planning: Tap into the folk culture and create activity spaces with the theme of folk culture based on the different site characteristics and historical and cultural resources of each district.

Folk culture as the theme of activity space, such as Jiaolu'an, Li Hang Er Gong Ancestral Hall, Qushui Eight Scenic Spots and so on. Integrate the existing residential areas, reduce the density of buildings, and restore the Eight Scenes of Qushui.

density of buildings, restore the Eight Scenes of Qushui and the traditional plant landscape, and build a good ecological environment for agriculture (fishing) in the wetland, so as to comprehensively display the unique folk culture of Xixi Wetland.

It will display the unique folk culture of Xixi Wetland and carry out leisure and holiday activities in the wetland.

(5) Visitor control: The tourism area of Xixi Wetland will be divided into a controlled area with charges and an open area with free access.

The flow of people is strictly controlled on the basis of ecological carrying

capacity.

Infrastructure design: On the premise of controlling the amount of visitors, an efficient and ecological infrastructure sharing system will be built.

Fig.3-3.Situational view of Xixi Wetland

Photo source：https://baike.baidu.com/item

3.1.4 Lessons learned

Although Xixi Wetland is significantly different from the Nature Reserve in terms of ecological importance, wetland area and functional zoning, it has nevertheless attached great importance to the protection and construction of the wetland ecological environment, the inheritance of history and culture, the sustainable development of the economy as well as the enhancement of the quality and comprehensive competitiveness of the city. This enables Xixi Wetland to coexist harmoniously and coordinate with each other in urban development. For Zhengzhou Yellow River Wetland Park, a large amount of farmland resources are distributed in it. In the planning process, cleverly combine these farming resources with the wetland ecological environment to plan colourful farming leisure and experience activities. Visitors can not only

enjoy the natural scenery of the wetland, but also feel the charm of farming culture, thus creating a unique ecological agricultural recreation experience area.

In addition, the Yellow River Wetland also contains rich history and humanity and unique geomorphological landscape. In the planning, we can hold various activities with the theme of folk culture according to the different characteristics and functional positioning of the site, and deeply excavate and display the local natural landscape characteristics, so as to create a unique humanistic and historical landscape.

The layered protection strategy adopted by Xixi Wetland in the process of urban development also provides valuable reference experience for the planning of the Yellow River Wetland Reserve. By studying and learning from these effective measures, we can better balance the relationship between wetland protection and urban development, and realize the harmonious coexistence of ecology, economy and culture.

3.2 Sungei Bungah Wetland Reserve, Singapore

3.2.1 Project overview

Sungei Buloh Wetland, a 161 ha nature reserve located in the north-west of Singapore, was designated as Singapore's first Wetland Centre and Nature Demonstration Site in 2002.

It was designated in 2002 as Singapore's first Wetland Centre and Nature Demonstration Site, and also serves as a stopover for migratory birds(INT-03).

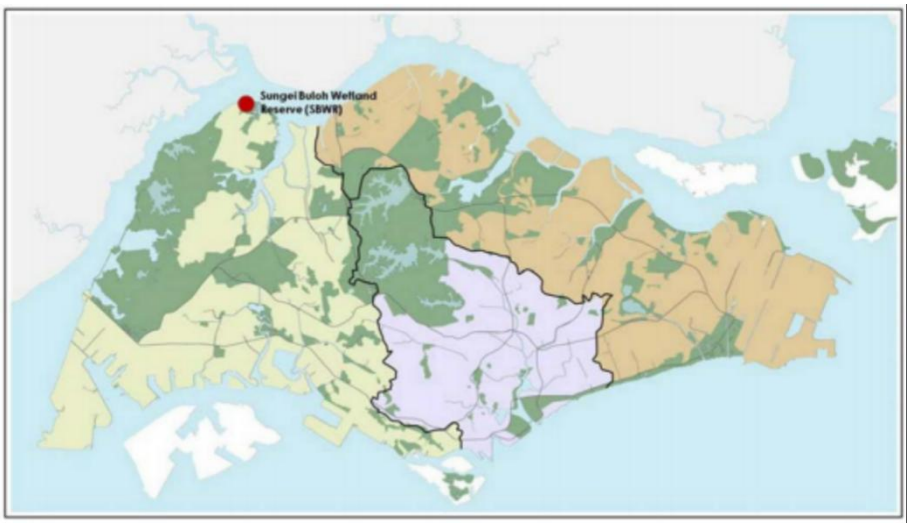


Fig.3-4.Location Map of Sungei Buloh Wetland Reserve

Photo source：https://bbs.co188.com/thread-9066730-1-1.html

3.2.2 Overall layout

The site is a lowland consisting of brackish ponds, river estuaries with semi-saline water, semi-saline marshes and coastal seawater, and the outer aid mainly mangrove wetlands, where many migratory birds rest and feed. The main zoning is high activity zone, medium activity zone, low activity zone and very low activity zone. Activity Zone and Very Low Activity Zone, with the High Activity Zone being the Cranz Nature Education Route for group visitors, the Visitor Centre, The Low Activity Zone is an area of minimal activity focused on conservation of the natural environment; and the Very Low Activity Zone is the core of the Wetland Reserve where disturbance is strictly prohibited and where conservation and research are the main focus.

Fig.3-5.Conceptual Plane Map of Wetland Reserve

Photo source：https://bbs.co188.com/thread-9066730-1-1.html

3.2.3 Planning Features

(1) Experiential landscape design: Through the design of nature trails, roller blades and other walking trails, visitors can learn the basic knowledge of wetlands and feel the life of wetlands; wetland experiential activities can be carried out on the mudflats during the low tide period.

(2) Destination Difference: Setting up different infrastructures such as viewing platforms to provide visitors with more ecological experiences.

Fig.3-6.Situational view of Wetland Reserve

Photo source：http://www.cila.cn/news/264481.html

3.2.4 Lessons learned

Shuangxi Buge Wetland Reserve focuses on the economic and cultural functions of the wetland while enhancing its ecological functions. It is not only committed to strengthening the protection of biodiversity, but also attracts a large number of tourists to experience the charm of the wetland through its unique charm, so that the relationship between people and the wetland is well coordinated and balanced. In Shuangxi Buge Wetland Reserve, everyone can become a participant in wetland protection through learning and participation, and jointly guard the diversity of flora and fauna. At the same time, this wetland also provides an ideal wintering stop for migratory birds, showing a beautiful scene of harmonious coexistence between man and nature.

When planning and designing the Yellow River Wetland Park, I made a scientific division of functional areas according to the geographical environment and ecological resource conditions in which each section is located. I created diversified habitats to provide ideal habitats for organisms, thus minimizing the disturbance and damage caused to them by human activities. In addition, we have effectively guided and controlled the flow of people through the zoning plan and the careful design of the garden paths, further harmonizing and balancing the relationship between people and the wetland. Such planning not only protects the diversity of flora and fauna, but also enables visitors to appreciate the beauty of the wetland and at the same time gain a deeper understanding and experience of the ecological value of the wetland.

Ⅳ STUDY ON PLANNING STRATEGIES FOR ECOLOGICAL PROTECTION AND RESTORATION OF WETLAND NATURE RESERVES

In order to create a wetland reserve landscape that combines ecological, aesthetic, cultural and educational functions, we must carry out careful planning and design through diversified ways of ecological protection, ecological restoration, ecological utilization and ecological management. At the same time, a comprehensive analysis of specific cases of wetland protected areas will help us to refine more accurate and effective ecological protection and restoration planning and design strategies. These strategies should not only fully consider the protection of the natural environment of the wetland, but also focus on the restoration and enhancement of the ecological function, in order to achieve the sustainable development of the wetland reserve. In addition, ways of ecological use should be actively explored so that the wetland resources can be reasonably developed and utilized, and at the same time, ecological management should be strengthened to ensure the health and stability of the wetland reserve[18].

4.1 Ecological Conservation Planning Strategies for Wetland Nature Reserves

4.1.1 Zoning protection

Because of its vast area, the wetland reserve makes it necessary to adopt the strategy of zoning management for ecological protection. The restoration of the wetlands in the Yellow River beach area is realized through the zoning

restoration method under the premise of strictly abiding by the management regulations of the wetland park and closely combining with the current land use situation. Due to the acceleration of urbanization, many beach lands have been over-developed, and some areas have even been extended to the core area, resulting in reclamation or destruction of the beach lands. Therefore, within the core zone and buffer zone, measures to return plough to wetlands and fishing to wetlands are actively implemented to eliminate potential threats to the wetland ecosystem. At the same time, unnecessary human interference is strictly prohibited, making full use of the hydrological cycle of the Yellow River, plant germplasm resources and natural fertility, and gradually repairing the damaged ecological environment and restoring the natural wetland habitats through natural restoration, so as to attract more birds to come to live and breed.

The zone of high human activity, as a relatively open and least restrictive area within the wetland protection zone, can appropriately carry out activities such as recreational tourism. However, these activities must be carried out under the premise of strict compliance with wetland protection regulations to ensure that they will not adversely affect the wetland ecosystem. Through such zoning management and rational utilization, I seek to protect the ecological environment of the wetland while achieving a harmonious coexistence of man and nature.

4.1.2 Water protection

As a key element of wetland ecological protection, the strengthening of water connectivity is crucial to the overall ecological health of the protected area. By optimise the connectivity of the water system inside and outside the park, it not only ensures clean and stable water quality, but also provides stable and

reliable water resource support for the wetland ecosystem. This improved connectivity further promotes the independent purification capacity of the urban water system and realizes a virtuous cycle of water bodies.

In addition, strengthening the connection between the water systems in the protected area can not only provide a broader living and activity space for organisms, thus enriching the biodiversity, but also strengthen the interconnection between surface water and groundwater, forming a more complete ecological water network.

4.2 Ecological Restoration Planning Strategies for Wetland Nature Reserves

4.2.1 Wetland Plants Restoration strategies

Wetland vegetation is an important indicator of the quality of wetland ecological environment. The construction of the vegetation system should aim at protecting the benign cycle of the wetland ecosystem, taking into account the ecological function of the wetland and the time of ecological recovery, diversifying the plant species configuration and minimizing the cost of artificial maintenance. Wetland landscape planning is, to a large extent, also plant landscape planning. Appropriate plants should be used in the right place, and more Plants suitable for wetlands should be used, and exotic plants should be planted in a reasonable combination. The design mainly considers the restoration and creation of water surface and marsh plant landscape. According to the depth of the water flow, the aquatic plant system will be configured from shallow to deep into quite aquatic plants, submerged and floating plants and floating aquatic plants, and various plant combinations will be configured , so as to increase the diversity of the habitat of the river wetland

and provide the conditions for the wetland's self-regulation, which will make the landscape of the wetland more aesthetically pleasing[10].

4.2.2 Wetland Landscape Restoration Strategy

As a water ecological corridor in urban and rural space of Zhengzhou City, the Yellow River not only plays an important ecological role as habitat, channel and barrier, but also has the functions of recreation, science education and urban landscape corridor. In order to avoid a single repetitive wetland landscape, the planning and design of the Yellow River wetland system should increase various forms of wetland water space design through the use of culture, plants, topography conditions, etc., use the Yellow River beach landscape to create high-quality public recreational space, build ecological space landscape corridors, plan and construct Science education zones, Farming experience gardens, Ecological ponds and Beach experience zones, etc, reasonably plan to restore the plant communities, and build an urban ecological corridor by combining with the development of the city and the demand of citizens for recreation and leisure. It also plans to restore plant communities through rational planning, construct urban wetland landscapes in combination with urban development and citizens' demand for leisure and recreation, carry out wetland ecological tourism, and provide leisure and holiday places for citizens.

Ⅴ ANALYSIS

This chapter summarizes the survey and analysis results of the park from large scale to small scale, and proposes the overall planning and design strategy on this basis.

5.1 Large scale analysis

5.1.1 History

The Yellow River, known as the mother river of the Chinese nation, has nurtured the roots of Chinese civilization. As early as the distant Stone Age, the Yellow River basin gave birth to China's earliest neolithic civilization, such as the Lantian civilization and the Half-slope civilisation, which emerged on the banks of the Weihe River, and the Longshan civilization, which shone brightly on the Shandong Peninsula. More than 6,000 years ago, the first traces of agricultural activities appeared in this fertile land, and the dawn of agricultural civilization rose here.

In the long history, the Yellow River basin has been the centre of Chinese politics, economy and culture. The middle and lower reaches of the Yellow River were the cradle of the development of science and technology as well as literature and art. Around 2000 B.C., bronzes have appeared in the basin, and the bronze smelting technology has reached its peak during the Shang Dynasty, and iron smelting has also risen, marking the leap of productivity. Iron adzes, iron axes and other artefacts unearthed in Luoyang proved that China developed the technology of cast iron softening much earlier than Europe. The "Four Great Inventions" of ancient China - paper making, printing with movable type, compass and gunpowder - were all born in the Yellow River Valley. From the beautiful poems of the Classic of Poetry to the magnificent literature of the Tang and Song dynasties, to the vast array of cultural texts, all were born in this fertile land. Although the national economic centre of gravity gradually shifted to the south after the Northern Song Dynasty, the Yellow River Basin and the plains downstream of the Yellow River still occupy a pivotal position in

the process of China's political, economic and cultural development. The glorious history and profound cultural heritage of the Yellow River will continue to influence the future development of the Chinese nation(INT-01).

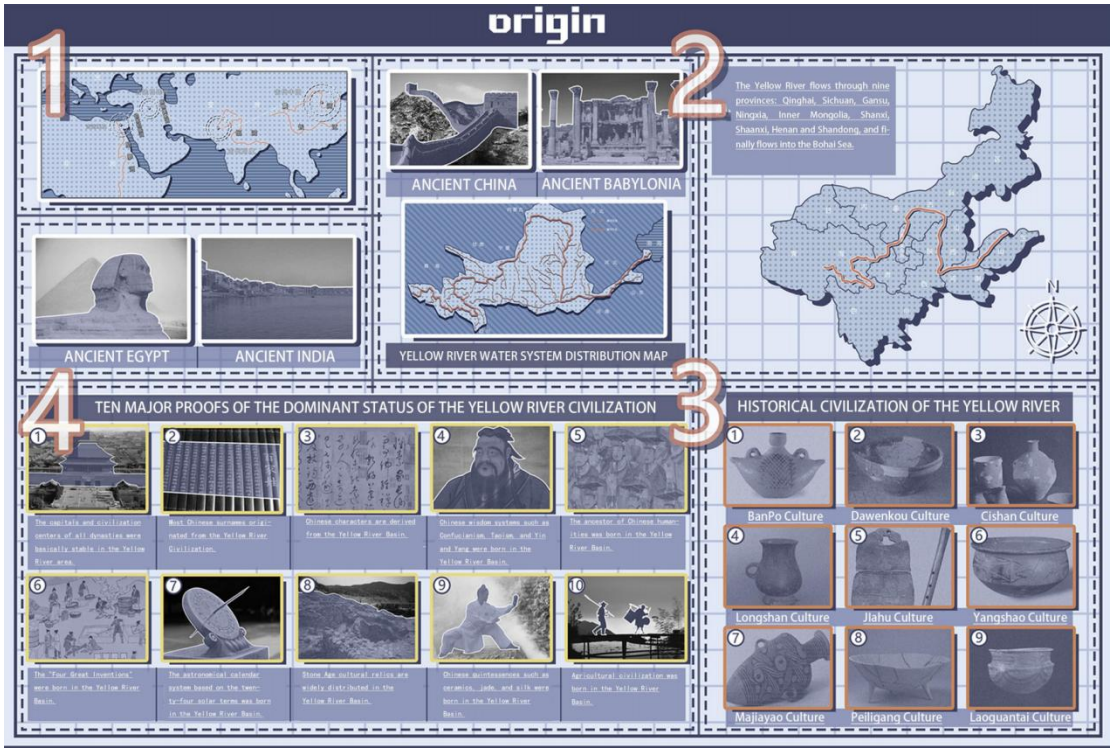


Fig.5-1.History of the Yellow River

The People's Government of Henan Province approved the establishment of the Yellow River Wetland Provincial Nature Reserve in Zhengzhou in 2004, and the Zhengzhou Municipal Government acted swiftly to strengthen protection and management. Wetland management methods were included in the legislative agenda, highlighting the determination to protect it. The municipal party committee and the municipal government listed wetland ecological restoration as a key project, and the Development and Reform Commission provided financial support. The Wetland Reserve took salvage measures to safeguard ecological safety. Deputies of the National People's Congress and citizens responded positively to the wetland protection regulations, promoting the depth of the work. Zhengzhou Municipality promulgated management measures(*National Wetland Park Construction Code* and *Zhengzhou Yellow River National Wetland Park Master Plan*), which were incorporated into the ecological construction and leapfrog development

plan to ensure that the wetland protection was sustained and effective. Detailed plans and wetland park plans were prepared to comprehensively protect wetland resources, implement restoration projects, increase investment and standardize protection work. Zhengzhou Yellow River wetlands, as a green home, are vital to water resources and ecological improvement. It needs to be scientifically planned and rationally utilized to achieve comprehensive, coordinated and sustainable development, and to be responsible for history, the future and future generations.

5.1.2 Traffic profile analysis

The ZZhengzhou Yellow River National Wetland Park is located in the northern part of Zhengzhou City, with a well-developed transport network of highways, expressways and Yellow River bridges running through it, providing convenient transport links between the north and south sides of the river. This area is home to several important transport nodes, from west to east they are the Jiaozuo Yellow River Highway Bridge, the Wu Xing Floating Bridge (located in Wuzhi County), the Taohuayu Yellow River Bridge, the Zhengzhou Yellow River Railway Bridge, the Zhengzhou Yellow River Highway Bridge, the Huanghe Huayuankou Floating Bridge, the Zhengxin Yellow River Public-Railway Bridge and the Liujiang Yellow River Bridge. In addition, the S87 Zheng Yun Expressway, G4 Beijing-Hong Kong-Macao Expressway, Beijing-Guangzhou Railway, Shiwu High-Speed Railway and G107 National Highway are also intersected here, which together carry the important task of Zhengzhou City's economic exchange and development. Visitors can arrive at the venue by private car or bus. If travelling by bus, there will be a shuttle bus to take visitors to the park upon arrival at the site. There is also the option of arriving by bike.The connection of these major transport routes not only strengthens the inter-regional links, but also provides a strong support for the

economic development of Zhengzhou City(INT-05).

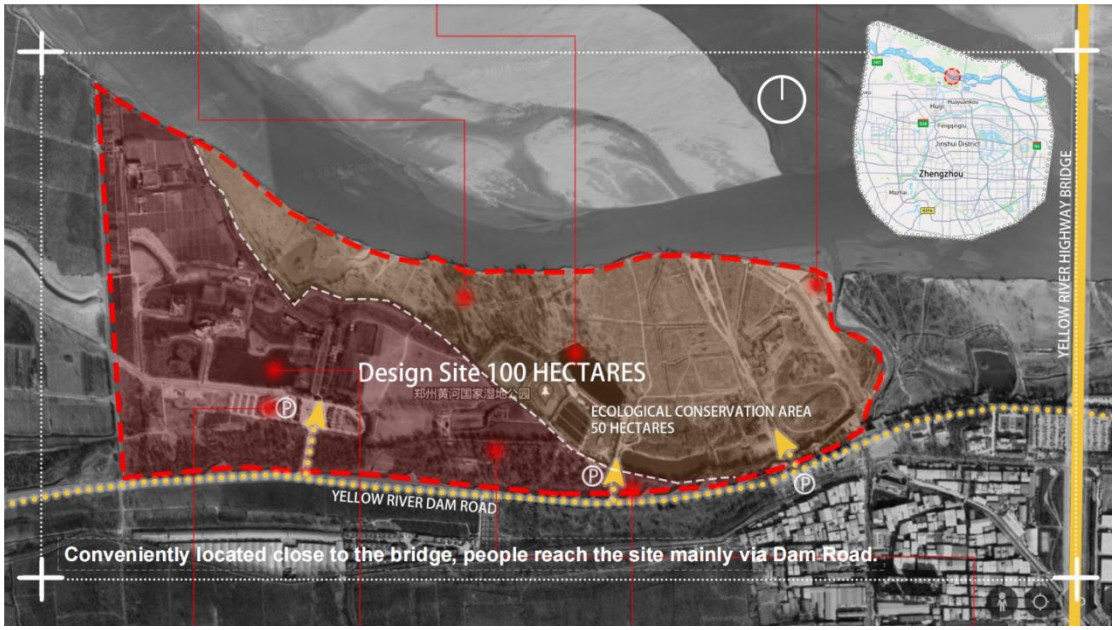


Fig.5-2.General information about the traffic around the park

5.1.3 Neighbourhood Analysis

Villages and agricultural land dotted around the site and increasing man-made developments have led to a shrinking of the wetland area. This phenomenon has far-reaching ecological implications. Wetland is one of the important ecosystems in nature, which is not only the habitat of many plants and animals, but also has important functions such as regulating the climate, purifying water quality, preventing floods and droughts. However, with the continuous expansion of human activities, the reduction of wetland area has led to the loss of biodiversity, the scarcity of water resources, and even the collapse of the ecosystem[19].

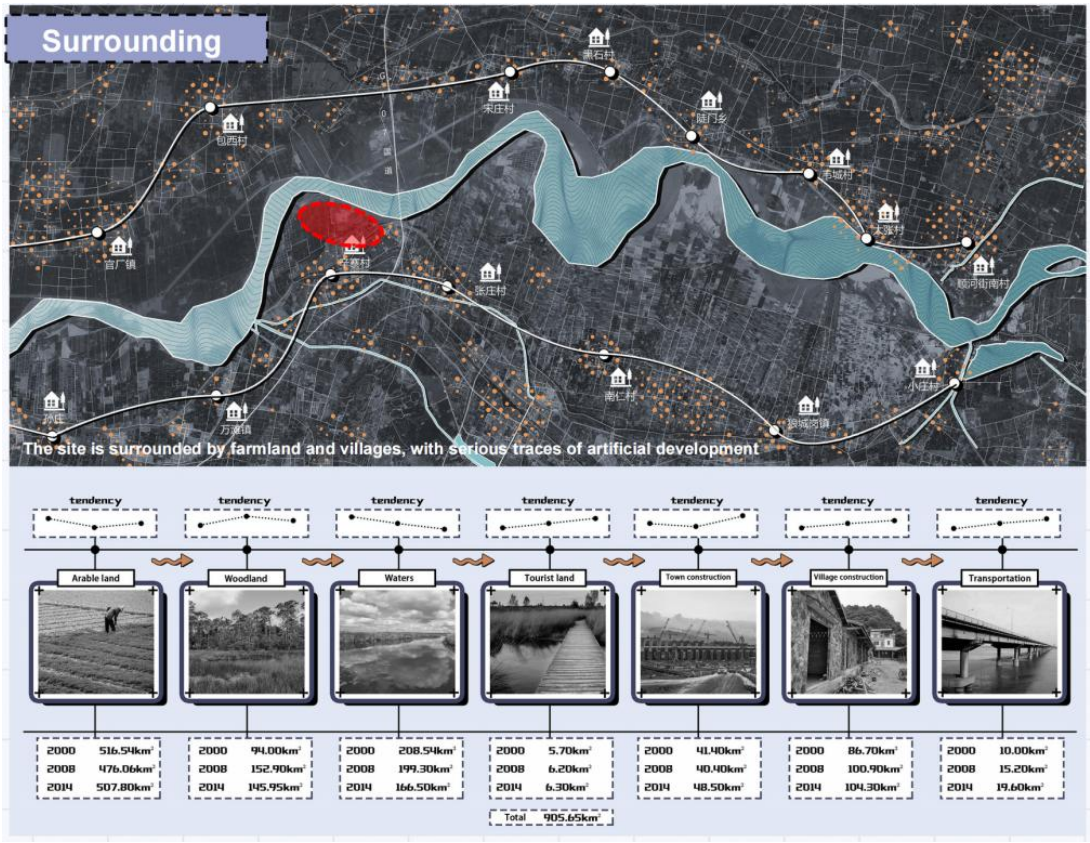


Fig.5-3.Neighbourhood and trends

5.1.4 Climate and hydrological changes

The site is located in the warm-temperate sub-temperate zone and is characterised by a significant continental monsoon climate. The four seasons are distinct and the climate is highly regular. Spring is dry, with scanty rainfall and frequent droughts; summer is hot and rainy, the main period of the flood season; autumn is sunny, with long hours of sunshine, which is suitable for the maturation of crops; and winter is cold and dry, with less snowfall.

In terms of rainfall, the average annual rainfall in the region is 640.9 mm, which is mainly concentrated in the flood season from June to September, when the Yellow River flooding is also high. The long frost-free period and sufficient sunshine throughout the year provide good conditions for crop growth.

The wind in Zhengzhou City has regular changes. The annual average wind speed is moderate, but the maximum average wind speed is high. In winter, the wind is mostly northwesterly, while in summer, it is southwesterly, and the wind alternates between spring and autumn; the wind speed is the highest in April, and the lowest in August and September(INT-01).

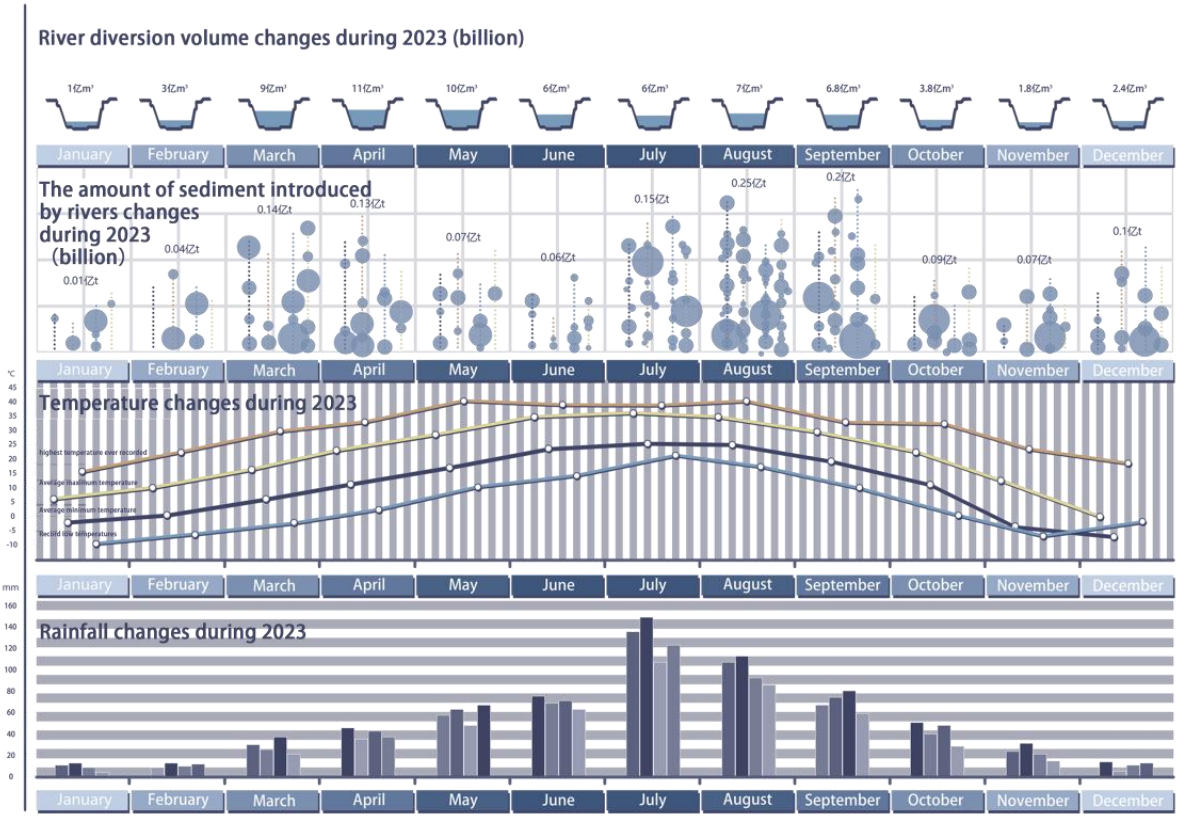


Fig.5-4.Climate Precipitation

5.2 Small scale analysis

5.2.1 Topographic and geomorphological conditions

The Yellow River passes through the mountainous areas and enters the plains in the Mengjin area of Luoyang, where it is interspersed with low mountains, and the main stream line changes frequently due to the influence of geological

terrain, showing unique hydrological characteristics. Constrained by the artificial embankment, the Yellow River has formed the phenomenon of "hanging river on the ground", which reflects the shaping of the river morphology by man and nature.

The area is widely distributed in the river floodplain, the terrain is flat, and the elevation is concentrated in 90.8 to 96 meters. The design site is located in a low-lying area with flat topography and elevations between 90.8 and 94 meters. The water level is about 88.2 meters in winter and 89.86 meters in summer.The embankment area has a higher elevation of 98 to 100 meters for effective flood protection.

The Yellow River flows from west to east with an average water level of 88.2 to 89.86 meters, bringing rich water resources to the plain. The Yellow River is not only a gift of nature, but also the cradle of civilization, its hydrological characteristics and geomorphological patterns profoundly affect the local ecology, history and culture(INT-06).

Although the low-lying location of the design site increases the difficulty of flood prevention, it also provides more possibilities for planning and design. Under the premise of respecting nature and protecting the ecology, the rational use of water resources and the enhancement of the comprehensive benefits of the site are issues that need to be thoroughly considered in the planning and design.

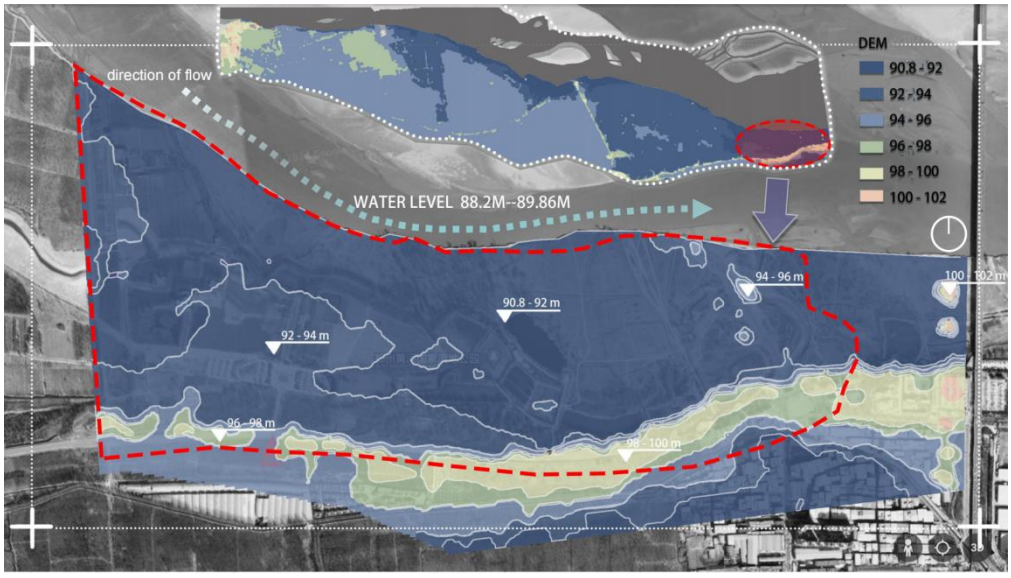


Fig.5-5.Site topography

5.2.2 Soil texture structure

The beach area of the lower reaches of the Yellow River is divided into lower floodplain, intermediate floodplain and higher floodplain according to the characteristics of overwatering. lower floodplain are shallow beaches often exposed during the dry water period, which share the function of flooding and sand transport with the river channel and are an important part of the ecosystem. The higher floodplain is located on one side of the embankment, which was originally an ancient embankment, due to the construction of villages and the accumulation of silt, which can avoid small and medium-sized flood inundation and ensure the safety of residents. The intermediate floodplain is located between the high beach and the control project, with moderate elevation, easy to be inundated during floods, and is the main area of sand retention and sedimentation, which is crucial for flood management and ecological protection. Each of these beaches has its own characteristics, which together constitute a complex ecosystem in the lower reaches of the Yellow River, and an in-depth understanding of their characteristics is of great significance to the development of management strategies[(INT-06)].

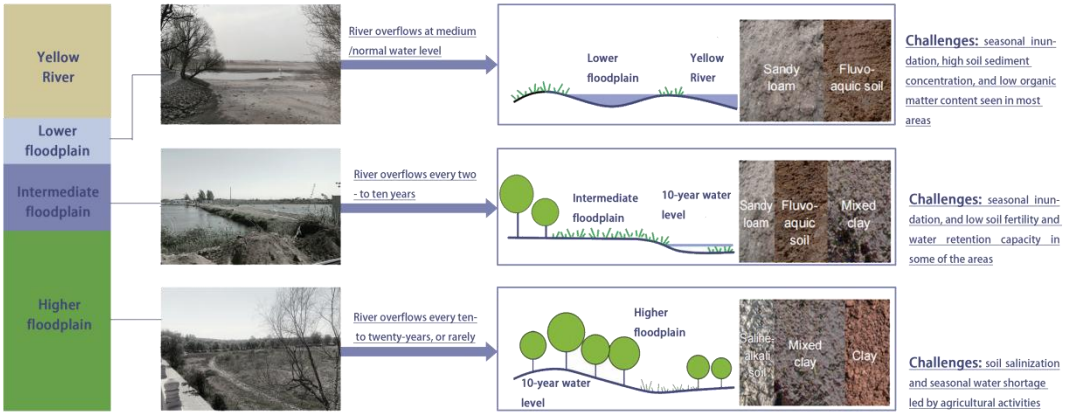


Fig.5-6.Soil texture structure

5.2.3 Plant Distribution

Zhengzhou Yellow River National Wetland Park is rich in plant species, There are a total of 128 species of green plants in the Wetland Park, covering 63 families and 105 genera, showing rich plant diversity. Among them, aquatic plants are an important part of the ecosystem of the wetland park, totaling 72 species[19]. These aquatic plants can be further classified into four types: aquatic, floating-leaf, submerged and marshy, as well as wild soybean, which is a national second-grade protected plant. The plant landscape community of the Yellow River Wetland Park is created with full respect to the existing topography and geomorphology of the park, and combined with the local historical and cultural requirements of Zhengzhou City. The plants selected in the park are mainly the Plants suitable for wetlands of the Yellow River Wetland, which protects the growth needs of the plants and creates multiple plant landscape effects, from aquatic plants - wet plants - ground cover plants - trees, shrubs and grasses, with a wide variety of plant species and a rich hierarchy, to satisfy the effect of the creation of the wetland natural landscape[15].

Zhengzhou Yellow River National Wetland Park is rich in plant species (Appendix 4 Form). In the wetland plant landscape, combining with the principles and points

of plant configuration, different plant configurations are planned in different functional zones of the park, and ecological landscape sub-zones are formed by combining with the sparse forest and grassland system. The plant configuration ranges from aquatic plants to terrestrial plants, and combines with the winding park walkway, fresh and elegant entrance square and local undulating micro-topography to form a good landscape pattern[21].

The main plant communities in the park are: "tree+shrub+herb+ground cover+aquatic" + "tree+shrub+herb", "tree+shrub", "trees + herbs", "shrubs + herbs", "single layer trees", "trees + shrubs + ground cover + aquatic ", "tree + shrub + aquatic", "tree + ground cover + aquatic", "shrub + herb + aquatic", "tree+aquatic", "shrub+aquatic", "herb+aquatic", "aquatic" and 14 other major forms.

Main zoning of the park	Major community forms	Common Plants	Plant configuration vignettes
ecological reserve	"Aquatic" "Herbaceous + aquatic"	Reed (Phragmites australis (Cav.) Trin. ex Steud), cattail (Typha angustifolia), bulrush (Typha orientalis Presl), water lily (Nymphaea L.), etc.	
science popularization and education area	"Shrub + aquatic" "Herb + aquatic "Tree + Shrub + Herb"	Welcome spring (Jasminum nudiflorum), woodruff (Rosa banksiae W.T. Aiton), reed (Phragmites australis (Cav.) Trin. ex Steud), cattail (Typha angustifolia), fragrant cattail (Typha orientalis Presl), and others. Typha angustifolia, Typha orientalis Presl, etc.	
Recreation Area	"Tree + Shrub + Herb" "Shrubs + aquatic" "Herb + aquatic"	Pentagram (Acer mono Maxim), weeping willow (Salix babylonica), spring (Jasminum nudiflorum), reed (Phragmites australis (Cav.) Trin. ex Steud), cattail (Typha angustifolia), balsam (Typha orientalis Presl), Platanus acerifolia, Cyperus amuricus Maxim., Cyperus fuscus L., etc.	
Yellow River Farming Culture Zone	"Trees + Shrubs + Groundcover + Aquatic"	Weeping willow (Salix babylonica), poinsettia (Acer mono Maxim), metapodophyllum (Acertruncatum Bunge), welcoming spring (Jasminum nudiflorum), woodruff (Rosa banksiae W.T. Aiton), reed (Phragmites australis (Cav.) Trin. ex Steud), cattail (Typha angustifolia), cattail (Typha orientalis Presl), bellflower (Platanus acerifolia) and others.	
Beach Exploration Area	"Herbaceous + aquatic"	Amur sedge (Cyperus amuricus Maxim.), brown fringe sedge (Cyperus fuscus L.), reed (Phragmites australis (Cav.) Trin. ex Steud), cattail (Typha angustifolia), balsam (Typha orientalis Presl), etc.	
Comprehensive Service Area	"Trees + Shrubs + Herbs + Groundcover"	Five-horned maple (Acer mono Maxim), dollar maple (Acer truncatum Bunge), larch (Taxodium distichum (L.) Rich.), spring (Jasminum nudiflorum), wood sorrel (Rosa banksiae W.T. Aiton), hammock (Platanus acerifolia), Amur sedge (Cyperus amuricus Maxim.), brown fringe sedge (Cyperus fuscus L.), and others.	
Core Protection Zone	"Aquatic"	Reed (Phragmites australis (Cav.) Trin. ex Steud), cattail (Typha angustifolia), bulrush (Typha orientalis Presl), water lily (Nymphaea L.), water onion (Scirpus validus Vahl), etc.	

Fig.5-7.Park Plant Distribution

5.2.4 Migration Changes

Zhengzhou Yellow River National Wetland Park, as a key node on the migratory route of migratory birds, attracts a large number of birds to breed here every year, presenting a vibrant picture of nature.In the wetland, there are 173 species of birds in 15 orders and 41 families, including 126 species of widespread species, 32 species of Pale arctic species and 15 species of Oriental species. The national level protected animals include great bustard, white-headed crane, oriental stork, black stork and peregrine falcon, etc., and the national second level protected animals include great swan, trumpeter swan, white spoonbill, gray crane, osprey, etc., and there are 15 species of key protected birds in Henan Province(INT-01).

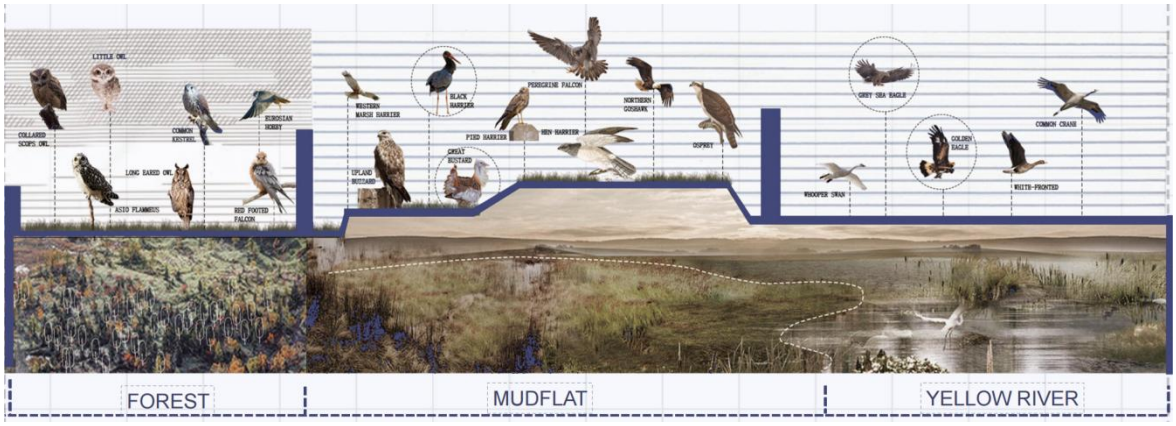


Fig.5-8.Bird type

5.3 Summary

5.3.1 Site status

The zoning of the site is unclear, with fish ponds and arable land encroaching on the designated functional areas. The fishponds are used for profit, while the arable land is mainly used for wheat and maize rotations. Functional areas including science education areas, ecological monitoring stations and viewing trails lacked clear definitions. In addition, roads are fragmented and do not effectively connect the functional areas. In winter, the lack of water, severe soil erosion and numerous mudflats prevent people from approaching the shore.

5.3.2 Values

As a national-level wetland park, the site excels in several ways.

(1) Its geographical location makes it one of the closest Yellow River wetland sites to the city. Visitors can either choose to drive themselves or take a bus to easily reach the vicinity of the site. Even more conveniently, the site is adjacent to the wide and flat Yellow River Dam Road, which is not only suitable for driving tours, but also provides excellent cycling routes for cycling enthusiasts. In addition, the highway entrance near the park is close at hand, which greatly facilitates foreign tourists to drive to the site.

(2) The wetland park is rich in internal water systems, providing unique conditions for landscape design. The original fish ponds on the site are connected to the tributaries of the Yellow River, forming a natural network of water bodies. This feature not only provides infinite possibilities for the design of water bodies, but also makes the water system of the whole park present a harmonious and natural ecological beauty.

(3) The vegetation types within the park are also quite rich. There are both Terrestrial plants and aquatic plants, etc., forming a diverse plant community. This provides rich materials and inspiration for future plant landscaping work, and helps to create a more characteristic and ecological plant landscape.

(4) It is worth mentioning that the wetland park as a whole is located on a flat terrain, which provides great convenience for the implantation of functional areas in the design. Designers can make full use of this advantage and rationally plan the layout of each functional area to ensure that visitors can enjoy a comfortable and convenient experience during their visit.

Fig.5-9.Value Map

5.3.3 Conflicts

Despite the significant advantages of this wetland park in certain aspects,

in-depth analyses reveal that it still faces a series of problems that need to be resolved.

(1) The existing farmland and fishponds within the site have been subjected to human intervention for a long period of time, and their production methods have already caused damage to the natural wetland system. Such intervention has not only altered the original ecological balance of the wetland, but may also have a negative impact on the survival and reproduction of wetland plants and animals.

(2)

(2) The problem of rubbish in the park should not be ignored either. In the bushes of the recreation area, rubbish can often be seen piled up randomly at the roots of large trees, which not only damages the ecological environment of the park, but also seriously affects the habitat of wetland plants and animals. Long time piling of rubbish will produce unpleasant and pungent smell and harmful gas, which poses a threat to the health of tourists, and also damages the image of the wetland park and reduces its competitiveness and influence.

(3) Except for the recreation area, the planning of the ornamental traffic organization system in other areas is incomplete, and the tour routes are not coherent, which makes it difficult for tourists to go from one attraction to another smoothly during the tour. Meanwhile, the poor road facilities in the park also bring many inconveniences to tourists visiting the wetland scenic spots.

(4) The large area of the aquatic environment has been shrinking, forming a sandy area and the area of aquatic plants is also shrinking. This not only leads to the expanding lack of wetland ecological landscape, but also seriously affects the ecological function and ecological balance of the wetland.

(5) Judging from the evaluations on the Internet, people's satisfaction with the

wetland park is generally low. Many tourists reflect that there are various problems in the park, such as dirty environment, imperfect facilities and inadequate management. These problems not only affect the tourists' visiting experience, but also restrict the sustainable development of the wetland park(INT-05).

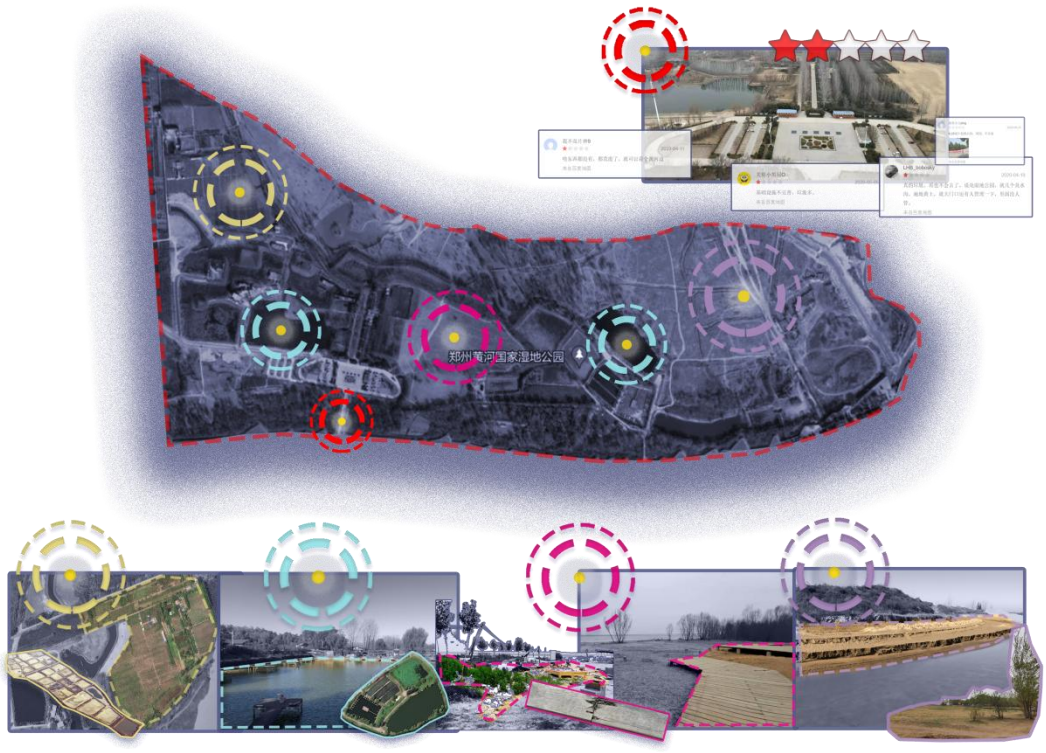


Fig.5-10.Conflicts Map

Ⅵ SYSTEMATIC PLANNING

6.1 Concept

In order to achieve sustainable development, I will work on the protection and improvement of wetlands. In my design, I will focus on the improvement of wetland degradation and ecological damage in order to maintain the ecological balance of the wetland. At the same time, the protection of biodiversity is also an important part of my work, through measures to protect the various species

of living organisms in the wetland to ensure their survival and reproduction. In addition, I will provide quality habitats for wildlife on the wetlands to ensure that they can live in a safe and comfortable environment.

In practice, I will make comprehensive use of a variety of means and methods to prevent wetland degradation and ecological damage from occurring at source. At the same time, I will also actively promote knowledge of wetland conservation, raise public awareness of the ecological value of wetlands, and form a favourable atmosphere for the whole society to jointly protect wetlands. Apart from this, I will also focus on the restoration and re-establishment of the ecosystem in which the wetland first existed. Through the introduction of adaptive management measures, I will promote the restoration of wetland vegetation and the increase of biodiversity.

In conclusion, I will aim at sustainable development and comprehensively strengthen wetland protection and improvement to ensure the ecological safety and health of wetlands, provide quality habitats for wildlife, and create a better ecological environment for the sustainable development of mankind.

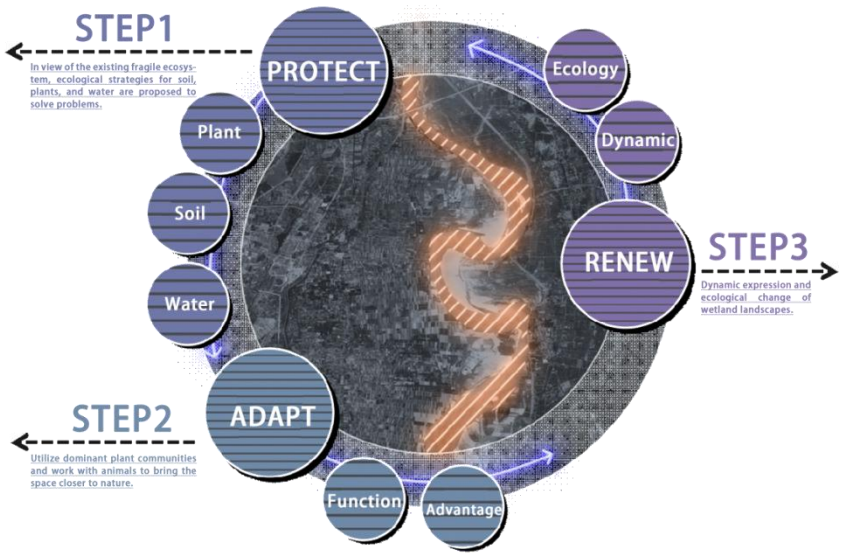


Fig.6-1.Development concepts 1

6.2 Strategy

After deeply analyzing the problems revealed by the preliminary investigation, I have formulated the following four key design strategies.

For the farmland area in the site, given its unique characteristics, we will promote its ecological transformation. This involves not only ecological restoration, but also the integration of farming culture and nature education, so that it will be metamorphosed into a composite agricultural area integrating nature experience, cultural heritage and agricultural production.

For the existing fish ponds, we plan to break their original boundaries and make them interconnected with the water system within the site, so as to shape the coherence and wholeness of the internal water landscape. This will not only help to enhance the ecological function of the wetland, but also bring a richer visual experience to visitors.

The expansion of science education and recreational functions is also an important part of the design strategy. We will re-plan the road system to ensure smooth connections between various functional areas, providing visitors with a more convenient and comfortable tour experience. At the same time, through the introduction of interactive science facilities and recreational programme, visitors can gain a deeper understanding of the wetland ecology and feel the charm of nature in a relaxing and pleasant atmosphere.

In order to strengthen the flood prevention function of the wetland and to conserve water, we plan to build ecological islands. These islands not only have the practical function of flood prevention and disaster mitigation, but also provide a place for wetland organisms to live and reproduce, further enriching the biodiversity of the wetland. At the same time, through rational landscape design, the ecological islands will be coordinated with the surrounding

environment to create a more beautiful and pleasant wetland landscape.

Through these four design strategies, we aim to achieve a comprehensive upgrade from wetland protection to ecological adaptation to landscape renewal. This will not only enhance the ecological value of the wetland, but also provide visitors with a more colourful tourism experience and promote the sustainable development of wetland conservation.

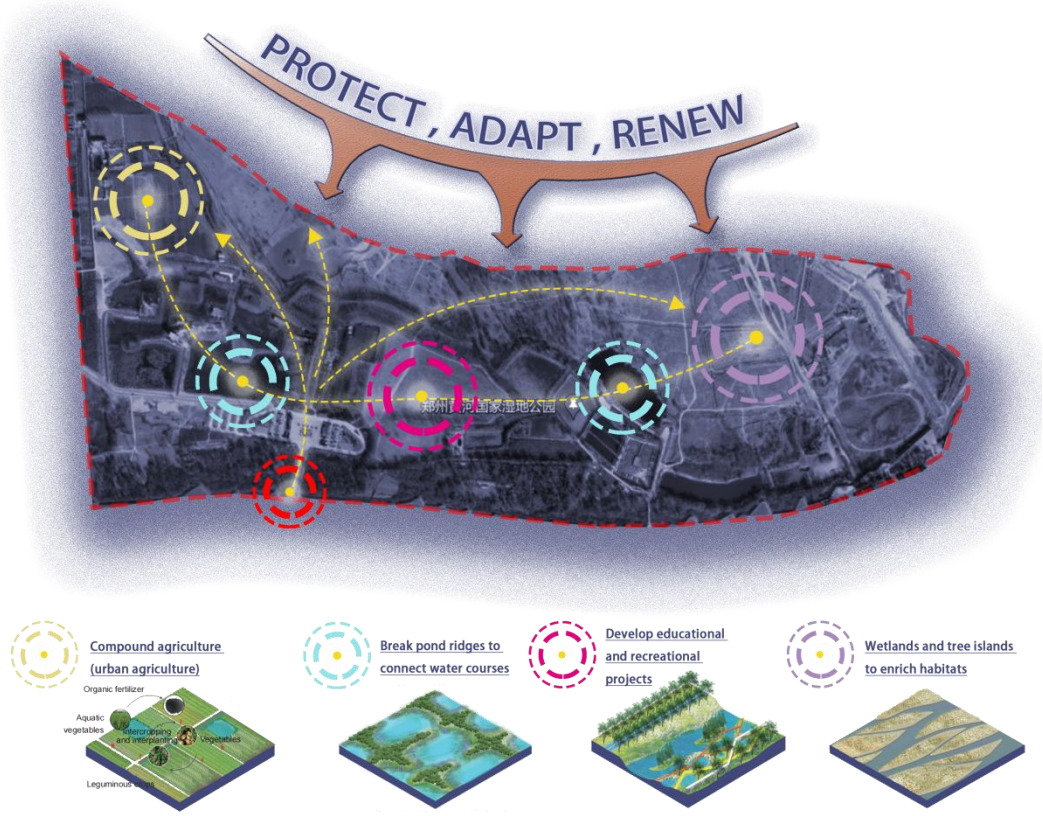


Fig.6-2.Focused Strategies

6.3 General design

6.3.1 Bubble Diagram

The analysis was combined with an initial functional zoning of the site. Firstly, the site was divided into human centre and nature centre. The Human Centre

includes: Farming Culture Zone, Ecological Monitoring Area, Science Education Area, Integrated Services Area and Recreation Area. The Nature Centre is divided into: Ecological Pond and Beach Exploration Area.

(1) Farming Culture Zone

The design aims to create an attractive farming culture zone, where visitors can experience a different kind of rural life from that of the city. This unique experience not only allows people to escape from the hustle and bustle of the city for a while, but also allows them to gain a deeper understanding and appreciation of the beauty of nature.

(2) Ecological Monitoring Area

In order to ensure the ecological balance and sustainable development of the park, a strict monitoring system for flora, fauna and water systems will be implemented. Through regular data collection and analysis, any factors that may pose a threat to the ecological environment can be detected in a timely manner, and appropriate measures can be taken to intervene, thus ensuring the stability and health of the entire ecosystem.

(3) Science Education Area

A science education area is set up to focus on popularising wetland knowledge to visitors. By demonstrating the formation and evolution of wetlands and their important role in nature, it is hoped to arouse people's respect for nature and inspire them to protect the environment.

(4) Integrated Services Area

An integrated services area is also essential to meet the diverse needs of visitors. In this area, a series of service facilities will be provided, including catering, rest, sanitation, etc., to ensure that tourists can enjoy comfortable and convenient services during their visit.

(5) Recreation Area

In order to allow visitors to spend a good time in a relaxing and pleasant atmosphere, a special recreation area will be created. This area will be equipped with a variety of recreational facilities and activities to meet the needs of visitors of different ages, so that they can have endless fun while enjoying the natural beauty.

(6) Ecological Pond

An Ecological Pond with special features will be constructed, where human intervention will be minimized as much as possible in order to maintain its most primitive and natural state. Visitors can observe the natural growth of various aquatic organisms and experience the mystery and beauty of nature.

(7) Beach Exploration Area

In order to allow visitors to enjoy the magnificent scenery of the Yellow River beach from a close distance, a special viewing area will be set up. In this area, the interference of human activities is strictly controlled to maintain the original landscape and ecological environment of the Yellow River beach. Visitors can enjoy the unique landscape and infinite scenery of the Yellow River beach land.

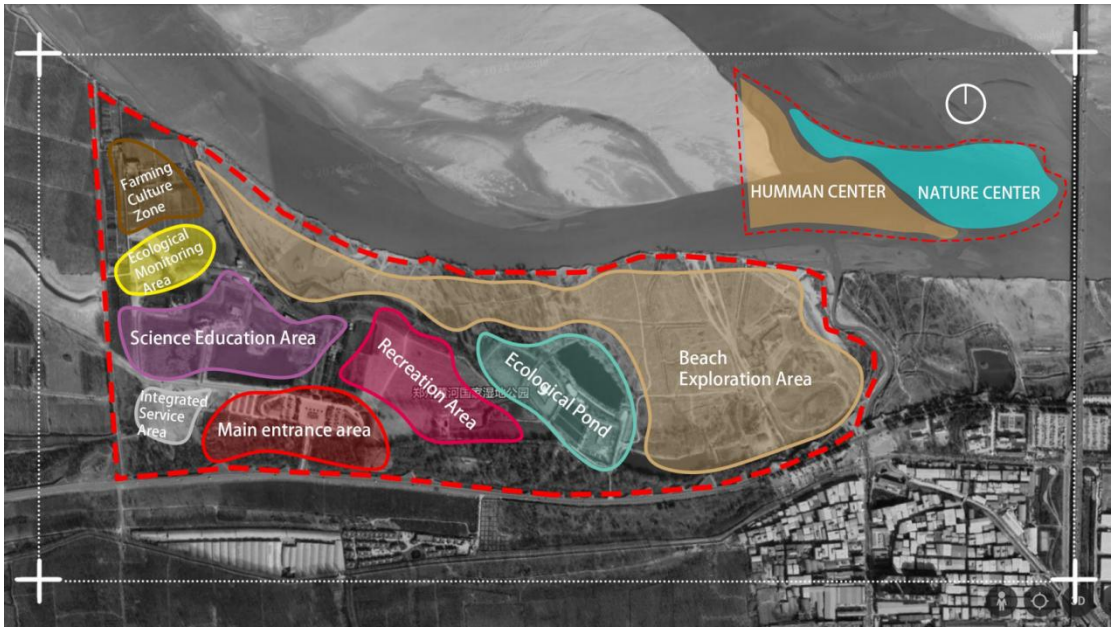


Fig.6-3.Bubble Diagram

6.3.2 Master plan

In the final design scheme, I have retained the two original main entrances for the convenience of visitors. At the same time, in order to meet the parking needs of visitors, I have set up a car park near the main entrances to provide sufficient parking spaces. This design not only facilitates visitors, but also helps alleviate traffic pressure.

On the west side of the site, I have specially set up an entrance for staff only to ensure the management efficiency and safety of the site. This entrance is separate from the main entrance, which avoids the flow of crossings between visitors and employees, allows for a more organised operation of the entire venue and facilitates the transport of agricultural machinery and heavy materials.

In terms of road traffic, I designed a main road that connects all the functional areas and ensures a smooth flow for visitors to explore the entire wetland park. This main road is not only spacious and flat, but also incorporates natural elements like the wood and bamboo, so that visitors can also feel the charm of

nature while walking. I purposely designed paths in the nature centre area. These paths meander through the tree-lined natural environment, providing visitors with a more intimate experience of nature and ensuring a harmonious coexistence with the surrounding environment.

Fig.6-4.Master Plan

6.3.3 Road system

The main road encircles the entire wetland park with a width of approximately 6 meters, providing visitors with ample space to explore.

The secondary roads connect the various functional areas with a width of about 2.5 meters, ensuring that visitors can travel smoothly between the various attractions. In the nature centre area, specially designed paths with a width of about 2 meters, It's wide enough for two people to walk next to each other, which are narrow and quiet, allow visitors to immerse themselves more

deeply into the natural environment and enjoy close contact with nature. Such a road network design not only optimizes the visitors' experience, but also fully demonstrates the unique charm of the wetland park. At the same time, the practicality and aesthetics of the roads have also been taken into account to ensure that visitors can feel convenient and enjoy the beautiful scenery during their visit.

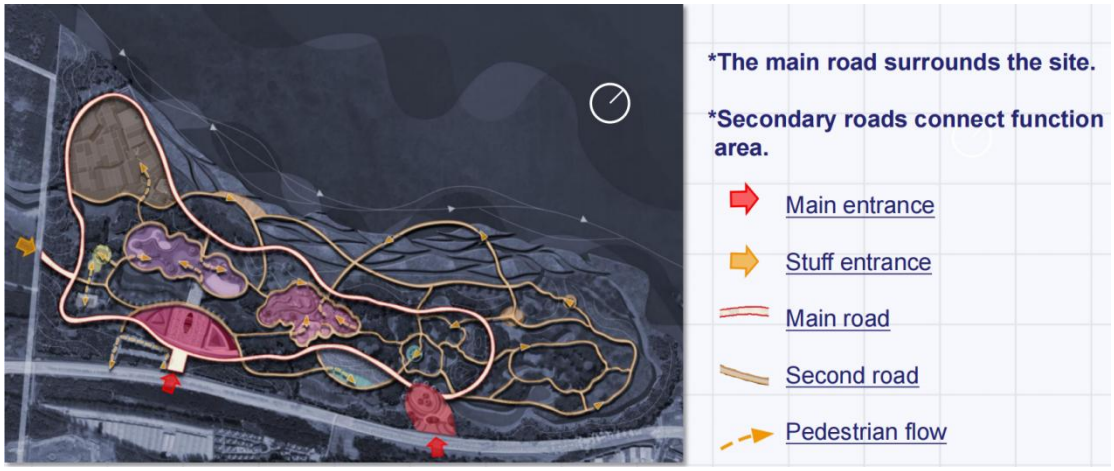


Fig.6-5.Road System Analysis

6.3.4 Plant design

The site has a green coverage of 90.3 per cent（Vertical projection of all green planting as a percentage of total area）, demonstrating significant ecological advantages. In order to further promote the process of plant community succession on the beach, a series of dominant species are planted on the Yellow River mudflats， such as white grass, reed, tamarisk, etc. The introduction of these species not only helps accelerate the natural succession of plant communities, but also gradually builds up native habitats on the mudflats[21].

zoning	Plant characteristics	plant classification	effect	Wetland Park Plant Species
Underwater area	Aquatic plant communities with typical water purification capacity, ornamental value	submerged plant	Underwater micro-ecosystems that purify water, provide oxygen, and provide food for fish	Ceratophyllum demersum, Vallisneria natans (Lour.) Hara, etc
		hydrophytic plant (i.e. plant that floats in water)	They can add a landscaping effect to the water surface, they can absorb minerals in the water and shade the sunlight that hits the water surface, and they can inhibit the growth of	Nymphaea tetragona , Ludwigia peploides (Kunth) Kaven subsp. stipulacea (Ohwi) Raven , Victoria amazonica (Poepp.) Sowerby , Nuphar pumila (Timm) DC. , Euryale ferox
		hydroplants	Reduce eutrophication of water bodies, purify water quality, provide landscape effect for wetland parks,	Verbena officinalis , Typha orientalis Presl , Phragmites australis (Cav.) Trin. ex Steud. , Cortaderia selloana
Mudflat area	Mostly water-tolerant plants, able to adapt to aquatic and terrestrial environments, wet plant communities of ornamental value	aquatic plant	Purify water, have certain ornamental value, etc.	Verbena officinalis , Typha orientalis Presl , Phragmites australis (Cav.) Trin. ex Steud. , Cortaderia selloana
		Herbs and shrubs	Decorate the mudflat area, beautify the mudflat environment, increase plant diversity in the park, and create natural ecological landscape, etc.	Jasminum nudiflorum , Aucklandia lappa Decne , Hibiscus mutabilis Linn
		Trees	Wind and sand protection, formation of natural landscape communities, increasing the diversity of wetland landscapes in the park, etc.	Metasequoia glyptostroboides Hu et Cheng , Taxodium ascendens , Taxodium distichum (L.) Rich. , Tamarix chinensis Lour.
Terrestrial area	Dry and mesophytic plant communities with some spatial distribution and ornamental value	herbaceous plant	Can change a large area to cover the soil, creating a green landscape with high ornamental value	Plantago asiatica L. , Lepidium apetalum Willd. , Taraxacum mongolicum Hand.-Mazz. , Imperata cylindrica (L.) Beauv. ex Spreng.
		Shrubs	Forming a sense of landscape hierarchy in the park, increasing the diversity of Jowo communities in the park and improving the ornamental value	Cercis chinensis , Prunus cerasifera Ehrhar f. , Camellia sasanqua , Ligustrum quihoui Carr. , Euonymus japonicus , Ilex cornuta
		Trees	Shade the park visitors from the summer heat, form beautiful natural landscape communities, increase the diversity of the park's landscape, etc.	Populus alba , Catalpa bungei C. A. Mey , Ligustrum compactum (Wall. ex G.Don) Hook.f. & Thomson ex Decne , Platanus acerifolia , Paulownia fortunei , Ulmus pumila L. , Firmiana simplex (Linnaeus) W. Wight

Fig.6-6.Dominant plant characteristics and plant lists for each sub-district

In terms of layout, the mudflats are divided into three main areas: terrestrial Vegetation, Hygrophyte and Aquatic Plants. In the Predominantly Vegetation area, fast-growing, adaptable plants will be planted to quickly form stable vegetation communities that provide shelter and food sources for other organisms. The wet plant zone focuses on the introduction of wet plants that can thrive in a moist environment and further enhance the ecological stability of the mudflats. The aquatic plant zone focuses on aquatic plants, which can maintain the water ecological balance of the mudflat.

Through such zoned planting and the introduction of dominant species, it is expected that a fully functional and ecologically harmonious native habitat can be constructed on the Yellow River mudflats. This will not only help to enhance the ecological value of the entire site, but also provide an ideal living space for many organisms and promote the healthy development of the entire ecosystem.

Fig.6-7.Site plant types

6.3.5 Analysis of water systems

In order to build a more ecologically harmonious wetland park, I plan to renovate the existing fishpond boundaries, breaking down the original boundaries and allowing the water system to connect smoothly. In particular, a series of wetland plants will be introduced into the ecological fishpond area, which will not only enhance the diversity of the landscape, but also create a distinctive wetland look through their unique growth pattern. In order to ensure that these plants can still grow during periods of no water, the water depth in these areas will be controlled to be between 0.1 and 1 meter.

In addition, in order to ensure full connectivity of the water system within the park, the water system will be deepened to a depth of 1.2 meters to ensure that the water can flow smoothly and without obstruction. This design will not

only help the natural circulation of the water body, but also provide a more suitable living environment for aquatic organisms.

A series of ecological islands are planned for the boundary section near the Yellow River. The depth of these islands will be controlled between 0.5 and 2 meters, which will provide a suitable habitat for aquatic plants and animals, and also serve as a viewing point for visitors to appreciate the unique charm of the Yellow River mudflats during their visit.

Through this series of water system renovation and planting measures, it is expected to construct a wetland park that is both ecological and aesthetically pleasing, and provide an important place for visitors to experience nature and understand the wetland ecosystem in close proximity. At the same time, this design will also help to protect the ecological environment of the Yellow River mudflats and promote the healthy development of the whole ecosystem.

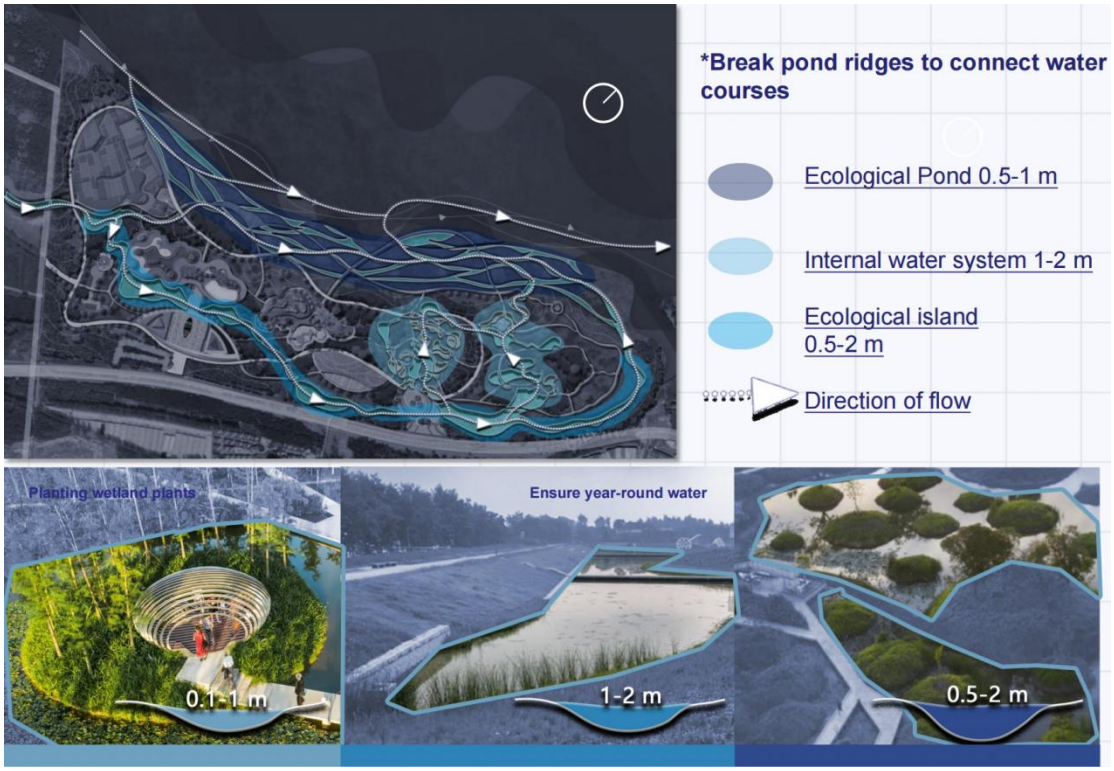


Fig.6-8.Analysis of water systems

6.3.6 Use and user

The intensity of crowd use shows a gradual transition from human centre to nature centre in the park. In the area of intensive human activities, rich science education activities are designed to enable visitors to gain in-depth knowledge of wetland ecology; at the same time, visitors can also experience the fun of agricultural life, participate in various farming activities, and feel the serenity and beauty of the idyllic scenery. In addition, leisure and recreational facilities are equipped to allow people to spend a pleasant time in a relaxing atmosphere.

As we move deeper into the nature centre, I have intentionally reduced the number of facilities in order to minimize the intervention of human activities in the natural environment. Here, the functions of ascent viewing and walking viewing are mainly retained so that visitors can enjoy the magnificent views of the wetland and the Yellow River mudflats in a more natural and intimate way. Through this design, it aims to allow visitors to enjoy the natural beauty and at the same time experience the tranquility and harmony of nature in a deeper way.

Overall, the design aims to achieve a harmonious symbiosis between human activities and the natural environment. In the Human Centre, I have provided a rich variety of activities and facilities to meet the diversified needs of visitors, while in the Nature Centre, I have reduced the impact of human activities by setting up fewer facilities, so that visitors can experience the charm of nature in a more in-depth manner. Such a design is not only in line with the principle of ecological conservation, but also with people's pursuit of a better life.

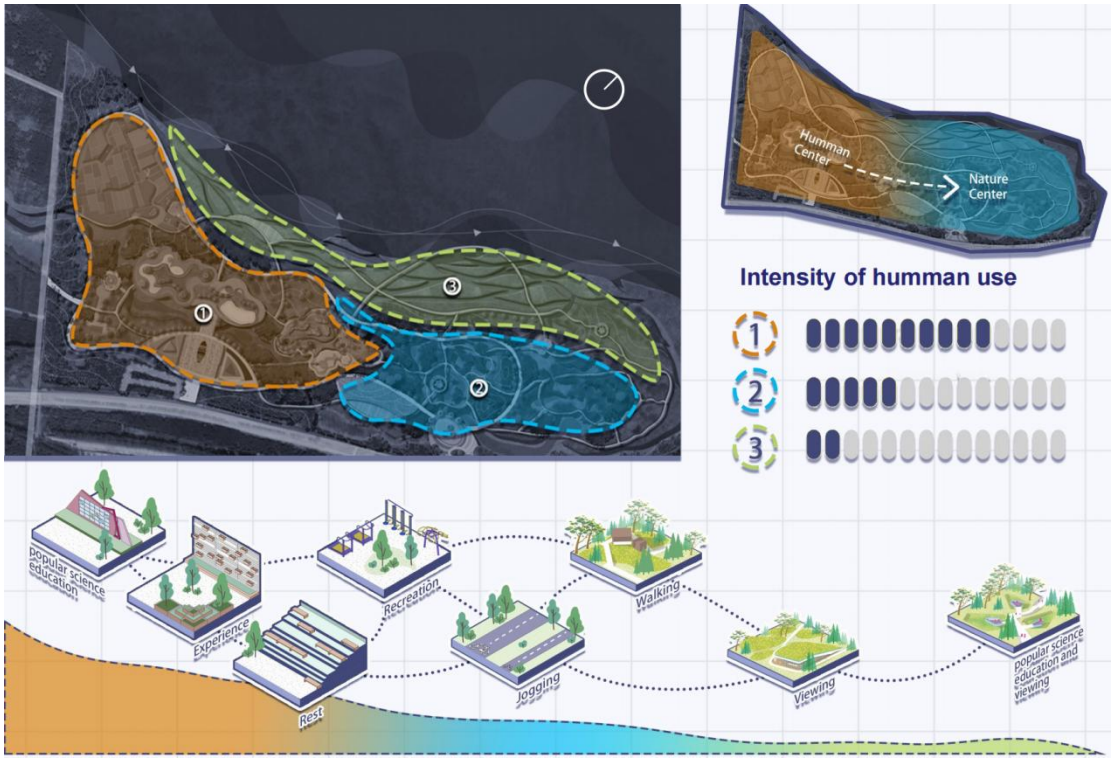


Fig.6-9.Intensity of use of the site by the population

Ⅶ DETAILED DESIGN

Farming culture area , Science education area , Beach exploration area, Ecological pond as the four most characteristic areas of the site, I will carry out detailed analysis and design.

7.1 Ecological pond area

At the heart of the Nature Centre, an ecological pond has been planned with the aim of restoring its original vitality and vigour and promoting a smooth ecological cycle. This area was originally a fish pond, but unfortunately, the concrete material it was made of severely damaged the living environment of plants and animals and limited the development of ecological diversity.

In order to reverse this situation, I decided to break down the boundaries of the original fishpond so that the water bodies could naturally connect and form a flowing water system. This not only helps the water body to purify itself, but also provides a wider living space for aquatic organisms. At the same time, emphasis is placed on the selection of terrestrial plant and water-loving plants for large-scale planting, which are not only adaptable, but also effective in improving soil and water quality, creating a more suitable living environment for plants and animals.

Concrete fishponds are widely used in current aquaculture practices, and these rely heavily on artificial nutrient feeds. However, this practice has adversely affected the ecological balance of natural wetlands, further weakening the natural stability of the wetlands and also exacerbating the problem of water quality pollution. In response to this current situation, this project proposes an innovative solution. Follow the food chain principle and co-evolution theory to restore and rebuild the wetland ecosystem.

Through this approach, material exchange can be carried out more effectively, thus optimising the whole ecosystem. Through this series of renovation measures, it is expected that the ecological fishpond will take on a new lease of life and become a bright pearl in the wetland park. It will not only provide a good place for visitors to observe the ecology of the wetland at close range, but also play an important role in the balance and harmony of the entire ecosystem.

In addition, viewpoints and resting facilities will be provided around the Ecological pond, so that visitors can enjoy the beauty of the scenery and at the same time feel the tranquility and harmony of nature. Through this design, we expect to be able to provide a high quality leisure experience for visitors while protecting the ecological environment.

Fig.7-1.Planes and Strategies for Ecological Pond

The water depth in the area is probably around 0.5 meters， providing ideal conditions for the growth of numerous plants. Even when the water level drops, the wetland is able to maintain a certain area of vegetation cover, thus ensuring ecological continuity. A range of plants have been selected for this area, which are not only adapted to the shallow water environment, but also enrich the biodiversity of the wetland, presenting visitors with a vibrant picture of nature.

In order to maintain the natural appearance of the wetland, the construction of hard space is minimized to avoid too many recreational facilities interfering with the ecological balance. Instead, several winding paths are set up to facilitate visitors to explore the mysteries of the wetland; at the same time, several resting points and bird-watching platforms are also set up to enable visitors to enjoy the beauty of nature and at the same time, stop and rest for a while to observe the ecological activities of the wetland.

In the choice of materials for the rest seats and verandas, natural materials such as bamboo, wood and stone are utilized to maximize integration into the

wetland environment.These materials are not only environmentally friendly, but also enhance visitors' closeness to nature, allowing people to become more immersed in nature during their visit.

Through this design, it is expected to create a wetland play area that is both ecological and pleasant, allowing visitors to experience the natural charm of the wetland in depth and feel the magic and harmony of nature in a relaxing and pleasant atmosphere.

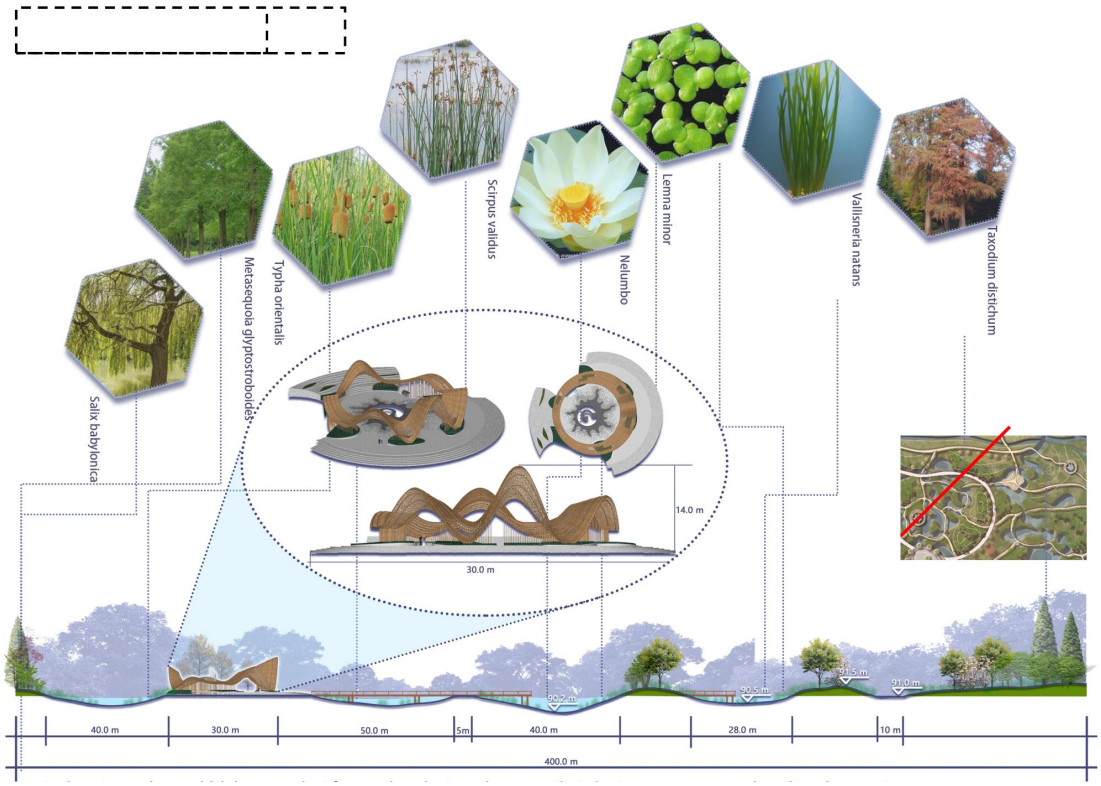


Fig.7-2. Ecological pond’s section, main plants and facilities

The design of the Ecological pond adopts the principle of wetland bubbles, aiming to build a more ecological and multi-functional water environment. Wetland bubbles are an effective ecological restoration technique that mimics the ecological environment of a natural wetland by creating a shallow water area in a specific area to purify the water quality and restore the ecology.

Wetland bubble is one of the many types of sponge system, which is a kind of water ecological infrastructure and an engineering technology to realise sponge system. Simply put, a wetland bubble is a site-specific construction of

water ecological infrastructure to create a good wetland landscape using modern landscape planning and design means and respecting the viewpoint of nature. The construction of wetland bubbles is based on the principle of minimum work, in-situ excavation, piling up the edge of the bubble by 0.5-1m to form a terrain with high edges and a concave centre, and constructing circular landscapes with diameters ranging from 50m, 70m and 100m, or irregular shapes according to local conditions. Planting grasses and trees on the high ground at the edge of the wetland bubble to form a green vegetation landscape. Water can be stored in the central depression of the wetland bubble to form a wetland and build an aquatic ecosystem, and a small square such as a dry sandy area can be built for people's recreational activities.

Wetland bubbles can be constructed individually or multiple wetland bubbles can be constructed jointly. In this way, it has a greater edge effect to achieve better ecological function and landscape effect.

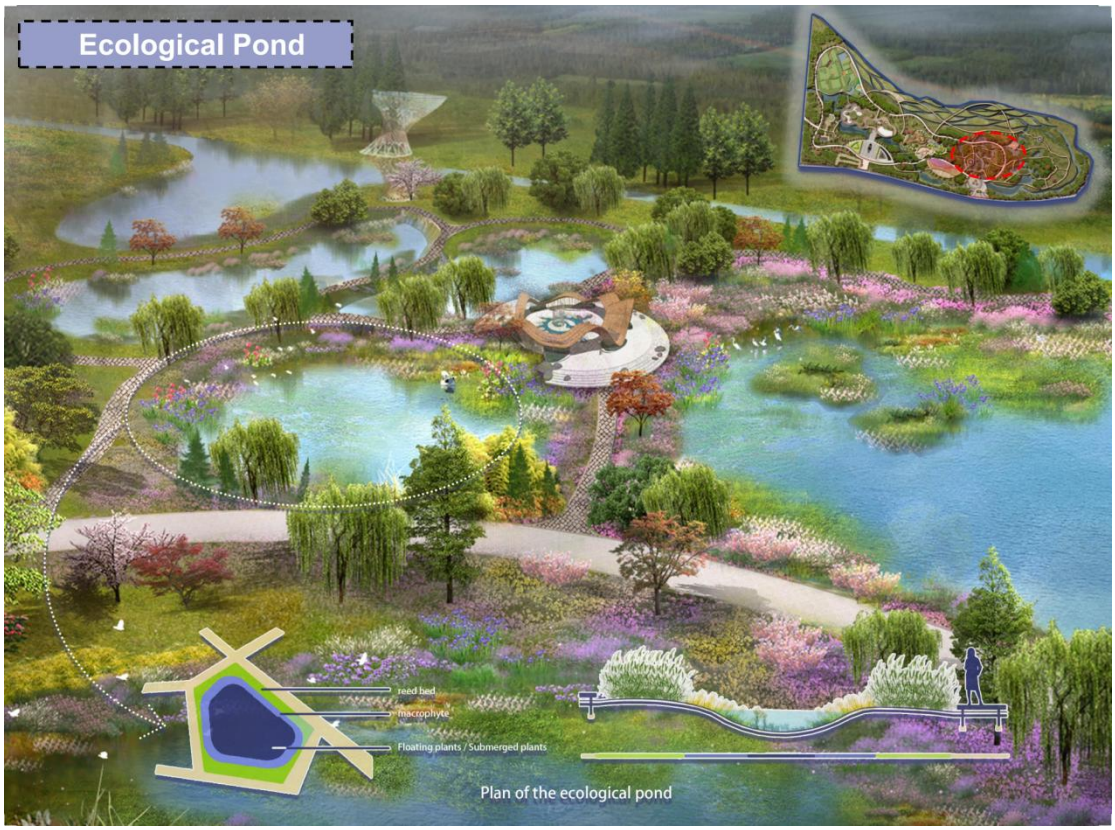


Fig.7-3. Visualization of the ecological pond

7.2 Beach Exploration Area

The Beach exploration area was set up to improve flood control. The Ecological island is located closest to the Yellow River water body, without any facilities, and uses the hydrological cycle of the Yellow River and local plant resources to restore the habitat. The installation of the ecological island can increase the planting area, which can not only prevent soil erosion, but also provide more living space for plants and animals, and there are only a few paths in this area, so that people can not do too much activity here, to maximize the restriction of human intervention, and ultimately to achieve the harmonious coexistence of man and nature.

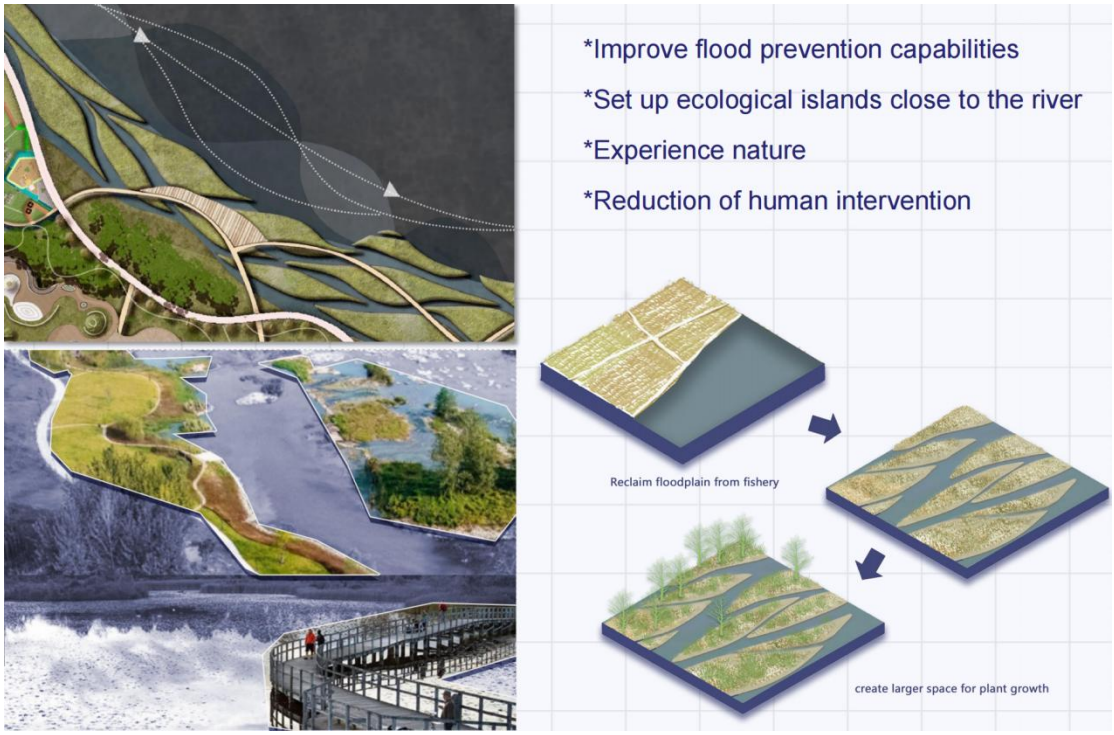


Fig.7-4. Planes and Strategies for Ecological Island

In this area, dominant species were planted to accelerate the growth process of plants on the beach, thus gradually building up the native habitat of the river beach. To achieve this goal, a series of highly adaptable and fast-growing plant species were selected for planting. These plants can not only effectively improve soil quality and enhance the ecological function of the beach, but also

provide a rich food source and habitat for other organisms.

Through scientific planting planning and careful maintenance and management, it is hoped that a rich, diverse and ecologically harmonious plant community can be formed in this area. Over time, these plants will gradually cover the entire beach, forming a beautiful landscape and adding life and vigour to the river beach.

In addition, ecological balance and environmental protection will be emphasized in the planting process to avoid damage to the beach ecosystem caused by over-development and human interference. This area will become a model for ecological restoration and protection of river beaches, providing valuable experience and reference for future ecological construction.

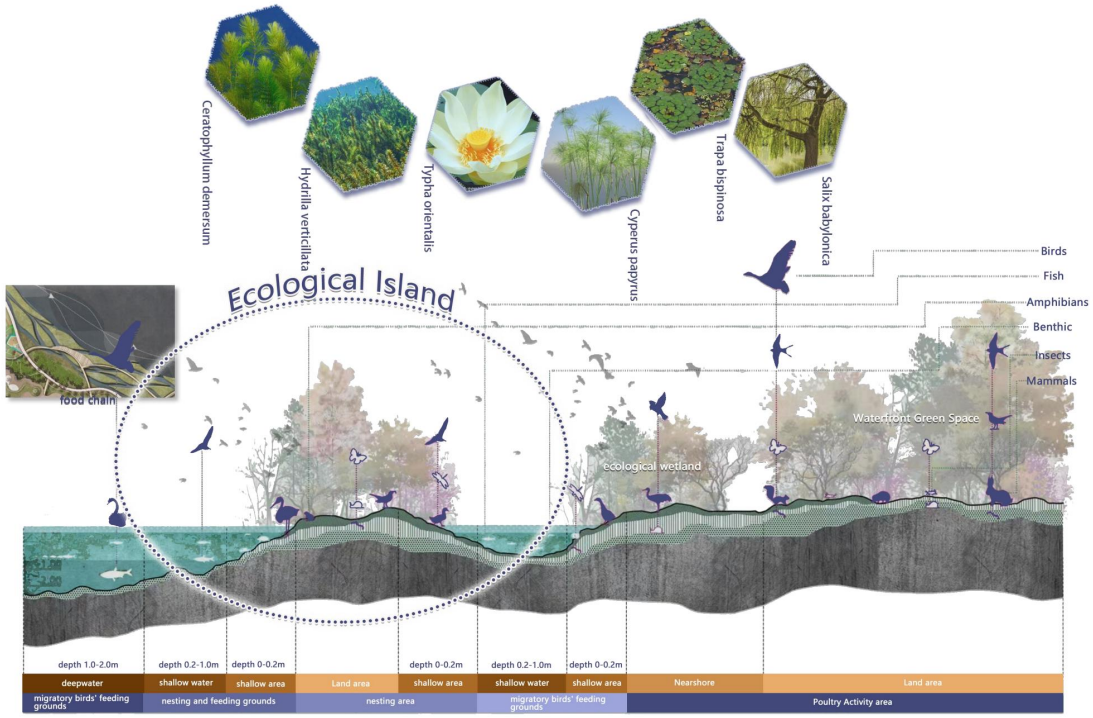


Fig.7-5. Ecological island's section, main plants

After the restoration of the habitat, you can see a vibrant scene, when you come here in winter, you can see the magnificent scene of migrating birds, you can also take a walk along the river and experience the different scenery

created by the plants in different seasons.

Fig.7-6. Visualization of the Beach Exploration Area

7.3 Farming Culture Area

The Farming culture area is the most distinctive and participatory part of the site. People can experience a completely different lifestyle from the city here. The experience garden satisfies the modern urbanite desire for country life and their demand for healthy organic food. By providing services such as farming experience, agricultural product picking, agricultural product display and agricultural product sales, the park allows visitors to get a close-up understanding of farming culture and a first-hand experience of rural life, while also promoting the concepts of organic agriculture and land conservation. The original farmland is a single inefficient planting pattern, but in the new design, the agricultural facilities and concrete infrastructure in the farmland are removed to create an ecological base. Sponge farm facilities are used to store

rainwater and water in the dry season. The final result is a composite planting model that incorporates agricultural experience and education.

Fig.7-7. Planes and Strategies for Farming Culture Area

The site is flat and provides a good basis for creating a recreational space in harmony with nature. To this end, I have selected a series of facilities made of natural materials and forms, with the aim of allowing visitors to experience the joys of agricultural life in an immersive way. The resting facilities are made of wood and bamboo and resemble farmers' straw hats, making them both practical and rustic. In addition, some agricultural tools, such as waterwheels and bamboo baskets, are deliberately placed so that visitors can operate them with their own hands and feel the charm of traditional farming culture.

On this piece of land, wheat and corn are planted in turn, forming a vivid picture of farming. When summer comes, the golden ears of wheat sway in the breeze, presenting a magnificent sight of wind-blown wheat waves, which is mesmerizing. In addition to a large area of grain crops, a special area has been set aside to create a vegetable patch landscape experience garden.

Here, visitors travelling from the city can have a vegetable garden of their own, planting vegetables and fruits with their own hands and experiencing the joy from sowing to harvesting.

A range of plants have been selected for planting in order to enrich the site's botanical landscape. These plants not only have an ornamental value, but also add ecological diversity to the site. Under careful planning and arrangement, the site will become an agricultural and ecological park integrating leisure, experience and sightseeing, providing visitors with a good place to get close to nature and experience farming culture.

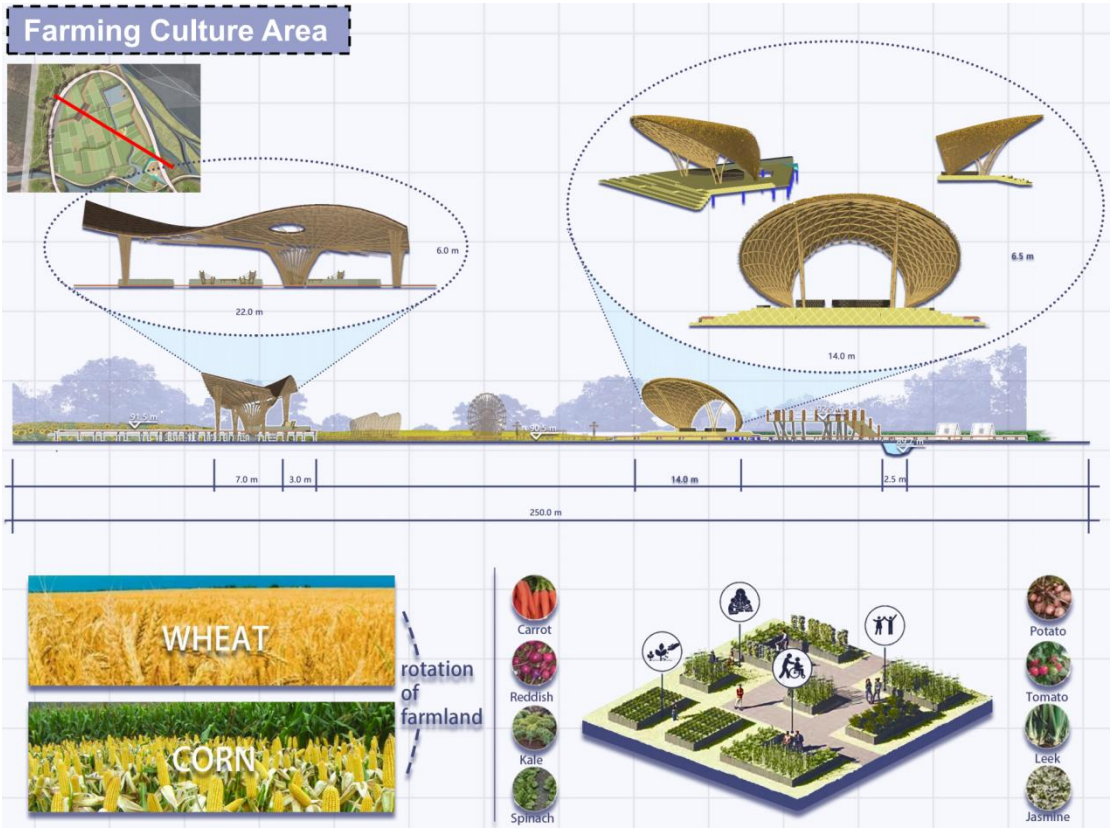


Fig.7-8. Farming Culture Area’s section, main plants and facilities

This area is going to be a very attractive place.

Fig.7-9. Visualization of the Farming Culture Area

7.4 Science Education Area

The science education area is an excellent place to explore and learn about wetlands. It provides an immersive experience that allows close contact with the natural environment, especially in line with the interests of children. Here they have the opportunity to gain knowledge in a very different way from the traditional school environment.

Within this area, there is a prominent building that serves as a centre for interactive learning. This building houses a variety of fascinating facilities, including cutting-edge technology such as naked-eye 3D displays. These features not only capture the imagination of young students, but also enhance their understanding of wetlands in a fun and interactive way.

By utilizing these interactive facilities, the Science Education Zone provides a unique platform for children to discover the wonders of nature and the complexity of wetland ecosystems. This approach to learning complements traditional classroom teaching and encourages children to deepen their understanding and appreciation of the natural world.

Fig.1-10.Planes and Strategies for Science Education Area

The site providing visitors with both indoor and outdoor spaces, allowing people to choose their activities according to their preferences and needs. In the selection of plants, special attention has been paid to the colour, smell and interest of the plants, aiming to add life and vitality to the site through the diversity of plants. The selected plant species not only have ornamental value, but also have educational significance, so that people can appreciate the beauty of the scenery, but also to increase knowledge.

In order to make it easier for people to learn more about these plants, I have equipped each plant with a special plant card. These cards contain detailed information on the name, characteristics and growing environment of the plants, allowing visitors to easily acquire relevant knowledge and further

deepen their understanding of the plants during the viewing process.

Through this combination of indoor and outdoor spaces and the colourful and educational plant configurations, the site not only provides a good place for people to relax and have fun, but also becomes an important platform for spreading plant knowledge and promoting nature education.

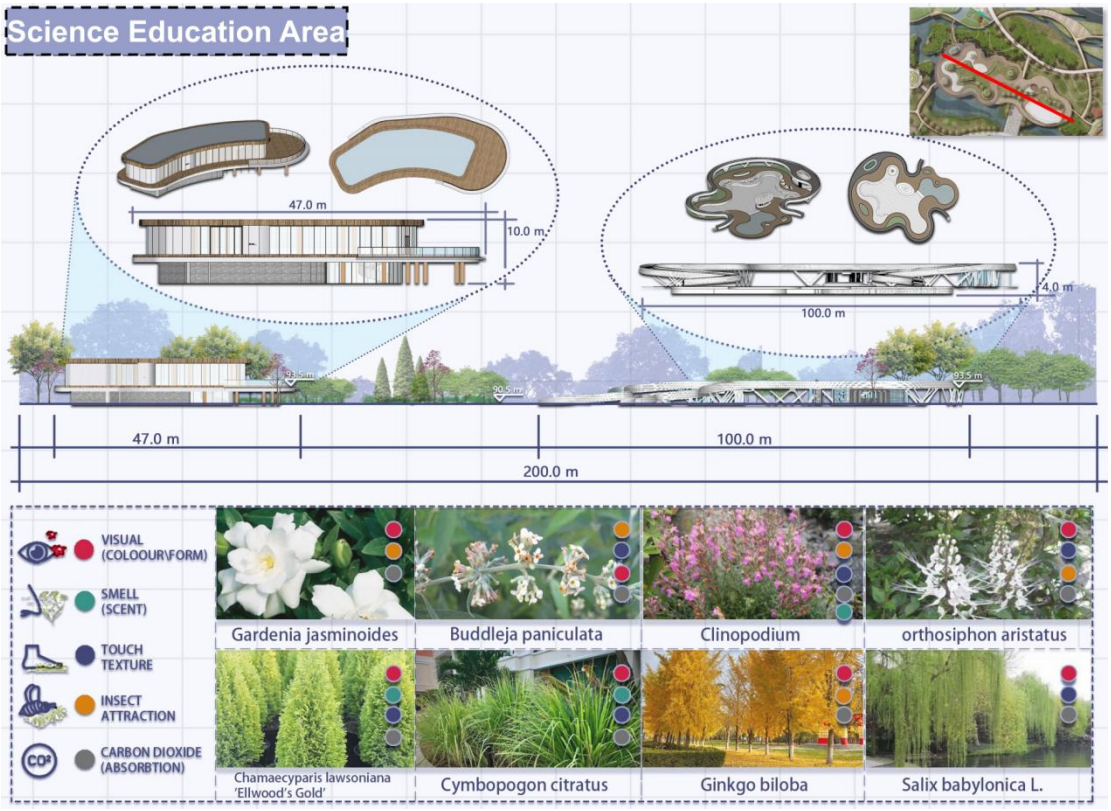


Fig.7-11.Science Education Area's section, main plants and facilities

This area is adjacent to the entrance of the scenic spot and provides a precursor space for visitors. Here, people can acquire prior knowledge about the wetland and have a general understanding of the layout of the site. This design enables visitors to build up a preliminary knowledge of the wetland before formally visiting the site, laying a good foundation for the subsequent exploration journey.

Through the setting of this area, it aims to enhance the tourists' experience of visiting the site. When tourists step into the scenic area, they can not only appreciate the natural scenery of the wetland, but also feel the importance of

the dissemination of wetland knowledge. This combination of knowledge dissemination and field experience not only satisfies the tourists' need to appreciate the natural beauty, but also stimulates their interest in wetland protection and sense of responsibility.

Fig.7-12.Visualization of the Science Education Area

Ⅷ CONCLUSION

According to the status quo of each land use such as mudflats, pits and ponds, water surface, farmland, etc. in Zhengzhou Yellow River Wetland Nature Reserve, as well as the ecological environment damage and ecological function degradation faced by the Yellow River Wetland, the degraded wetland in Zhengzhou Yellow River Wetland Nature Reserve will be protected and restored, and on the basis of ecological minimal intervention, the ecologically

sustainable development of the Yellow River Wetland will be explored, the ecological environment of the wetland will be improved, and citizens' closeness to the nature, and realize the harmony between human and nature.

The land use status, ecological and cultural resources, topographic and geomorphological features, current problems, spatial patterns, ecological features and functional roles of Zhengzhou Yellow River Wetland are summarized, focusing on the ecological problems of the Yellow River Wetland Park, such as the Yellow River Wetland being over-cultivated, ecological environment damage, serious landscape fragmentation, and ecological function degradation, etc., and systematically analyzing the current problems and the reasons of the Zhengzhou Yellow River Wetland Nature Reserve, Characteristics of planning elements. Based on the ecological protection and restoration of the Yellow River wetland, under the premise of exploring how to restore the ecological environment of the Yellow River wetland, from the resource environment of the Yellow River wetland, and with the principles of ecological priority protection, coordinated sustainable development, and coordinated planning and zoning protection, it restores the natural ecological environment of the wetland and explores the ecological planning and designing method of wetland, taps into the characteristics of the resources of different regions, and explores the Zhengzhou Yellow River Wetland Park's ecological Restoration and protection strategy, so as to maximise the ecological function of the wetland, become a natural ecological conservation barrier and a charming place for the display of special culture in the fringe area of Zhengzhou, and create a wetland park integrating natural ecology, popular science education, cultural display and recreation.

APPENDIX

1 List of Figures

2 References

[1] Zhang, J., Liu, J., Wan, Z., & Lu, J. (2018). Channel Morphology Evolution and Corresponding Coping Strategy in the Lower Yellow River “Study on Ecological Reconstruction and Management of the Floodplains in the Lower Yellow River” (I). Yellow River, 40(7), 1-6, 37.

[2] Zuo, Q. (2020). Critical problems and construction of synergy governance system in the beach area of the lower Yellow River. Science and Technology Review, 38(17), 23-32. doi:10.3981/j.issn.1000-7857.2020.17.002.

[3] Tian, Y., Sun, Y., Li, Y., & Ma, J. (2019). Study on the Management Strategy of the Floodplain of the Lower Yellow River. Yellow River, 41(3), 16-20, 35. doi:10.3969/j.issn.1000-1379.2019.03.004.

[4] Xu, X., Tan, L., & Li, Y. (2020). Thoughts and Suggestions on Land Use Control in Beach Areas of the Lower Yellow River. Online publication. Consulting Research Center of Ministry of Natural Resources.

[5] Xia, J., Li, J., & Zhang, S. (2016). Channel Adjustments in the Lower Yellow River After the Operation of Xiaolangdi Reservoir. Yellow River, 38(10), 49-55. doi:10.3969/j.issn.1000-1379.2016.10.010

[6] Tian, Y., Qu, B., Li, Y., & Gu, Z. (2019). Research and Perspective on Floodplain Treatment in the Lower Yellow River. Yellow River, 41(2), 14-19. doi:10.3969/j.issn.1000-1379.2019.02.004

[7] Pei, Z. (2014). Analysis of Land Ecological Utilization Regionalization Construction in Beach Area of Lower Yellow River. China (International) Water Summit Forum—2014 River and Lake Health and Ecological Civilization Construction Conference Papers (pp. 222-227). Hu’nan, China.

[8] Zhang, M., Zhang, Y., Zhu, W., Liao, C. & Zhao, S. (2010). Wetland Restoration Models in Zhengzhou Yellow River Nature Reserve, Henan Province. Wetland Science, 8(1), 67-73.

[9] Wu, S., Wang, H., Li, Q., & Wang, P. (2021). Study on landscape plant design and ecological restoration in floodplain area of the Lower Yellow River—A case study of floodplain area of Yellow River in Changyuan City, Henan Province. Jiangsu Agricultural Sciences, 49(8), 141-148, 157. doi:10.15889/j.issn.1002-1302.2021.08.025

[10] Zhang, J., Liu J., Li, C., & Cui, Z. (2018). Management of Floodplain and Ecological Reconstruction Modes Development in the Lower Yellow River— “Study on Ecological Reconstruction and Management of the Floodplains in the Lower Yellow River” (IV). Yellow River, 40(10), 1-5, 24.

[11] Liu, S., He, Y., Cui, M., Zhang, J., Wan, Z., Cui, C., ... Wang, J. (2013). Research on the key technology of comprehensive management of beach area in the lower Yellow River. Retrieved fromhttps://d.wanfangdata.com.cn/cstad/ChFDc3RhZE5ld1MyMDIxMDgwMhIKMTQwMDQ3MA0ORoIamJjaDZwbDE%3D

[12] Zhengzhou Huiji District Flood Control Command. (2019). Flood Control Plan of Yellow River in Huiji District.

[13] Yan, C., Yuan, G., Li, Z., Liu, X., & Ye, Y. (2020). Analysis of Morphological Change of the Yellow River in Zhengzhou Section Based on RS. Yellow River, 42(1), 21-26.

doi:10.3969/j.issn.1000-1379.2020.01.005

[14] Guo, H., He, X., & Shi, S. (2012). Siltation and Erosion in Zhengzhou Section of the Yellow River Channel and Its Influencing Factors. Yellow River, 34(3), 4-5. doi:10.3969/j.issn.1000-1379.2012.03.002

[15] Yao, X., Wang, X., Hu, Y., Chen, Y., He, P., & Tian, G. (2021). Study on diversity of herbaceous plants along the Yellow River Wetland in Zhengzhou City. Jiangsu Agricultural Sciences, 49(1), 186-191. doi:10.15889/j.issn.1002-1302.2021.01.034

[16] Song, X., Wang, C., Peng, Z., & Yang, H. (2007). Study on Integrated Development by Taking Forestry as the Main of Floodplain Area of the Lower Yellow River. Yellow River, 29(12), 12, 14. doi:10.3969/j.issn.1000-1379.2007.12.006

[17] Daily, G. C., Ouyang, Z., Zheng, H., Li, S., Wang, Y., Feldman, M., ... Ruckelshaus, M. (2013). Securing Natural Capital and Human Well-Being: Innovation and Impact in China. Acta Ecologica Sinica, 33(3), 669-685. doi:10.5846/stxb201212311905

[18] Yu, K. (2020). Designing and Building a Beautiful City with the Vision of Ecological Civilization. Renming Luntan Xueshu Qianyan, (4), 18-36. doi:10.16619/j.cnki.rmltxsqy.2020.04.003

[19] He, X., Zheng, D., Guo H., & Ma, G. (2014). The Vegetation Species Diversity and Its Response to the Human Activities in Zhengzhou Yellow River Wetland Reserve. Wetland Science, 12(4), 459-463. doi:10.13248/j.cnki.wetlandsci.2014.04.008

[20] Yu, K. (2019). Large scale ecological restoration: empowering the nature-based solutions inspired by ancient wisdom of farming. Acta Ecologica Sinica, 39(23), 8733-8745. doi:10.5846/stxb201905311146

[21] Li Xue. (2017). Exploration of National Wetland Park Design Based on Sustainable Development (Master's thesis, Henan Agricultural University). https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CMFD201801&filename=1017282399.nh

3 Website

INT-01:Baidu Baike
Available:https://baike.baidu.com/

INT-02:360 Baike
Available:https://baike.so.com/

INT-03:Gooood design network
Available:https://www.gooood.cn/

INT-04:www.cnki.net
Available:https://www.cnki.net/index/

INT-05:Baidu map
Available:https://map.baidu.com/

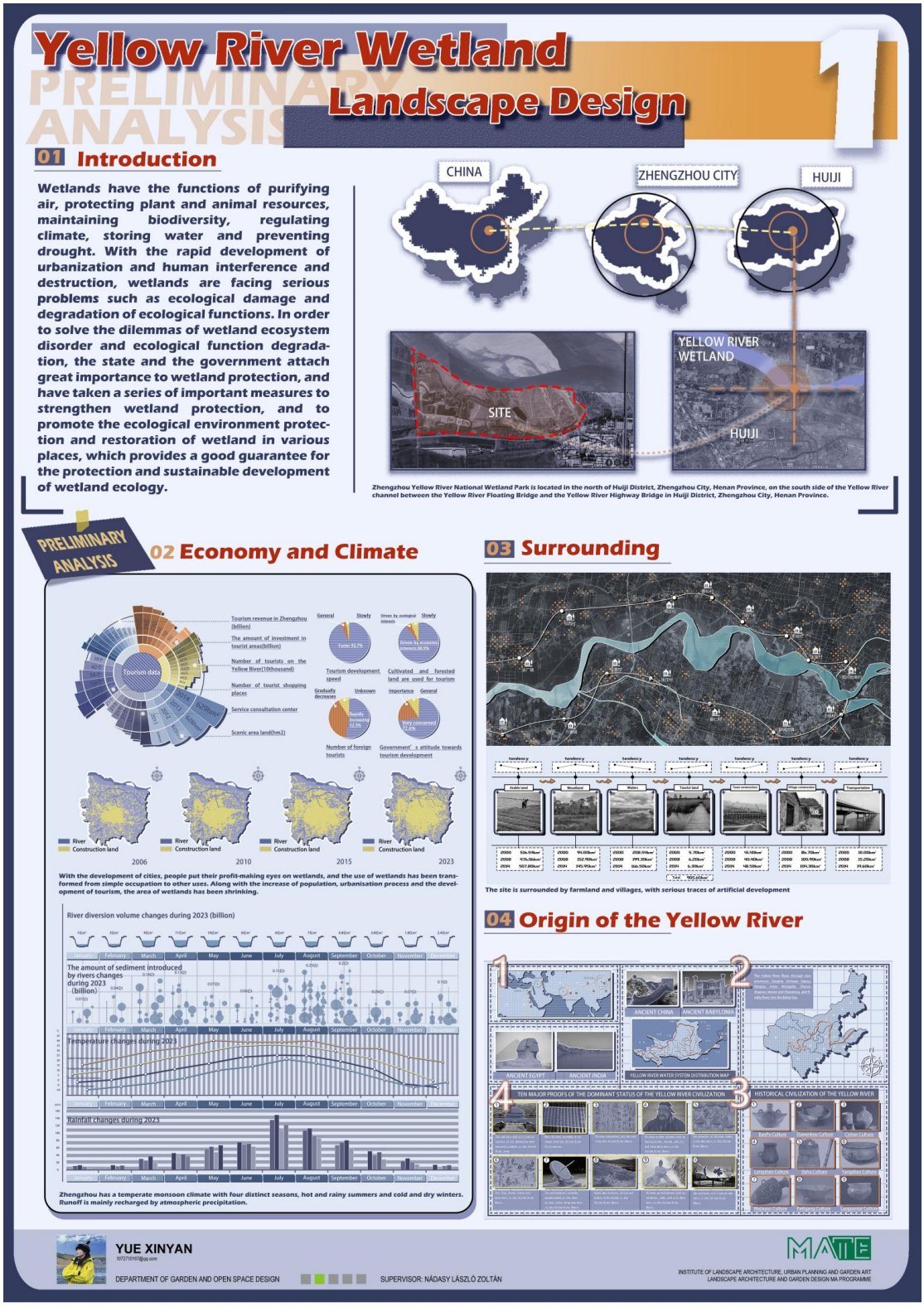
INT-06:topographic-map.com
Available:https://zh-cn.topographic-map.com/map-72ltt6/%E4%B8%AD%E5%9B%BD/?center=34.83184%2C113.21411&zoom=6

4 Form

categorisation	serial number	Latin name	Plant characteristics
Deciduous trees	1	*Platanus acerifolia*	Light-loving, like warmth and humidity, more cold-tolerant, resistant to air pollution, line planting
	2	*Diospyros kaki Thunb.*	like warm weather, cold-resistant, barren, drought-resistant.Choose hillside land with gentle terrain, as long as the soil is deep. The size of the plantation should be 10-50 acres.
	3	*Acer mono Maxim*	Slightly shade-tolerant, deep-rooted, prefers moist, fertile soil
	4	*Acer truncatum Bunge*	Weakly sunny, tolerant of semi-shade, cold, relatively wind-resistant, intolerant of dry heat
	5	*Taxodium distichum (L.)Rich.*	Light-loving, adaptable, tolerant of low temperatures, water and humidity
	6	*Salix babylonica*	Light-loving, cold-tolerant, moisture-tolerant, strong sprouting power
	7	*Albizia julibrissin Durazz*	Light-loving, tolerant of dryness and barrenness, intolerant of waterlogging, fast-growing
	8	*Koelreuteria paniculata Laxm*	Light-loving, slightly tolerant of semi-shade, cold-tolerant
	9	*Sophora japonica Linn*	Light-loving, slightly shade-tolerant, cold-tolerant, deep and well-developed roots
	10	*Ailanthus altissima 'Qiantou'*	Resistant to drought, flooding, cold, pests and diseases, highly adaptable
	11	*Catalpabungei C.A.Mey*	Light-loving, hardy, avoid waterlogging
	12	*Rhus Typhina Nutt*	Light-loving, adaptable, tolerant of drought and barrenness, tolerant of water and humidity
	13	*Ginkgo biloba L.*	drought tolerant, does not tolerate waterlogging
	14	*Cotinus coggvgria Scop*	Light-loving, also tolerates semi-shade; cold-tolerant, does not tolerate water and humidity
	15	*Fraxinus chinensis Roxb.*	Light-loving species, not cold hardy
	16	*Metasequoia glyptostroboides Hu et Cheng*	Prefers warm and humid climate, does not tolerate barrenness and drought
Evergreen trees	1	*Cedus deodara(Roxb.)G.Don*	Prefer sunny environments, slightly shade-tolerant, adaptable
	2	*Magnolia grandiflora Linn*	Light-loving, prefer warm and humid climate, slightly cold-resistant
	3	*Ligustrum compactum Ait(Wall.ex G.Don)Hook.f.*	Adaptable, light-loving, strong germination all over
	4	*Pinus tabulaeformis Carr.*	Positive species, shallow-rooted, light-loving, barren-resistant
	5	*Podocarpus macrophyllus (Thunb.)D.Don*	Prefers warm and humid climate, weak cold tolerance, strong shade tolerance
	6	*Juniperus chinensis 'Kaizuka'*	Sun-loving, slightly shade-tolerant, prefers warm, humid environments
	7	*Eriobotrya japonica (Thunb.)Lindl.*	Light-loving, slightly shade-tolerant, not cold-tolerant, slow-growing

Deciduous flowering shrubs	**1**	*Magnolia soulangeana Soul.-Bod.*	Prefers sunny, warm and humid climate
	2	*Prunus yedoensis Matsum.*	Prefer full sunlight, intolerant of shade and humidity, avoid waterlogging, cold tolerance
	3	*Crataegus wilsonii Sarg.*	Prefer cool and humid environment, cold-tolerant, heat-tolerant, adaptable
	4	*Lonicera maackii (Rupr.)Maxim.*	Light-loving, slightly drought-tolerant, grows well in slightly damp and dry environments
	5	*Forsythiasuspensa*	Light-loving, slightly shade-tolerant, tolerant of drought and barrenness, afraid of waterlogging
	6	*Amygdalus persica var:persica f.duplex*	Prefers warmer climates, good cold tolerance
	7	*Chimonanthus praecox (Linn.)Link*	Sun-loving, tolerant of shade, cold and drought, avoid waterlogging
	8	*Malus Halliana Koehne*	Sun-loving, shade-intolerant, cold-intolerant, prefer warm and humid environment
	9	*Prunus mume*	Prefers warmer climates, more tolerant of drought, less tolerant of flooding, long-lived
	10	*Syringa oblata Lindl.*	Prefer warm, humid, slightly cold hardy, more drought tolerant
	11	*Prunus triloba*	Light-loving, slightly shade-tolerant, cold-tolerant, strong disease resistance, well-developed root system
	12	*Hibiscus syriacus Linn.*	Prefers warm and humid climate, resistant to pruning, very adaptable
	13	*Punica granatum L.*	Prefer warm and sunny environment, drought-resistant, cold-resistant
	14	*Cornus alba*	Warm and humid climate, light-loving, slightly shade-tolerant, fertiliser-loving
	15	*Kerria japonica.*	Prefers warm, humid and semi-shady environments, poor cold tolerance
Vineyard hedge	1	*Berberis thunbergii var:atropurpurea Chenault*	Prefer cool and humid environment, adaptable, resistant to pruning
	2	*Ligustrum vicaryi*	Light-loving, slightly shade-tolerant, cold-tolerant, disease-resistant
	3	*Ligustrum vicaryi*	Prefer warm and humid environment, shade tolerant, cold tolerant, easy to maintain
	4	*Buxus megistophylla Levl.*	Light-loving, slightly shade-tolerant, fast-growing, adaptable
	5	*Yucca gloriosaL.*	Prefer warm and humid environments, tolerate barrenness, cold hardy
	6	*cv.Aurea Nana*	Prefer warm sunshine, do not tolerate high temperature, slightly cold-resistant
	7	*Euonymus fortunei var:radicans*	Warm-temperate tree species, hardy, preferring shady and humid environments
	8	*Phyllostachys glauca McClure*	Tolerant to cold, drought and barrenness
	9	*Lespedeza bicolor Turcz*	Drought-resistant, tolerant to barrenness, well adapted to the soil
	10	*Rosa banksiae W.T.Aiton*	Prefer warm and humid environment, not cold hardy, tolerate barren
Aquatic plant	1	*Phragmites australis (Cav.)Trin.ex Steud*	Water purification and resistance
	2	*Typha angustifolia*	Aquatic plants, water purification
	3	*Tipha orientalis Presl*	Water-supporting plants, good landscape effect
	4	*Lythrum salicariaL.*	Water-holding plants for good landscaping
	5	*Schoenoplectus tabernaemontanni.*	Water-supporting plants with upright green stalks
	6	*Nymphaea alba L.*	Leaves floating on water, good landscape effect

5 Poster


Yellow River Wetland
Landscape Design
1
PRELIMINARY ANALYSIS
01 Introduction
Wetlands have the functions of purifying air, protecting plant and animal resources, maintaining biodiversity, regulating climate, storing water and preventing drought. With the rapid development of urbanization and human interference and destruction, wetlands are facing serious problems such as ecological damage and degradation of ecological functions. In order to solve the dilemmas of wetland ecosystem disorder and ecological function degradation, the state and the government attach great importance to wetland protection, and have taken a series of important measures to strengthen wetland protection, and to promote the ecological environment protection and restoration of wetland in various places, which provides a good guarantee for the protection and sustainable development of wetland ecology.
CHINA
ZHENGZHOU CITY
HUJI
SITE
YELLOW RIVER WETLAND
HUJI
Zhengzhou Yellow River National Wetland Park is located in the north of Huiji District, Zhengzhou City, Henan Province, on the south side of the Yellow River channel between the Yellow River Floating Bridge and the Yellow River Highway Bridge in Huiji District, Zhengzhou City, Henan Province.
PRELIMINARY ANALYSIS
02 Economy and Climate
Tourism data
Tourism revenue in Zhengzhou (billion)
The amount of investment in tourist areas(billion)
Number of tourists on the Yellow River(10thousand)
Number of tourist shopping places
Service consultation center
Scenic area land(hm2)
Tourism development speed
Cultivated and forested land are used for tourism
Number of foreign tourists
Government's attitude towards tourism development
River
Construction land
2006
2010
2015
2023
With the development of cities, people put their profit-making eyes on wetlands, and the use of wetlands has been transformed from simple occupation to other uses. Along with the increase of population, urbanisation process and the development of tourism, the area of wetlands has been shrinking.
River diversion volume changes during 2023 (billion)
The amount of sediment introduced by rivers changes during 2023 (billion)
Temperature changes during 2023
Rainfall changes during 2023
January
February
March
April
May
June
July
August
September
October
November
December
Zhengzhou has a temperate monsoon climate with four distinct seasons, hot and rainy summers and cold and dry winters. Runoff is mainly recharged by atmospheric precipitation.
03 Surrounding
tendency
Arable land
Woodland
Waters
Tourist land
Town construction
Village construction
Transportation
The site is surrounded by farmland and villages, with serious traces of artificial development
04 Origin of the Yellow River
1
2
3
4
ANCIENT CHINA
ANCIENT BABYLONIA
ANCIENT EGYPT
ANCIENT INDIA
YELLOW RIVER WATER SYSTEM DISTRIBUTION MAP
TEN MAJOR PROOFS OF THE DOMINANT STATUS OF THE YELLOW RIVER CIVILIZATION
HISTORICAL CIVILIZATION OF THE YELLOW RIVER
Banpo Culture
Yangshao Culture
Longshan Culture
Erlitou Culture
Taosi Culture
Xinglongwa Culture
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SUPERVISOR: NÁDASY LÁSZLÓ ZOLTÁN
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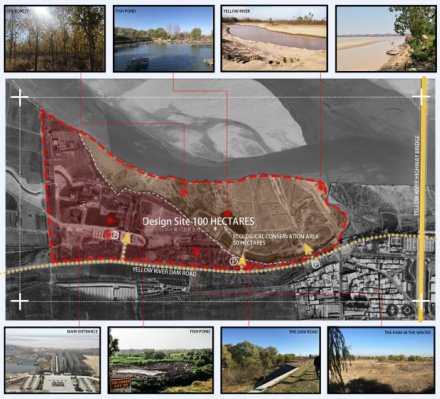
INSTITUTE OF LANDSCAPE ARCHITECTURE, URBAN PLANNING AND GARDEN ART
LANDSCAPE ARCHITECTURE AND GARDEN DESIGN MA PROGRAMME

Yellow River Wetland Landscape Design

PRELIMINARY ANALYSIS

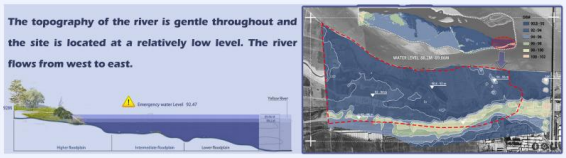
2

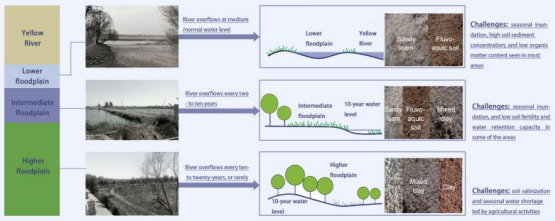
05 Design site



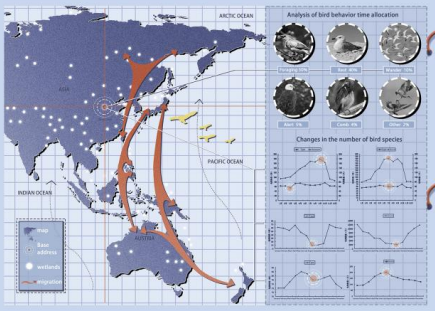
06 Topography and Soils

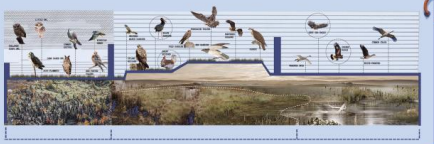
The topography of the river is gentle throughout and the site is located at a relatively low level. The river flows from west to east.

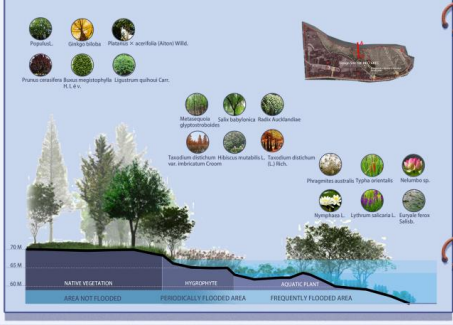




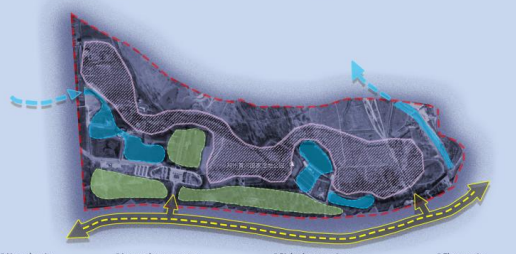
07 Plants and Animals

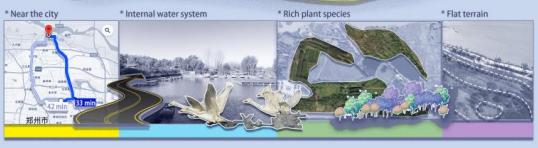






08 Conflict and Values





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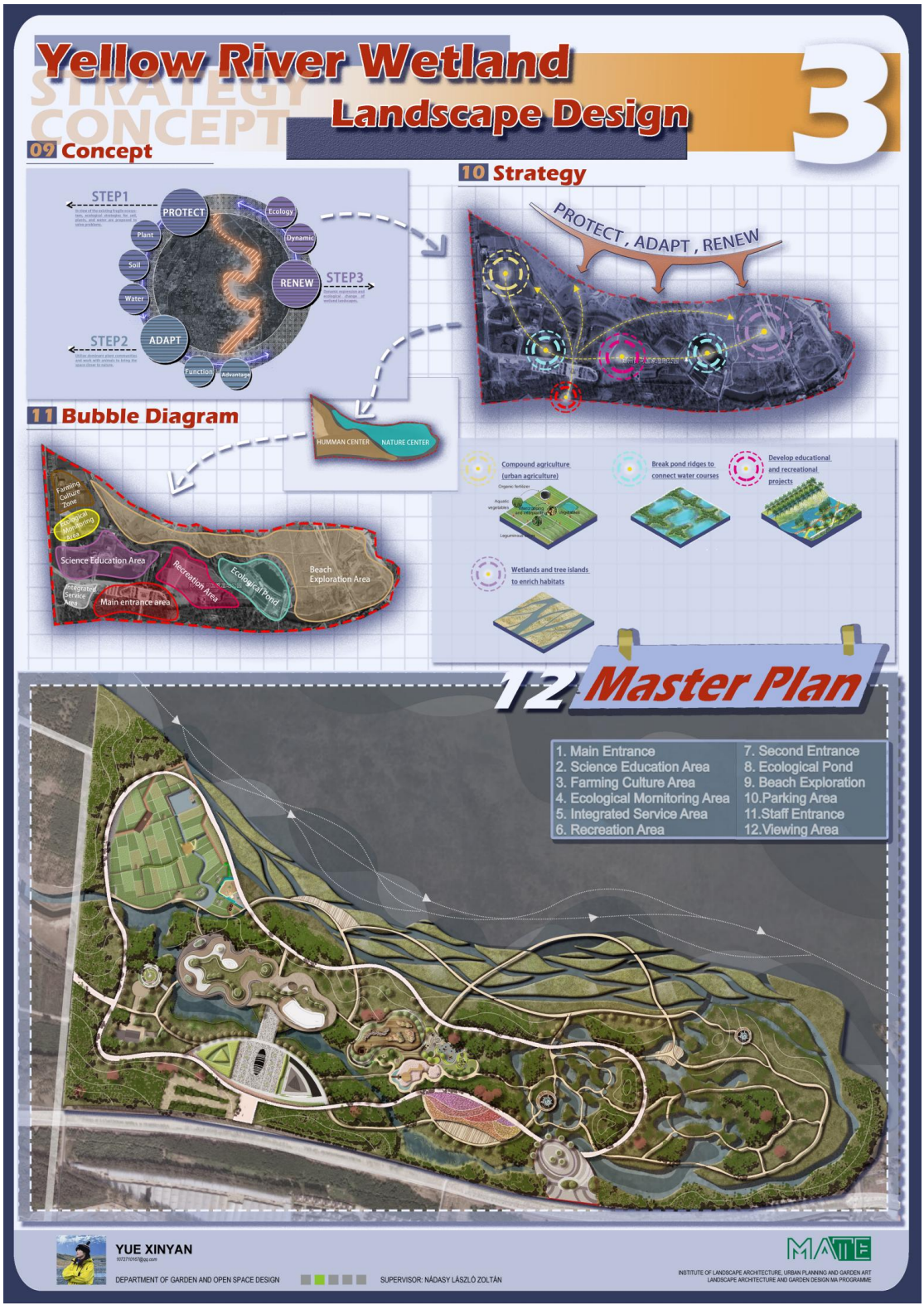
Yellow River Wetland
Landscape Design
3
STRATEGY
CONCEPT
09 Concept
STEP1
PROTECT
Ecology
Dynamic
Plant
Soil
Water
RENEW
STEP3
STEP2
ADAPT
Function
Advantage
10 Strategy
PROTECT , ADAPT , RENEW
11 Bubble Diagram
HUMMAN CENTER
NATURE CENTER
Farming Culture Zone
Ecological Monitoring Area
Science Education Area
Recreation Area
Ecological Pond
Beach Exploration Area
Integrated Service Area
Main entrance area
Compound agriculture (urban agriculture)
Break pond ridges to connect water courses
Develop educational and recreational projects
Wetlands and tree islands to enrich habitats
12 Master Plan
1. Main Entrance
2. Science Education Area
3. Farming Culture Area
4. Ecological Mornitoring Area
5. Integrated Service Area
6. Recreation Area
7. Second Entrance
8. Ecological Pond
9. Beach Exploration
10.Parking Area
11.Staff Entrance
12.Viewing Area
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Yellow River Wetland Landscape Design

GENERAL DESIGN

4

13 Road & Plant

*The main road surrounds the site.

*Secondary roads connect function area.

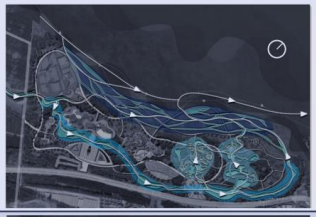
- Main entrance
- Stuff entrance
- Main road
- Second road
- Pedestrian flow

*Planting dominant species, accelerating the succession of plant communities on the beach, and gradually forming native habitats on the Yellow River beach.

- Predominantly vegetation
- Hygrophyte
- Aquatic plants

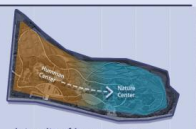
1 Predominantly vegetation	2 Hygrophyte	3 Aquatic plants
PopulusL.	Metasequoia glyptostroboides	Nelumbo sp.
Ginkgo biloba	Salix babylonica	Nymphaea L.
Platanus × acerifolia (Aiton) Willd.	Radix Aucklandiae	Lythrum salicaria L.
Prunus cerasifera	Taxodium distichum var. imbricatum Croom	Euryale ferox Salisb.
Buxus megistophylla H. L é v.	Hibiscus mutabilis L.	i.giganticae
Ligustrum quihoui Carr.	Taxodium distichum	Iris pseudacorus l
Acer buergerianum Miq.	Typha orientalis	Thalia dealbata
Pittosporum tobira	Phragmites australis	Iris lactea Pall. var.chinensis (Fisch.) koidz.

14 Water & User



*Break pond ridges to connect water courses

- Ecological Pond 0.5-1 m
- Internal water system 1-2 m
- Ecological island 0.5-2 m
- Direction of flow

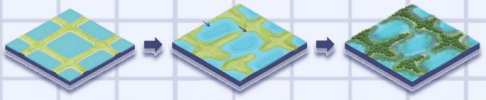


Intensity of humman use

15 Ecological Pond

*Restoring the animal and plant habitats in the beach

*Enjoy the nature on the paths



Constructed concrete fish ponds

Break pond ridges to connect water courses

Plant native vegetation to form a nice habitat

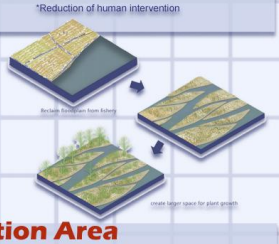
16 Beach Exploration Area

*Improve flood prevention capabilities

*Set up ecological islands close to the river

*Experience nature

*Reduction of human intervention



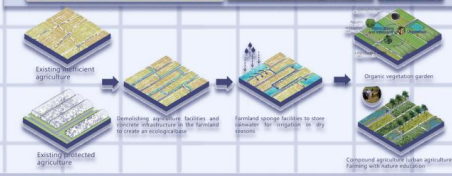
17 Farming Culture Area

*Experience a life different from the city

*Experience Growth

*Pastoral Market

*leisure in the field



Existing inefficient agriculture

Existing protected agriculture

Demolishing agriculture facilities and concrete infrastructure in the farmland to create an ecological base

Farmland sponge facilities to store rainwater for irrigation in dry seasons

Organic vegetation garden

Compound agriculture (urban agriculture) Farming with nature education

18 Science Education Area

*Experience the wetland scenery

*Learning Science Knowledge

*Improve the quality of people

Existing condition of the site

Wetlands and tree islands to enrich habitats

Slow traffic for better waterfrontrec-reational experience

YUE XINYAN

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INSTITUTE OF LANDSCAPE ARCHITECTURE, URBAN PLANNING AND GARDEN ART

LANDSCAPE ARCHITECTURE AND GARDEN DESIGN MA PROGRAMME

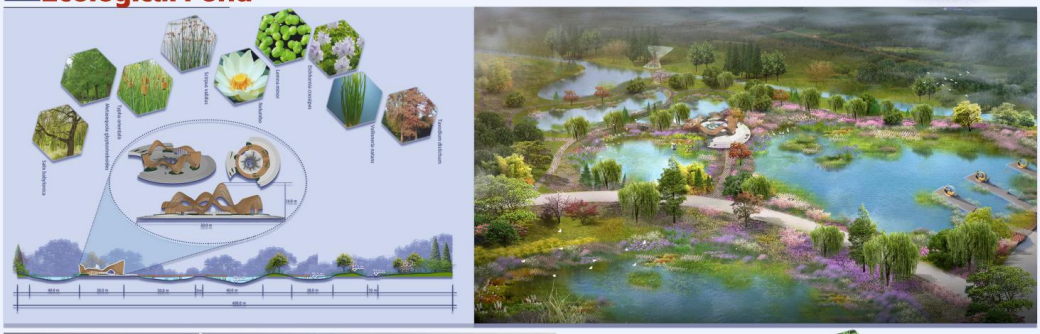
Yellow River Wetland

DETAILED DESIGN

Landscape Design

5

19 Ecological Pond



20 Beach Exploration Area

21 Farming Culture Area

22 Science Education Area

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