

WETLAND PARK DESIGN BASED ON FLOOD RESILIENCE AND ECOLOGICAL WISDOM

THE LANDSCAPE DESIGN OF CHUANJIANGCHI PARK.ECO&WISDOM CITY. WUHAN.CHINA

PROJECT STATEMENT

The Wetland Park project is located in Hubei Province, central China. Its main innovation lies in designing a resilient space that can both discharge rain and store floods, purifying rainwater while avoiding flooding to prevent disasters. Designers have protected and restored the aquatic ecosystem, consisting of rivers, wetlands, detention ponds, bio-swales and ditches. By using natural drainage systems such as ecological ditches and low-impact development facilities, the designers promote natural accumulation, infiltration, purification, and clean water discharge of rainwater to achieve the park's climate adaptation resilience and rainwater purification functions.

All of these measures are perfectly integrated with the park's recreational, camping, children's playground, adult fitness, and ecological education functions. The parking lot meets the charging needs of new energy vehicles, and the ground uses recycled synthetic materials made of concrete. The sewage discharge from the toilets is also treated and purified on-site. These measures improve the natural recovery ability of the park's ecosystem, maintain the ecological functions of the city, balance the relationship between humans and nature, and provide ecological and scientific education to visitors. These measures embody the ecological wisdom in park design.

PROJECT NARRATIVE

Design Ideas

The project is located in Wuhan Economic Development Zone, Hubei Province, and is the core area of the Wisdom Eco-City, bordered by Chuanjiang river Second Road to the east, Chuanjiang river Road to the south, Tongshunhe Avenue to the west, and Managed Hill Road to the north, and close to the Three Kingdoms Culture Important Node Managed Hill and Dongjing River. It is the ecological demonstration area, wisdom demonstration area and greenway demonstration area of the wisdom ecological city. The design area is about 753,000 square meters, half of which is wetland.

The main content of the project is to protect water ecological sensitive areas such as rivers, lakes, wetlands, ponds and ditches, to give priority to the use of natural drainage systems and low impact development facilities, to achieve natural accumulation, natural infiltration, natural purification and sustainable water cycle of rainwater, to improve the natural restoration capacity of water ecosystems, to maintain good ecological functions of the city, to coordinate the balanced relationship between humans and nature and to fill the missing natural science and technology function.

Design Strategy-NbS

It is necessary to give priority to nature, respect nature, strengthen the protection of natural resources, deal with the waste in the site according to local conditions, vigorously promote the protection and restoration of the ecosystem, comprehensively grasp the greening work, not to make a big opening, retain the wild features of the urban-rural combination, and create an ecological mudflat with natural wildness different from the urban landscape.

How to meet the ecological and environmental protection needs under the environmental protection inspectors, deal with the garbage in the site, and improve the flood control treatment. How to ensure the seasonal water level of the site on the re-greening of plants, the ecological environment of the adaptive impact.

• Incorporate Sustainable Design

Incorporate sustainable design principles to minimize the park's impact on the environment. This can include using renewable energy sources, conserving water, reducing waste, and using locally sourced materials.

Use Renewable Energy Sources: Incorporate renewable energy sources, such as solar panels or wind turbines, to power park facilities and amenities. This will reduce reliance on non-renewable energy sources and reduce carbon emissions.

Conserve Water: Use low-flow fixtures, rainwater harvesting systems, and drought-tolerant landscaping to reduce water usage. This will conserve water resources and reduce the demand on the local water supply.

Minimize Waste: Use materials that are durable and long-lasting, and design park amenities to be easily disassembled and recycled at the end of their useful life. This will reduce the amount of waste generated by park construction and maintenance.

PROJECT NARRATIVE

Use Sustainable Materials: Use sustainable materials such as recycled materials, reclaimed wood, and low-maintenance materials like composite decking or permeable pavers. This reduces the environmental impact of park construction and maintenance.

• Stormwater Management

Consider the potential impacts of climate change on the park and design it to be resilient to those impacts. This can include designing for flooding, extreme heat, and drought. Stormwater runoff is a major environmental issue that can cause flooding, erosion, and pollution of local waterways. Sustainable stormwater management practices, such as bio-swales, detention ponds, and retention ponds, have become increasingly popular as a way to minimize the environmental impact of runoff and protect local water resources.

Bio-Swale: A bio-swale is a vegetated channel that is designed to capture and treat stormwater runoff. The channel is typically filled with vegetation and soil, which helps to slow down the flow of water and absorb pollutants. As water flows through the bio-swale, it is filtered and treated by the vegetation and soil, reducing the amount of pollutants that reach local waterways.

Bio-swales are often used in urban environments, where impervious surfaces, such as roads and parking lots, prevent water from infiltrating the ground. By capturing and treating stormwater runoff, bio-swales help to minimize the environmental impact of runoff and reduce the risk of flooding.

Detention Pond: A detention pond is a man-made basin that is designed to collect and temporarily store stormwater runoff. The pond is typically excavated to a depth that allows it to hold a certain volume of water, which is slowly released over time. This slow release of water helps to minimize the impact of runoff on local waterways and reduce the risk of flooding.

Detention ponds are often used in areas where there is limited space for other stormwater management practices, such as bio-swales or retention ponds. They are typically designed to be aesthetically pleasing, with vegetation and landscaping used to blend the pond into the surrounding environment.

Retention Pond: A retention pond is similar to a detention pond in that it is designed to collect and store stormwater runoff. However, unlike a detention pond, a retention pond is designed to hold water permanently. The pond is typically excavated to a depth that allows it to hold a certain volume of water, which is maintained over time.

Retention ponds are often used in areas where there is a need to maintain a certain level of water in the surrounding environment, such as wetlands or rivers. They can also be used to improve water quality, as the pond provides an opportunity for pollutants to settle out of the water before it reaches local waterways.

In summary, boardwalks, bio-swales, retention lakes, and detention ponds are all important components of sustainable park design. Boardwalks provide a safe and accessible space for visitors to enjoy the natural environment, while bio-swales, retention lakes, and detention ponds help to minimize the environmental impact of stormwater runoff and protect local water resources. By incorporating these sustainable practices into park design, we can create a more environmentally friendly and resilient urban environment.

PROJECT NARRATIVE

- **The combination of ecological wisdom and flood parks**

Combining ecological wisdom and floodable park design requires a holistic approach that takes into account the complex relationships between natural and human-made systems.

Use natural processes to manage flooding: Rather than relying solely on concrete or steel flood control measures, consider using natural processes to manage floodwater. This could include creating wetlands or bioswales that can absorb and filter water, or designing the park in a way that allows water to flow naturally through the landscape.

Incorporate sustainable materials and practices: Use sustainable materials in the park design, such as recycled or locally sourced materials. Use practices that promote resource conservation and waste reduction, such as rainwater harvesting, composting, or renewable energy sources.

Protect and enhance biodiversity: Incorporate plant and animal species that are native to the area and support local biodiversity. Design the park in a way that creates habitats for different species, such as providing nesting sites for birds or creating areas for pollinators.

Educate and engage the community: Encourage community involvement and engagement in the park design and management process. Create opportunities for educational programming and outreach to promote ecological literacy and encourage sustainable behaviors.

Prioritize resilience and adaptability: Design the park with resilience and adaptability in mind, so that it can withstand and recover from extreme weather events and other environmental stressors. Incorporate features such as flood-resistant infrastructure, green roofs, or permeable pavements.

By integrating ecological wisdom into the design and management of a floodable park, it is possible to create a space that not only provides recreational and aesthetic benefits but also supports local biodiversity and contributes to the overall health and well-being of the surrounding ecosystem.

PROJECT NARRATIVE

• Provide Multiple Uses

Balance Functionality and Aesthetics: The park should be designed to balance functionality with aesthetics. This can include creating beautiful landscapes that also serve a functional purpose, such as providing habitat for wildlife or controlling erosion. Balance functionality with aesthetics by creating beautiful landscapes that also serve a functional purpose.

Floodable Park: The park has been designed to be floodable, allowing it to absorb excess water during heavy rainfall events and minimizing the risk of flooding.

Children's Play Area: The park offers a children's play area, featuring a variety of equipment and structures that promote physical activity and imaginative play.

Sports Facilities: The park features several sports facilities, including a basketball court, a soccer field, and a volleyball court, providing recreational opportunities for visitors of all ages.

Education Buildings: The park features a modern and energy-efficient office building that takes advantage of the park's amenities and offers employees a sustainable and accessible workplace. The park office building should be designed to be flood-resistant and sustainable. It should be raised above the flood level and have a foundation that can withstand flooding. The building should incorporate passive solar design principles and use renewable energy sources such as solar panels and wind turbines. The building should also be designed to capture and recycle rainwater for irrigation and other non-potable uses.

Overnight Accommodations: The park should have overnight accommodations for visitors who want to stay and experience the park at night. These accommodations should be designed to be sustainable and resilient to climate change impacts. They could be in the form of eco-lodges, yurts, or cabins that use renewable energy sources and incorporate passive solar design principles. The accommodations should also be designed to minimize their impact on the natural environment.

Green corridors: The park's green corridors offers visitors a chance to escape into nature and discover the local flora and fauna, with several trails and amenities available for picnicking and bird-watching.

In summary, the park has been designed to offer visitors a sustainable and accessible space for recreation, relaxation, and exploration. With its floodable design, sustainable elements, sports facilities, children's play area, office building, and woodland, the park provides a unique and diverse range of amenities and opportunities for visitors of all ages and interests.

• Trail System

The trail system should be designed to allow visitors to experience the park's natural beauty while minimizing its impact on the environment. The trails should be made of natural materials and designed to be permeable to allow water to infiltrate into the ground. The trail system should also be designed to minimize erosion and protect sensitive habitats.

PROJECT NARRATIVE

• Park Lot for New Energy Vehicles

The park lot should be designed to accommodate new energy vehicles such as electric cars and bicycles. It should have charging stations for electric vehicles and bike racks for bicycles. The parking lot should also be designed to reduce the urban heat island effect by incorporating shade trees and permeable pavement to allow rainwater to infiltrate into the ground.

• Planting Design

Choose Native Species: When selecting shrubs and groundcover, choose native species that are adapted to the local climate and soil conditions. Native plants require less water, fertilizer, and maintenance, making them a more sustainable choice. They also provide food and habitat for local wildlife.

Group Plants by Water Needs: Group plants with similar water needs together to create more efficient irrigation zones. This will help reduce water usage and minimize the risk of overwatering or underwatering certain areas. For example, shrubs that prefer wet soil conditions can be planted closer to the river or wetland areas, while drought-tolerant groundcovers can be planted in drier areas of the park.

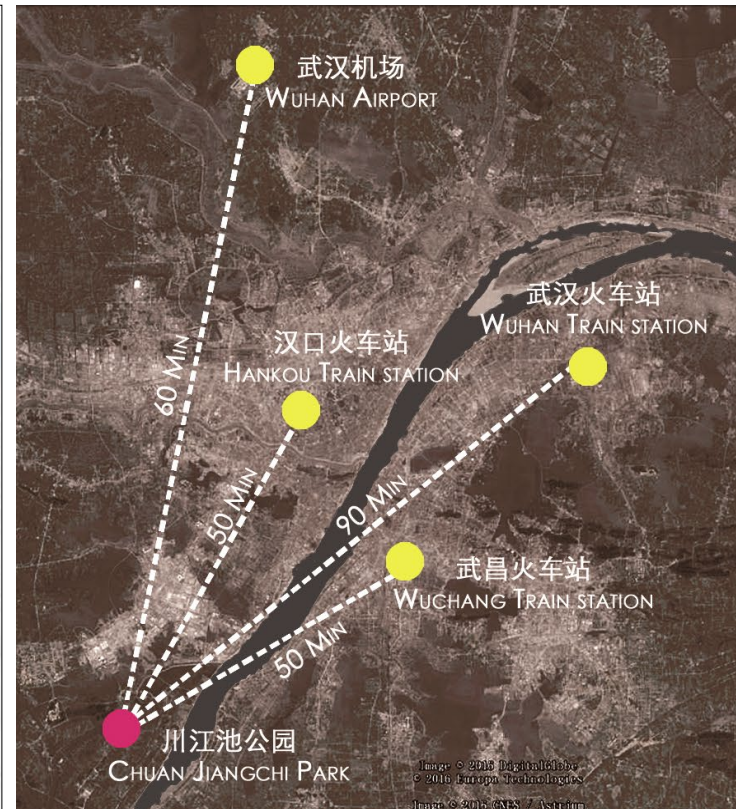
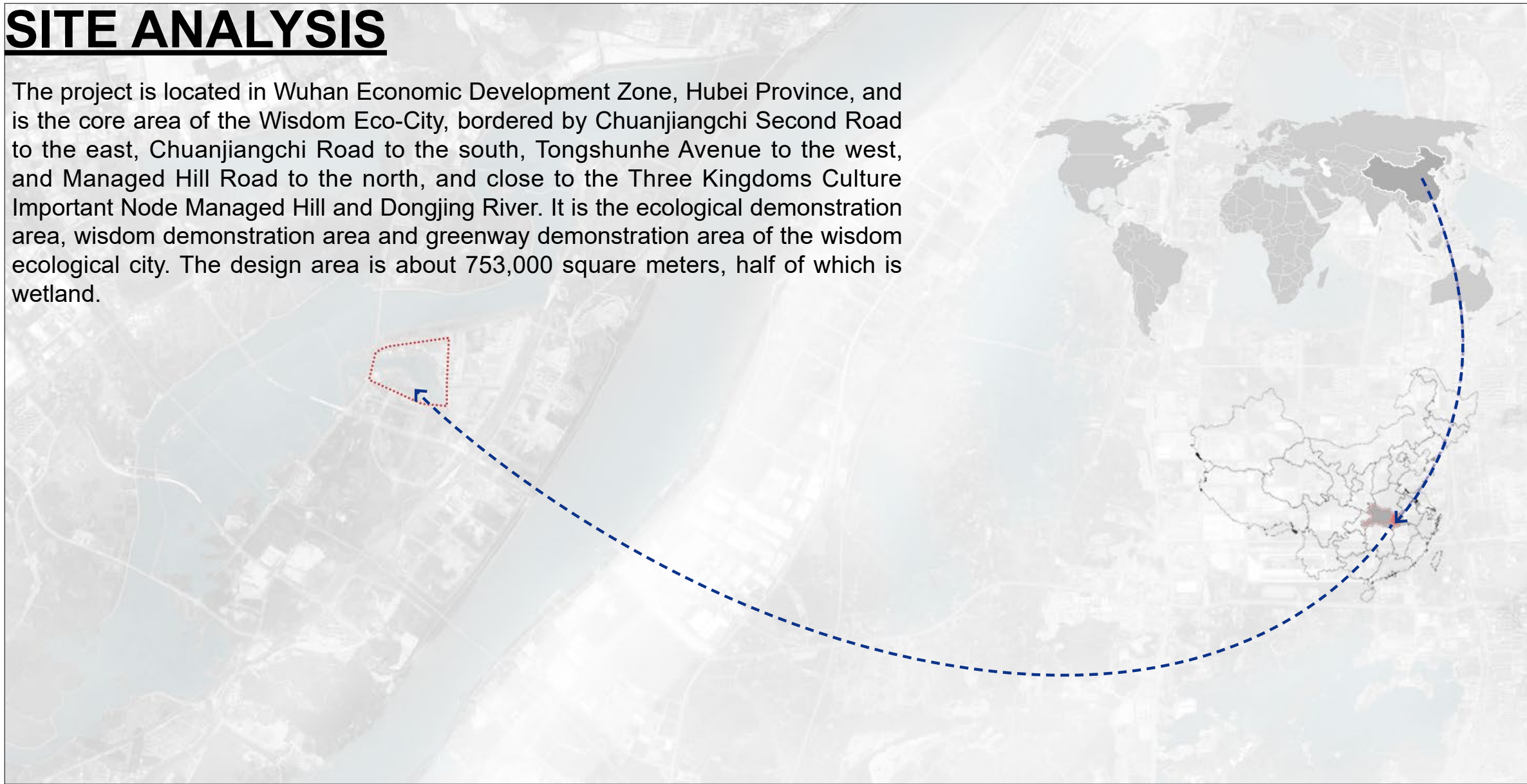
Use Mulch: Mulch can help retain soil moisture, suppress weeds, and regulate soil temperature. Use a natural, organic mulch such as wood chips, straw, or leaves. Apply a layer of mulch around shrubs and groundcover to help conserve water and reduce the need for frequent watering.

Create Edges: Use shrubs and groundcover to create defined edges around pathways, borders, and other features in the park. This will help give the park a more manicured look while also providing additional habitat for wildlife.

Incorporate Drought-Tolerant Species: In areas of the park where water is scarce or irrigation is difficult, consider incorporating drought-tolerant shrubs and groundcover. These plants have adapted to survive in arid conditions and can thrive with minimal water.

SITE ANALYSIS

The project is located in Wuhan Economic Development Zone, Hubei Province, and is the core area of the Wisdom Eco-City, bordered by Chuanjiangchi Second Road to the east, Chuanjiangchi Road to the south, Tongshunhe Avenue to the west, and Managed Hill Road to the north, and close to the Three Kingdoms Culture Important Node Managed Hill and Dongjing River. It is the ecological demonstration area, wisdom demonstration area and greenway demonstration area of the wisdom ecological city. The design area is about 753,000 square meters, half of which is wetland.



PROBLEMS AND CHALLENGES

Four main issues currently exist on the site: (1) threatened biological habitats;(2) insufficient activity space and environmental damage; (3) serious water and soil pollution;(4) crumbling event space.



MASTERPLAN

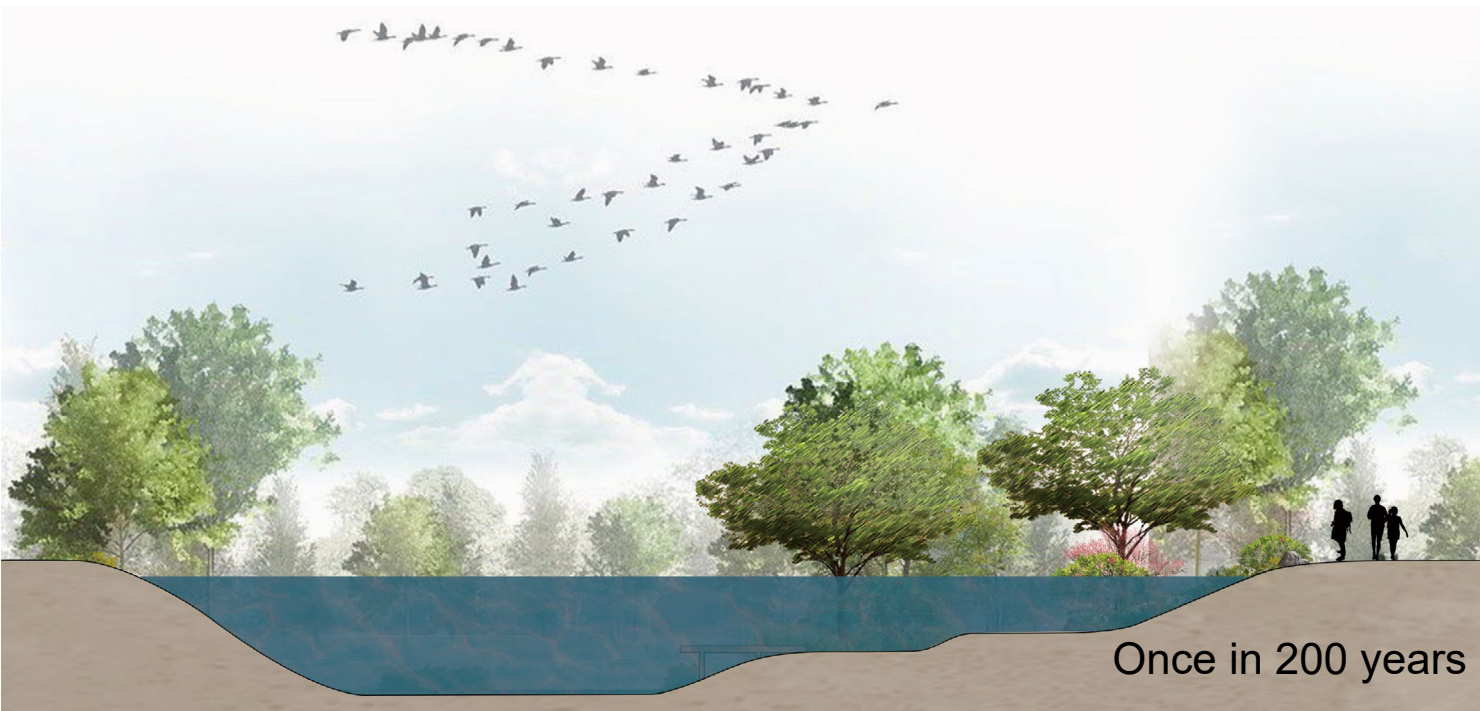


0m 50m 100m 200m 400m

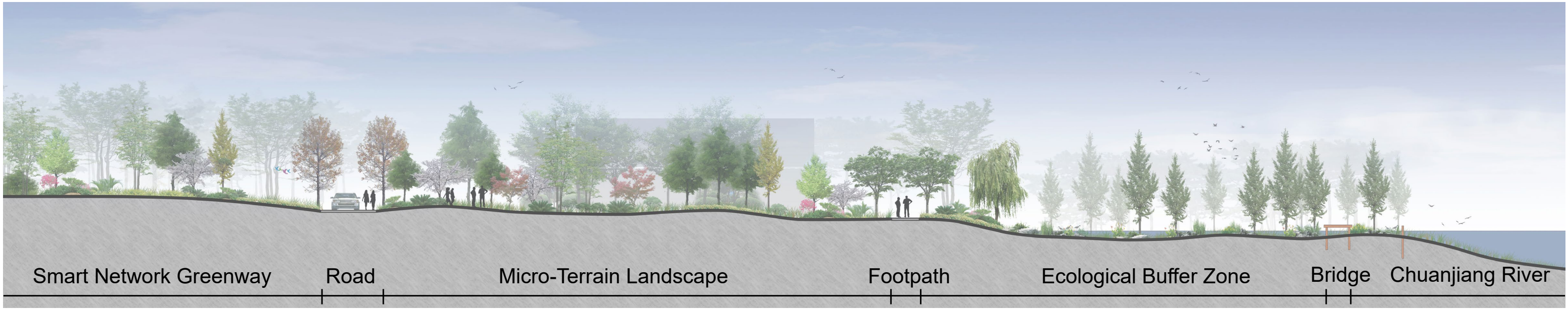
STORMWATER MANAGEMENT

Stratages:

- (1) The park incorporates sustainable design elements, such as a retention lake, bio-swale, and solar panels, to minimize its environmental impact and reduce its carbon footprint.
- (2) Surface runoff in the whole area is purified according to the vegetation grass ditch and then flows into the Chuanjiang river;
- (3) Water resilient park construction, can accommodate flooding. Flood water is divided into three levels of elevation, except for the highest loop for flooding in different reoccurrence periods.



HABITAT DIVERSITY

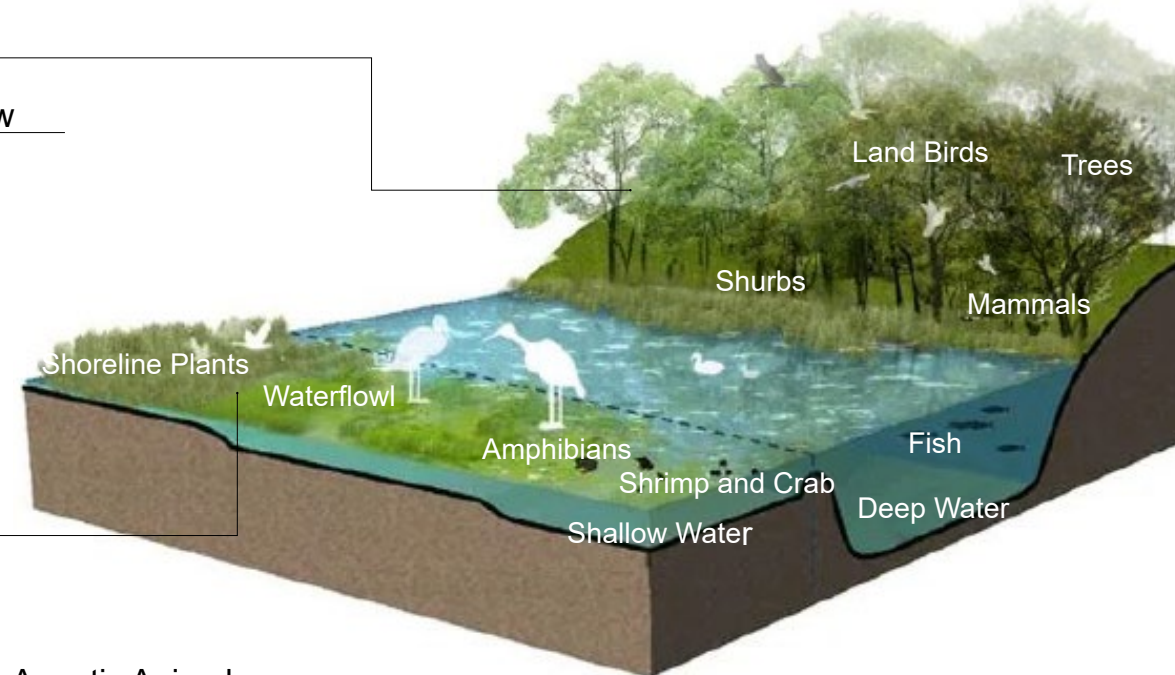


Land Area:

- Spotted owl, cattle-backed heron, blackbird, sparrow
- Pond fir, balsam fir, dry willow, manzanita
- Grasshoppers, snakes, ants

Wet Area:

- Little egret, night heron, pond heron, duck
- Reeds, Chrysanthemum, Plantain
- Dragonflies, fish, frogs
- Water depth 1.5m



Aquatic Plants:



Aquatic Animals:



Protect Biodiversity
+
Ecosystem Resilience



Water Purification
+
Wetland Area

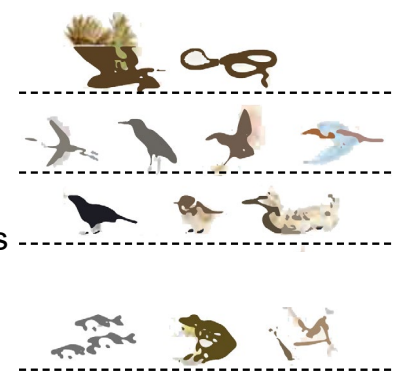
Senior predators

Tertiary predators

Secondary predators

Primary predators

Herbivores





The Chuanjiang River water environment has been effectively protected, the ecosystem has been restored, the habitat system has been rebuilt, and the good ecological environment has provided a habitat and breeding ground for various organisms.



A unique system of stormwater, flooding and planted seashore habitat was constructed by the design of the detention pond , bio-swales, and drainage ditches.



Increase the function of science education, so that visitors on the walkway are widely involved in the natural environment, and then learn wetland-related knowledge during the tour, and have good interaction with the natural environment.



In the planting design of the re-greening, the method of "forest as appropriate, grass as appropriate" is used to plant plants that are resistant to drought, flooding, scouring and soil consolidation.



The idea of "let nature do its work" has been implemented, with birds inhabiting and wildflowers blooming to maximize the protection of the water bodies and ecological environment.



The green corridor offers visitors a chance to escape to nature and discover local flora and fauna, with facilities for picnicking and bird watching. The building has been designed to offer visitors a space for education, relaxation and exploration.