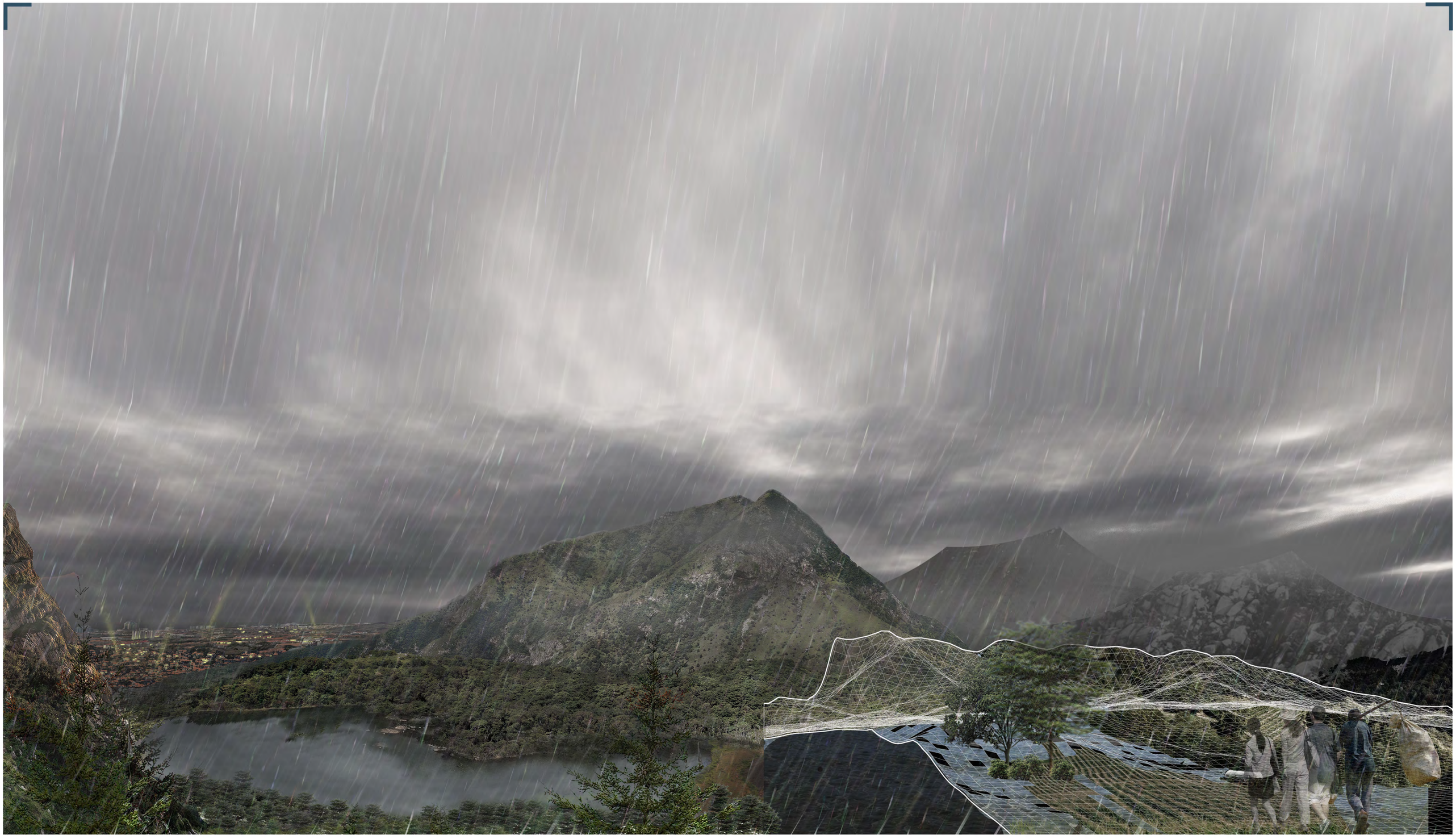

Country / City	China
University / School	Qingdao University of Technology
Academic year	2017-2018
Title of the project	Invisible Reservoir——The ecological restoration of Mountain Fu
Authors	Xin Liu, Fangzhou Lvy, Ruqiao Jin

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Avenida Diagonal, 649 piso 5
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TECHNICAL DOSSIER

Title of the project	Invisible Restoration——The ecological restoration of Mountain Fu
Authors	Xin Liu, Fangzhou Lvy, Ruqiao Jin
Title of the course	Landscape Planning and Design
Academic year	2017-2018
Teaching Staff	Sen Liu, Fei Qi, Yiping Zhang
Department/Section/Program of belonging	School of Architecture, Department of Landscape Architecture
University/School	Qingdao University of Technology

Written statement, short description of the project in English, no more than 250 words

The pilot zone of our program is located in Mountain Fu, Qingdao city, Shandong Province, which is a coastal city in Eastern China. The per capita fresh water capacity in Qingdao is less than 247m^3 while the international standard of severe water shortage is 500m^3. Even it was in the urban area of Qingdao, Mountain Fu failed to become an air purifier and was threatened by aridity as well as flood resulted from monsoon climate.

Problems to be solved:

Once vibrant and covered with dense primary vegetation, Mountain Fu was lumbered and quarried as the spreading urbanization, which has undermined the natural environment and ecologic system there. When the rainstorm comes, the water can't be reserved in Mountain Fu and a flood may erupt intimidating local residents.

This program tackles with the problem of the water reservation first. We come up with three strategies of reservoir construct, aiming to change Mountain Fu into a reservoir with ecological resilience.

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INVISIBLE RESERVOIR

Mountain Fu is surrounded by Qingdao city. Vegetation in Mountain Fu was destroyed because of human' s intervention. And the mountain bacame bare, which resulted in water and soil erosion. It is a great risk that local people would live around Mountain Fu as a result of climate change.

reservoir

'river valley'

pedestrians

water-getting spot

peak

human activity area

touring route

high sensitivity

LOCATION

MASTER PLAN

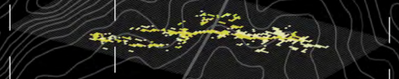
PROBLEM SOLVING PROCESS

Spatial configuration

Exsiting facilities

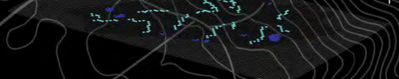
Exposed soil

Exposed rock



Vegetation

Runoff&Reservoir

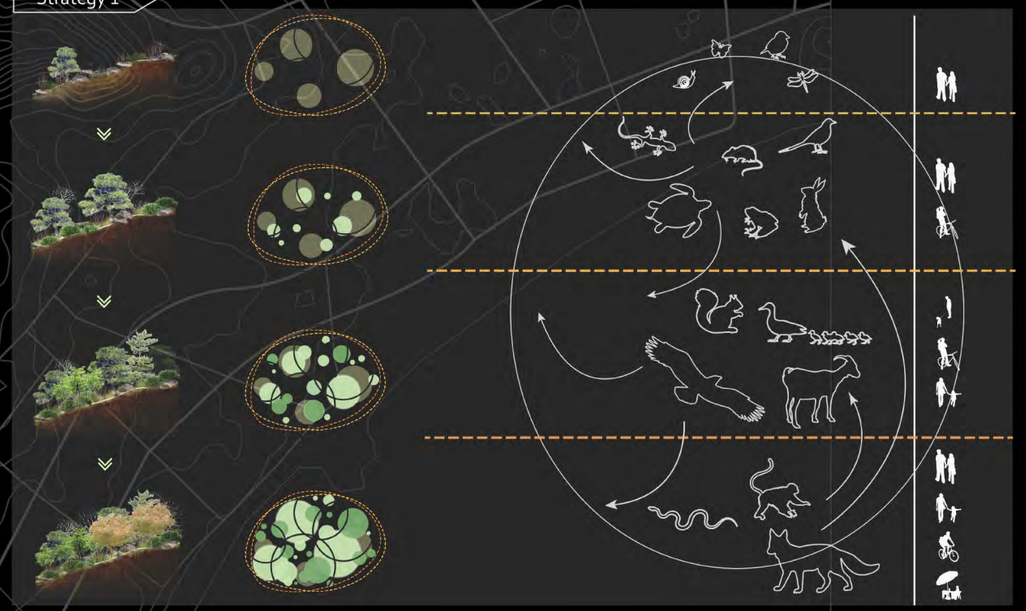


Problem

- Thin soil layer
- Exposed rock surface
- Soil salinization
- Monsoon climate
- low runoff coefficient
- Low precipitation
- Poor diversity
- Poor growth
- Plants invasion
- Saltwater intrusion
- Lack of economic vatality
- Dense community
- Improper development
- Fading memory
- Wasted quarry

Strategies

Strategy 1



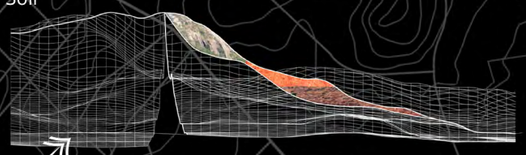
Stage 1: Planting pioneer tree species with the method of fish-scale pit. Combining with water collection and water blocking devices to ensure the survival rate of pioneer tree species, reduces soil erosion and gradually recovers the soil fertility.

Stage 2: Based on Stage 1, planting indigenous plants to fix the soil. After that, the mountain begins to have a certain storage capacity. More and more animals habitats here and then the food chain is going to be complete and the mountain ecosystem is gradually restored.

Final : People, animals and plants gradually join the ecosystem of Mountain Fu to fulfill their respective responsibilities. The ecosystem is complete and the mountain recovers self-regulatory capabilities.

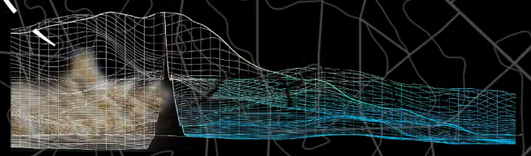
Site resourse

Soil



The mountain was seriously damaged, and the vegetation coverage from the foot to the top of the mountain gradually decreased, and the soil layer gradually changed from saline soil to exposed rock.

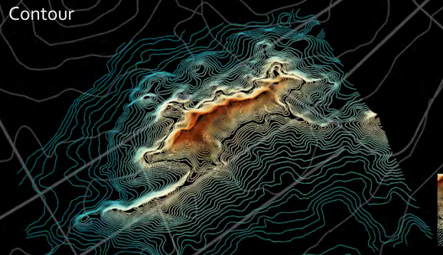
Groundwater



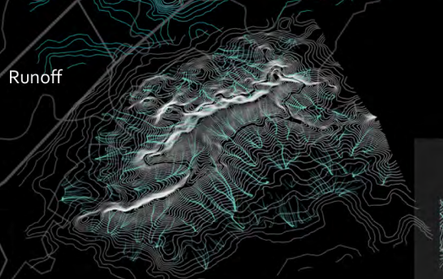
Due to the overexploitation of groundwater, the groundwater level drops, and the salinization of soil is further aggravated by seawater irrigation.

Mountain analysis

Contour



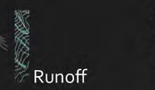
Runoff



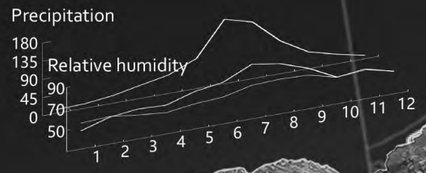
Site resourse

Precipitation

Weather



Precipitation

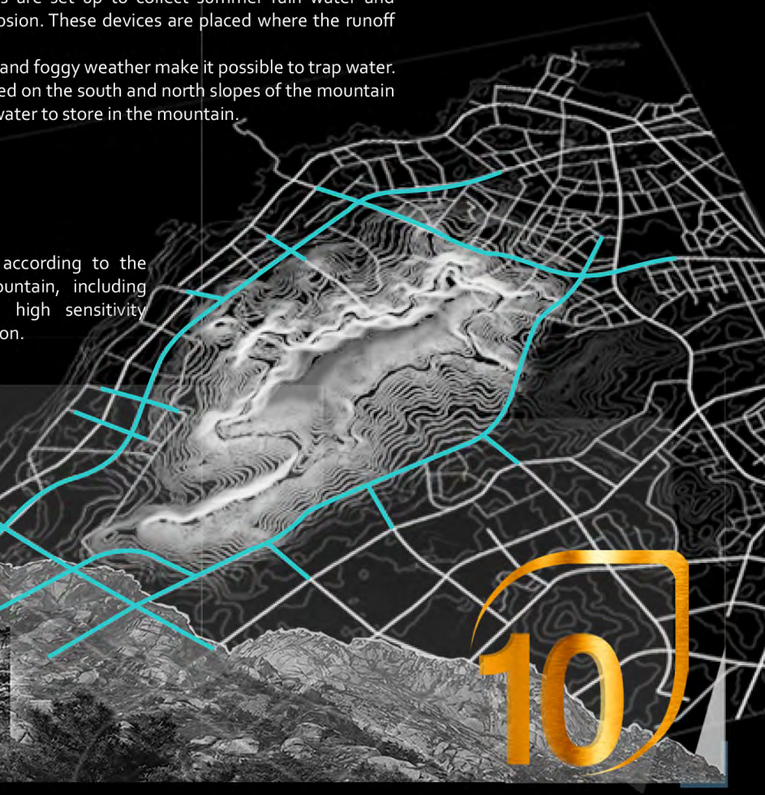


Strategy 2

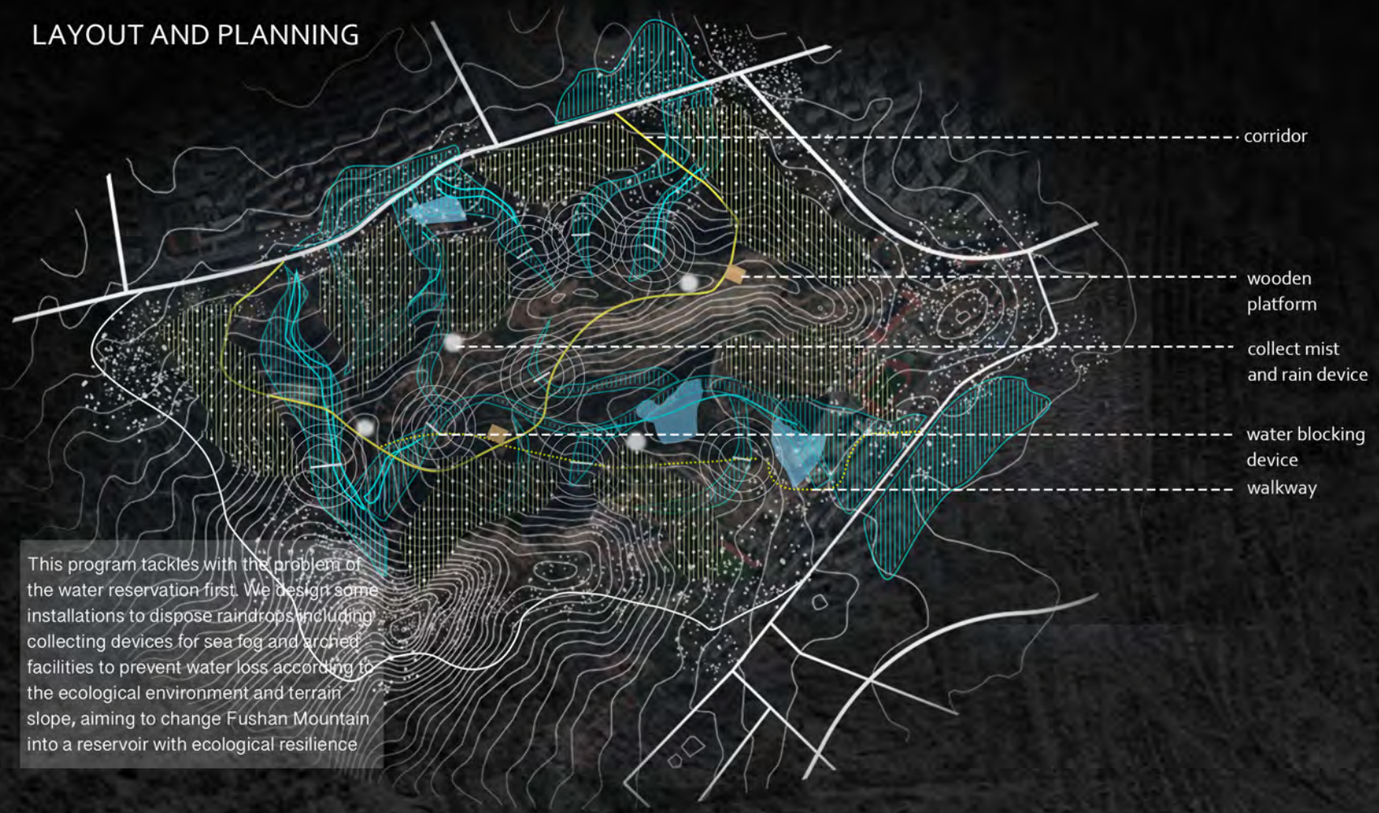
Water-blocking devices are set up to collect summer rain water and prevent further soil erosion. These devices are placed where the runoff coefficient is high.
High relative humidity and foggy weather make it possible to trap water. These devices are placed on the south and north slopes of the mountain to collect enough rainwater to store in the mountain.

Strategy 3

Each area is divided according to the sensitivity of the mountain, including human activity area, high sensitivity protection area and so on.

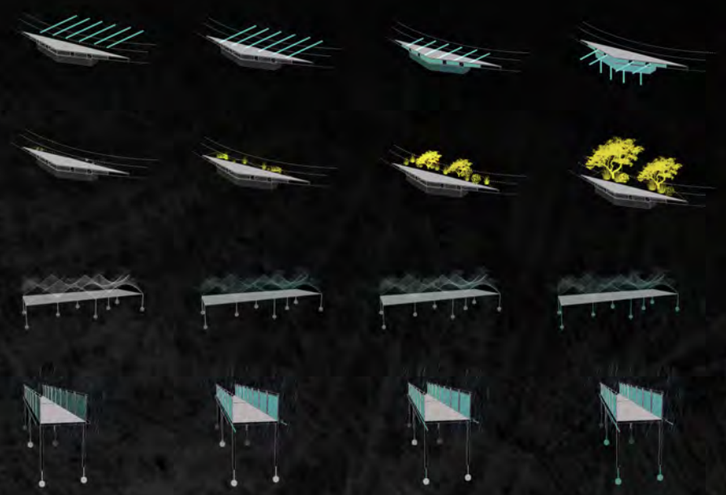


LAYOUT AND PLANNING



This program tackles with the problem of the water reservation first. We design some installations to dispose raindrops including collecting devices for sea fog and arched facilities to prevent water loss according to the ecological environment and terrain slope, aiming to change Fushan Mountain into a reservoir with ecological resilience

DESCRIPTION OF DEVICES

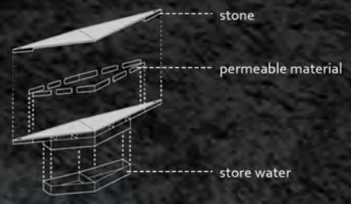


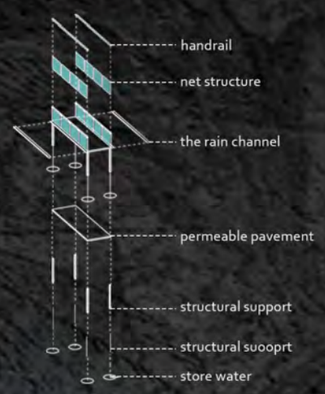
VEGTABLE SLECTION

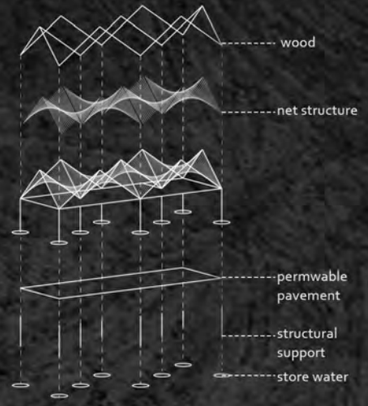
PURPOSE

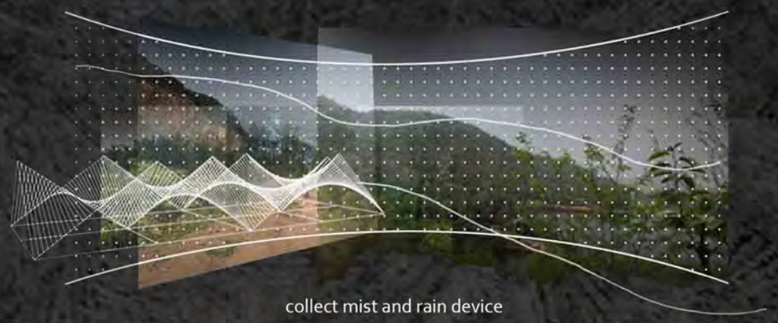
wetland perpective　　the mountain corridor　　water blocking device

COMPOSITION OF DEVICES









collect mist and rain device

The Return of Life

Country / City Qingdao,China

University / School Qingdao Technological University,Architecture and Urban Planning College

Academic year 3rd

Title of the project The Return of Life—The landscape Ecological Restoration of Shaohai Wetland

Authors Chongming Tang,Ying Zhang,Haixu Wang

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TECHNICAL DOSSIER

Title of the project	The Return of Life—The Landscape Ecological Restoration of Shaohai Wetland
Authors	Chongming Tang,Ying Zhang,Haixu Wang
Title of the course	Landscape Planning and Design
Academic year	3rd
Teaching Staff	Sen Liu,Jie Yang,An Zhang,Kun Yan,Fei Chen
Department/Section/Program of belonging	Landscape Architecture
University/School	Qingdao Technological University

Written statement, short description of the project in English, no more than 250 words

The project is located in jiaozhou city, shandong province, China.A flood destroyed the area more than a decade ago.To prevent another flood, the government began to dig the lake.The lake is the site of the project, Shaohai wetland park.Thousands of local residents have left their homes to support the project.

However, after investigation, we found that the ecology of Shaohai is not optimistic.A large number of non-native plants have been planted on the site, and local plants have been removed for ornamental purposes. The whole Shaohai presents a false flourish.

The problem is exacerbated by a single habitat, and over time the Shaohai will lose its primary function of flood storage. So we solve the silt crisis by building diverse habitats to attract animals, so as to bring energy out of the site.Besides, we have given economic value to plants, allowing indigenous people to return home by weaving reeds and operating fishing grounds.

These ideas are embodied in constructing artificial bird's nest structures, changing the shoreline and topography of lakes, constructing overhead walkways, letting nature do its work.

For further information
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Consult the web page http://landscape.coac.net/

HISTORY

2001 — A flood occurred in jiaozhou, Qingdao.

2003 — Jiaozhou city has carried out a new round of overall urban

2004 — Start construction of the eastern stagnant area.

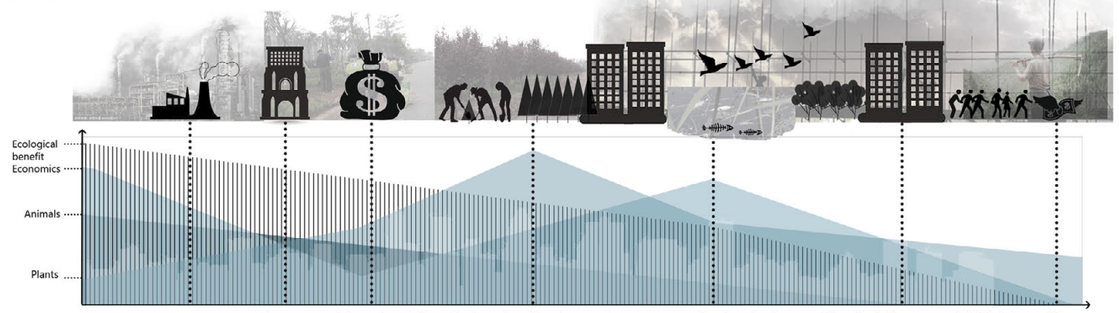
2006 — The water conservancy project is basically completed.

2007 — The first phase of nanhu public landscape project

2008 — Business construction began to develop. There is a lot of real estate development around.

2009 — Open to visitors and continue to build.

SOCIETY



The rapid economic development brought by industry has also brought severe ecological and environmental problems.

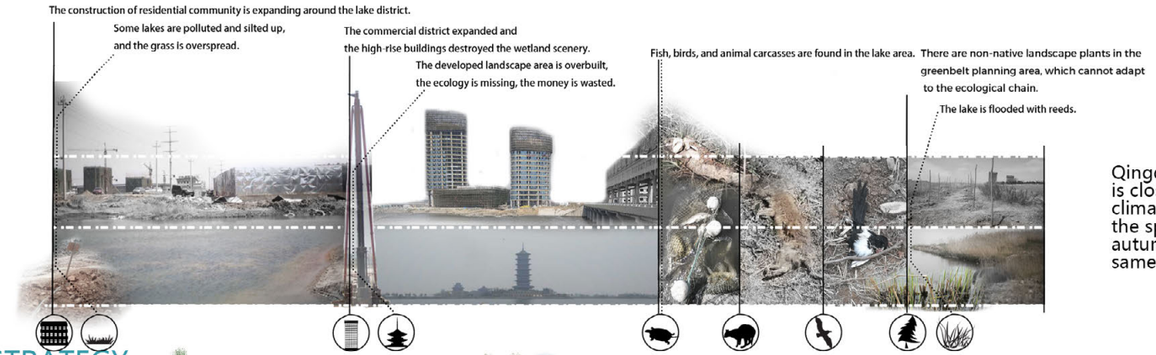
The government began to attach importance to the environment and invest a lot of manpower and money.

Various cities began intensive urban greening construction, planted a large number of garden plants. Real estate is also seeing great opportunities everywhere.

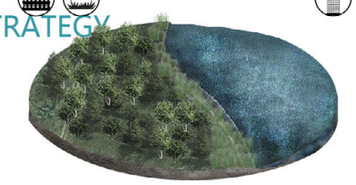
However, **garden plants** that do not consider the nature of the site cannot really improve the environment. Despite the abundance of plants, the animals chose to leave.

The indigenous people left their homes with compensation because of real estate development, but the construction of real estate which is not suitable for local conditions cannot attract people to move in.

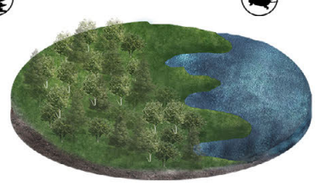
SITE



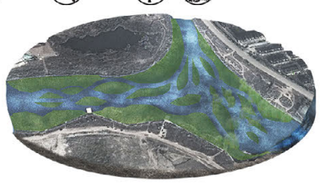
STRATEGY



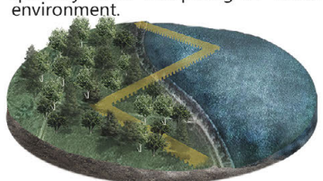
To establish a variety of plant communities, plant selection should be conducive to improving water quality and adapting to local environment.



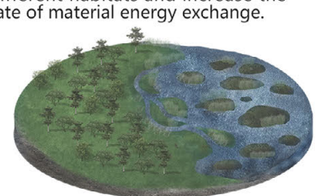
Change the shoreline of the lake to make it more zigzagging to create different habitats and increase the rate of material energy exchange.



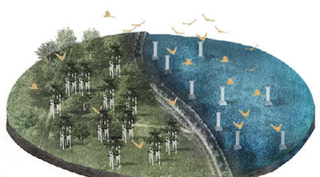
Design the **ecological dam** at the inlet to improve the water quality.



To design an **empty footpath**, give the plants enough Living space, to prevent them from absorbing water, sunlight, and air.

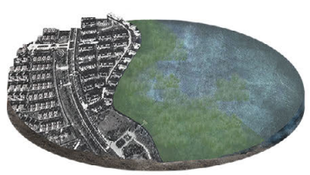


Different forms of **eco-floating islands** were established to create habitats.



Artificial bird nests were designed to give birds habitat at the beginning.

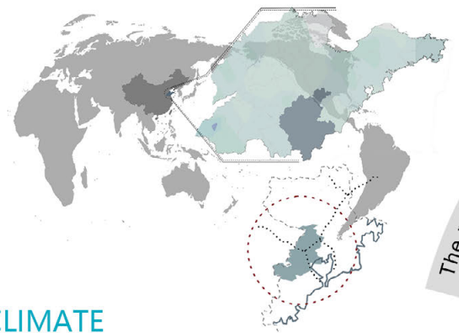
Microtopography are built in the field to allow animals to get the habitat of various terrains.



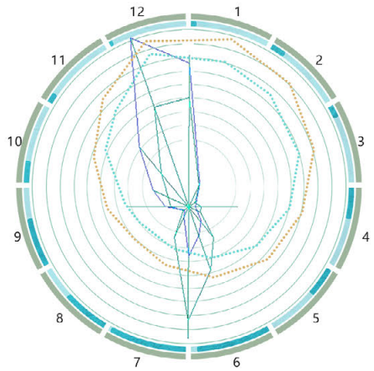
Transformation of hard bank into ecological form in residential area.

Design ecological fish ponds in suitable areas, improve ecosystems and increase economic returns.

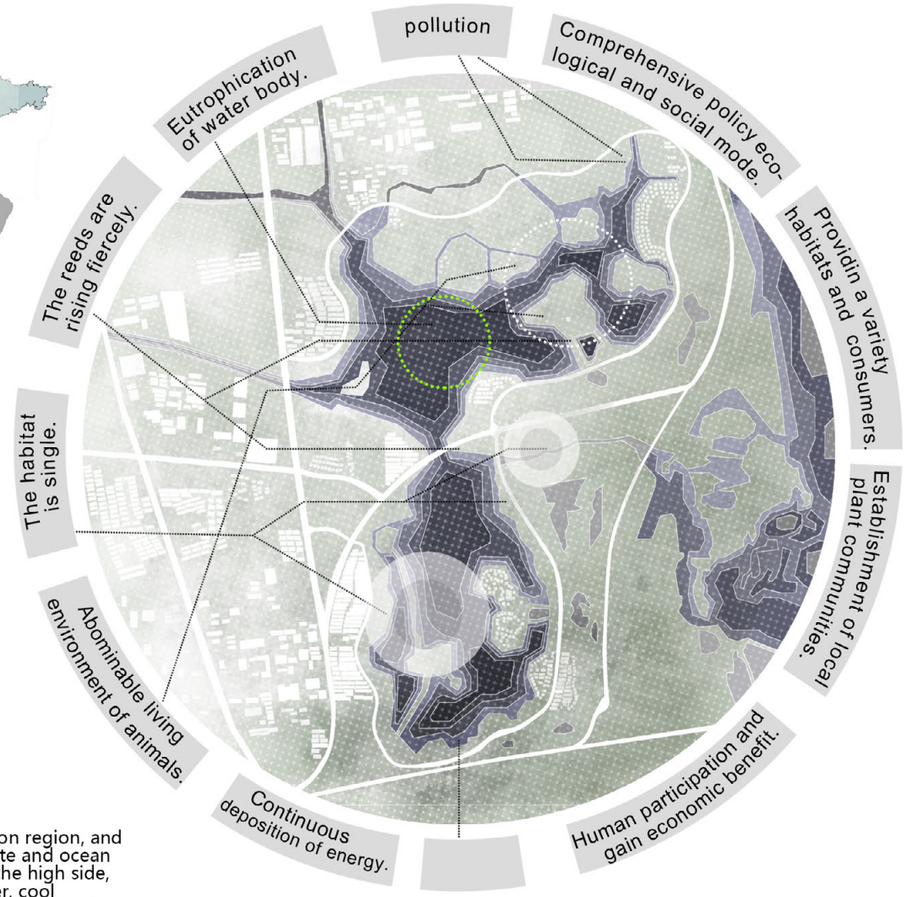
LOCATION



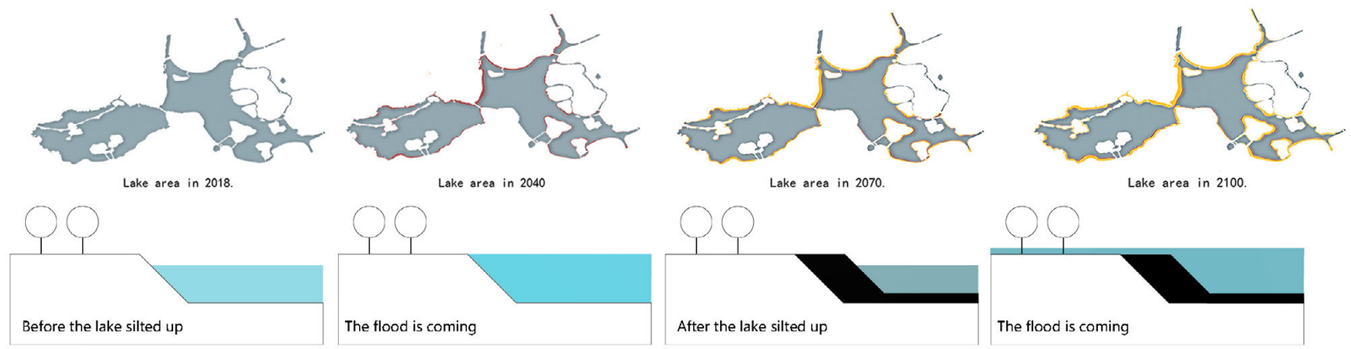
CLIMATE

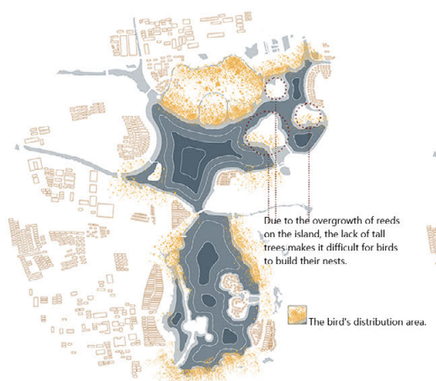


Qingdao is located in the north temperate monsoon region, and is close to the yellow sea, with the monsoon climate and ocean climate characteristics, winter air temperature on the high side, the spring thaw slowly, less hot weather in summer, cool autumn.Humid air, moderate precipitation, rain and heat in the same season, pleasant climate.

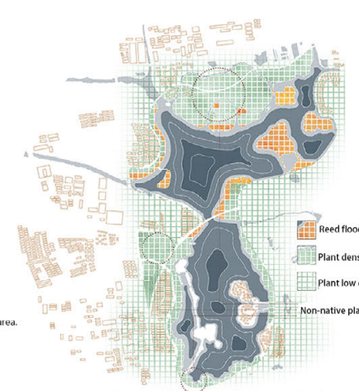


A sharp increase in silt





Distribution analysis of birds nest



Plant distribution analysis

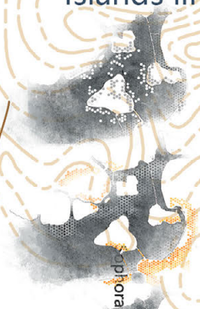
Analysis of building distribution of birds

Construction of terrain

The earth is transformed in a balanced way, and then it is impacted by water to form a natural floating island

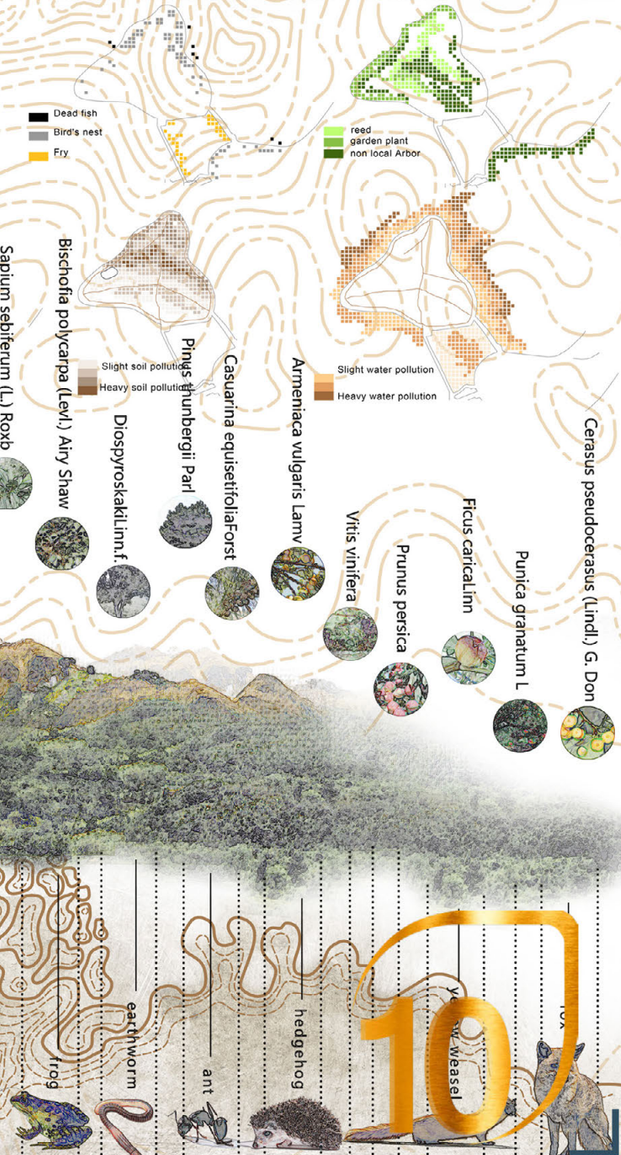
Floating island analysis

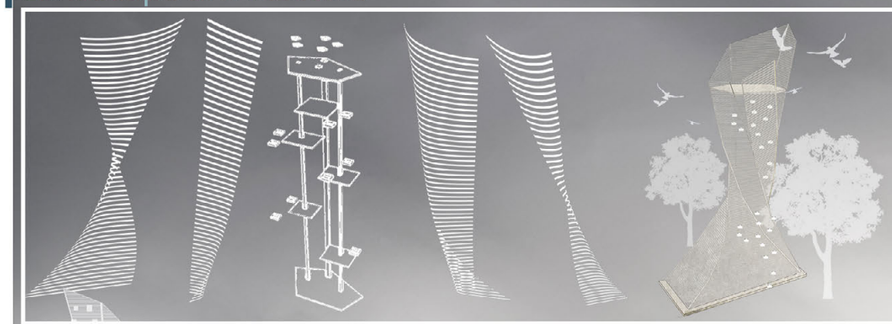
Islands link

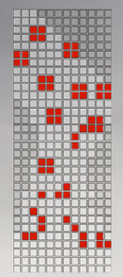


The five small islands on the north side of the wetland are not densely populated and the plants and birds grow well, but there are still some pollution and siltation, so the design focuses on the ecological restoration of the islands. We hope the islands will become a paradise for birds.

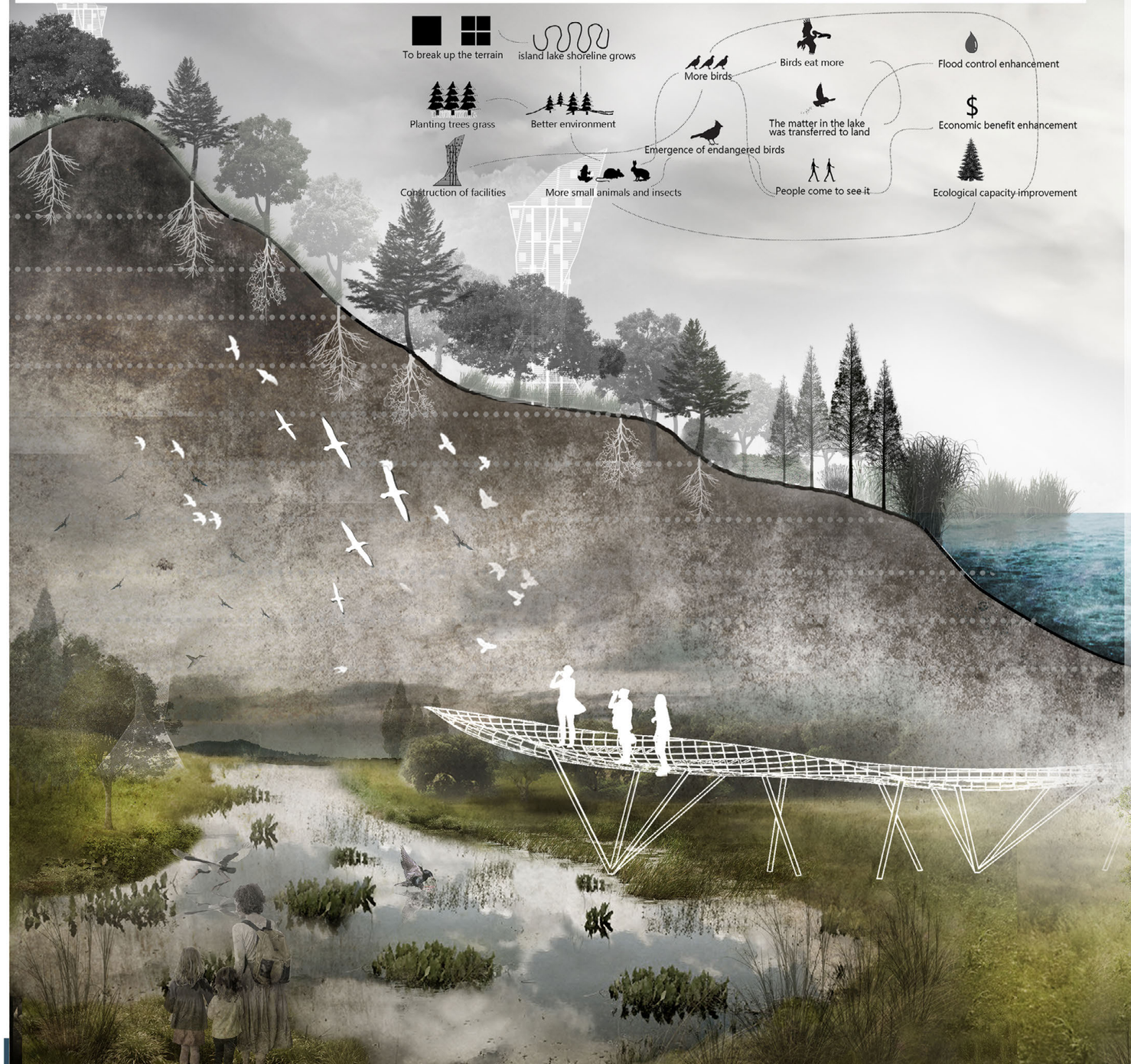
Present situation of the island







We have designed artificial bird nests, ranging from 5 to 10 meters high, to serve different birds. Artificial nests of different sizes are placed from low to high in the structure, temporarily replacing trees when plants are not growing up. The structure can become a temporary home for birds.



The habits of birds

Plant succession

In the early stages of ecological succession, we artificially induced the settlement of green herbs and shrubs.Small plant-eating herbivores can then be found on the site, as well as small insect-eating carnivores and small omnivores.The ecosystem of this period is relatively simple in composition and structure, and its function is not perfect enough.

The stable period of ecological succession, more creatures appear.Higher-level consumers such as weasels and foxes have begun to settle down, and the food web has become more complex.There are more birds than there were in the last period.Large Numbers of bird nests began to appear on trees.

In the middle of ecological succession, green trees began to appear and shrubs and herbs were no longer dominant species.More small herbivores and small carnivores and small omnivores have emerged, food webs have gone from simple to complex, and birds have begun to appear frequently-Birds began to nest and settle down.

The late stage of ecological succession is also the climax stage of succession.Ecosystem during this period, no matter on the composition and structure are complicated, formed between the biological specific relationship and the level of nutrition of the food chain, biological

Rest seats are designed at intervals along the walkway.

The shading canopy is designed in the trestle, and the shading shed can serve as the bird's nest platform.

Country / City	China
University / School	QingDao technological University
Academic year	3rd
Title of the project	Breathe Untrummeled
Authors	LiangWenrong,ZhangNan,WangHongyuan

10

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08028 Barcelona-Spain

TECHNICAL DOSSIER

Title of the project	Breathe Untrummeled
Authors	LiangWenrong,ZhangNan,WangHongyuan
Title of the course	Ecological restoration design of QingDao ShaoHai Wetland Park
Academic year	The third year
Teaching Staff	LiuSen,QiFei,ZhangYiping
Department/Section/Program of belonging	Landscape Architecture
University/School	QingDao technological University

Written statement, short description of the project in English, no more than 250 words

ShaoHai Wetland Park is an important part of network in DaGu river system in the JiaoZhou bay.It is the national largest wetland park dominated by city flood control functions , north China's largest artificial freshwater lake.Need to solve the flood threat, a perennial water-logging and flooding, whenever the DaGu river is high water level during the flood, the flood flow backward, DianZi river and YunXi river cannot pour out water and easy to form water-logging.

At the same time, water pollution can lead to eutrophication, reeds and other plants make silting fast.The measures in "Urban ecological rehabilitation programme" are not suitable for all venues.Invest much money, but outside species don't grow well, The ecological benefits are reduced instead.In order to improve the storage capacity of the site and make it more resilient,we design to dig silt in the center of the site and use it to build up floating island;Braid the ecological revetment, restrain the growth rate of the plant,Change the shoreline of the lake, avoid silt fast deposition;Construct underwater ecological landscape equipment, perfecting the ecosystem, improving water pollution, restoring the vitality of the lake and establishing a sustainable and stable ecological space;Develop suitable plants to attract people to participate in. People-oriented, focus on economic benefits.

For further information
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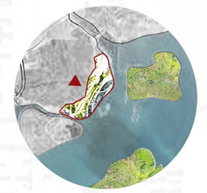
Consult the web page http://landscape.coac.net/

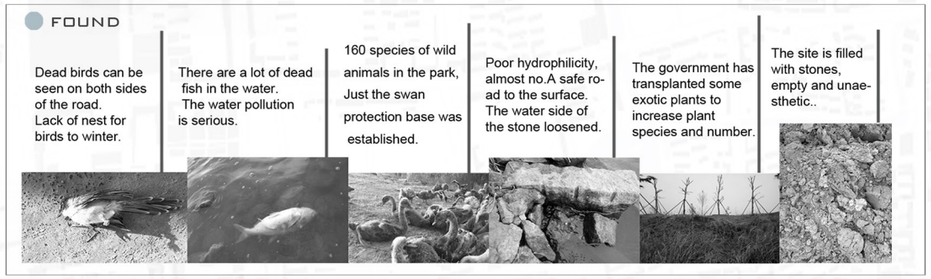
BREATHE UNTRAMMELED 1

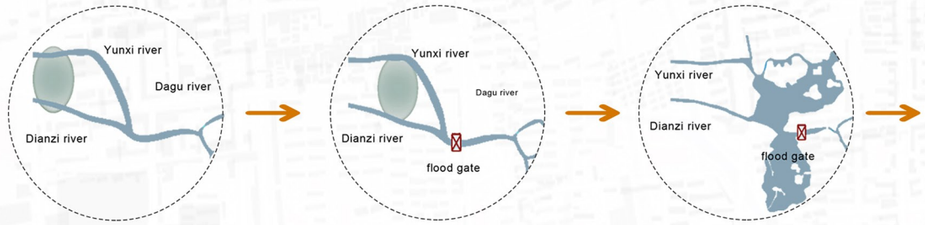
LOCATION

Qingdao Jiaozhou Shaohai Wetland Park is located at No. 1, Hong Kong Road, Jiaozhou, Qingdao, Shandong Province. National 4A tourist attraction.



FOUND





FLOOD

Shandong Shaohai National Wetland Park, formerly known as the detention basin, is located in the east of JiaoZhou city, and belongs to the mouth of dagu river downstream in JIAOZHOU city.

It is plagued by waterlogging and seawater back irrigation all the year round.,during the flood discharge at high water level and high tide level of Dagu river, the water can not be drained, so it is easy to form waterlogging.

SERVICE

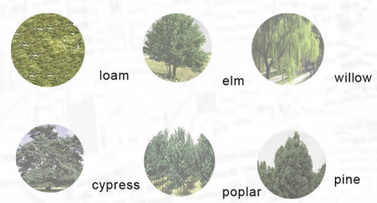
INFRASTRUTURE

The site is empty and many facilities are needed.

NON-INFRASTRUCTURE

Large reeds can create economic value and attract consumers.
Serve people.It happens that problem with the reeds: some reeds are
so high that affect people's proximity to the water which need to fix.

SOIL



A large area of water in the eastern part of the city has kept floodwaters stuck in the area of the flood detention-area, so formed a salt marsh.
The surface soil in the detention area is generally loam or clay, the soil structure is loose and the grain is small.

RESEARCH PROCESS

GO TO DESTINATION

RESEARCH DESTINATION

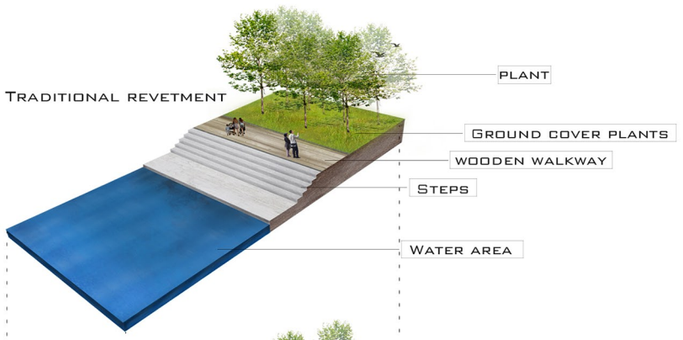
OBSERVING THE VENUE

RECORD DATA

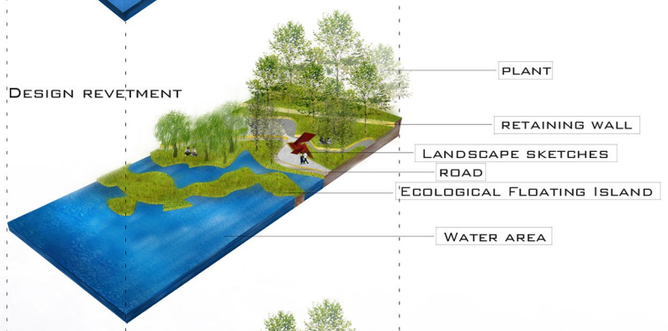
RECORD PLANT

10

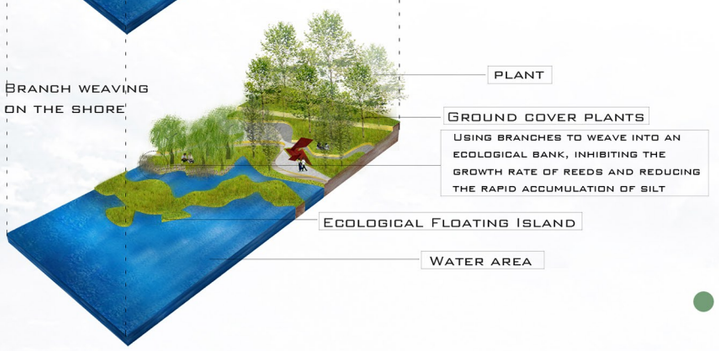
MEASURE2



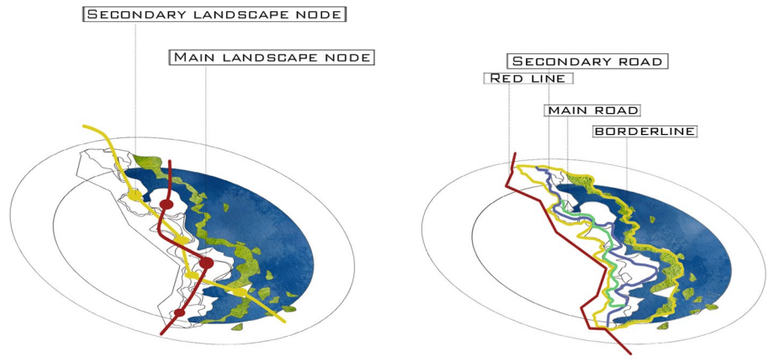
TRADITIONAL REVETMENT

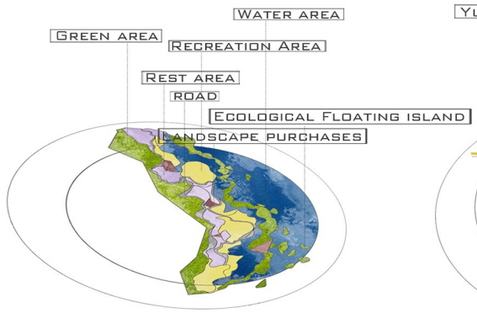


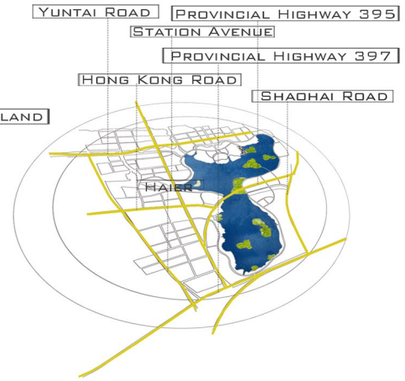
DESIGN REVETMENT



BRANCH WEAVING ON THE SHORE



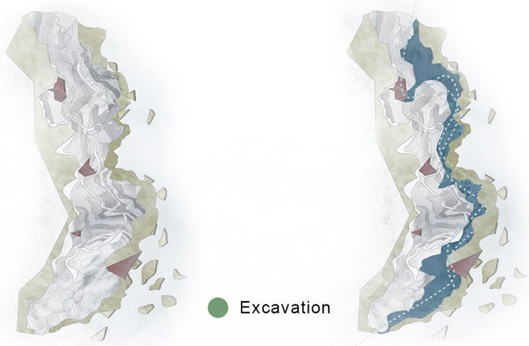




FLOOD PROTECTION

The main problem of flooding the site, and for the defense against floods, makes the site more flexible, mainly through two means. First, the excavation of small water areas is equivalent to the increase of water storage area; Second, the settlement of silt in the site, increase the storage of water ability.Ability to make the venue more flexible

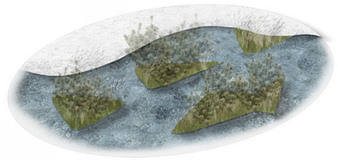
MEASURE1



Not excavated

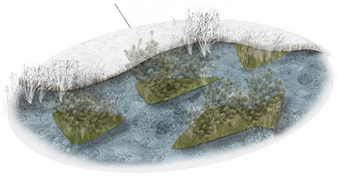
Excavation

MUD FLOATING ISLANDS ICON

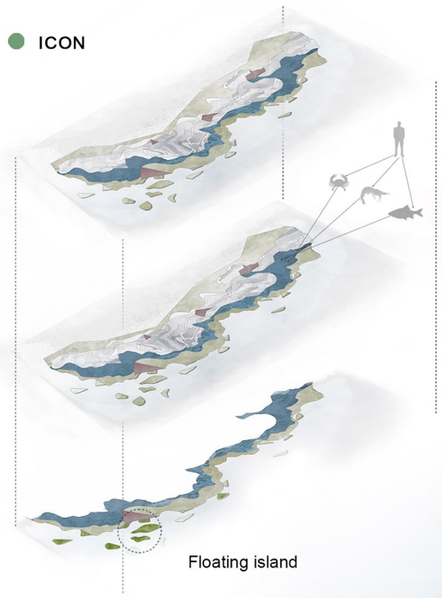


ECOLOGY WEAVE SLATS FOR WEAVING

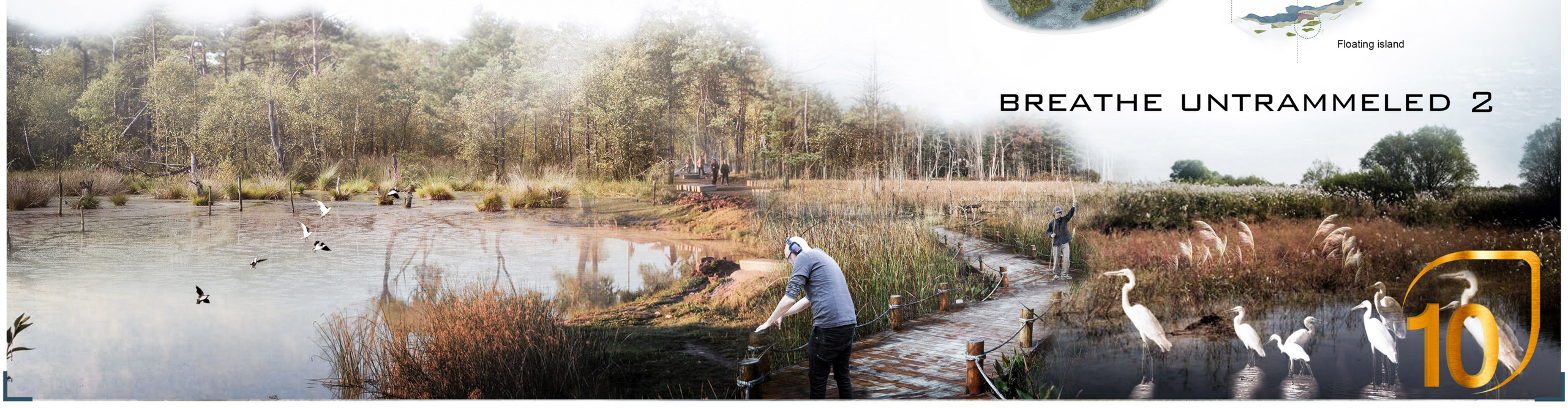
Ecological branch reeds



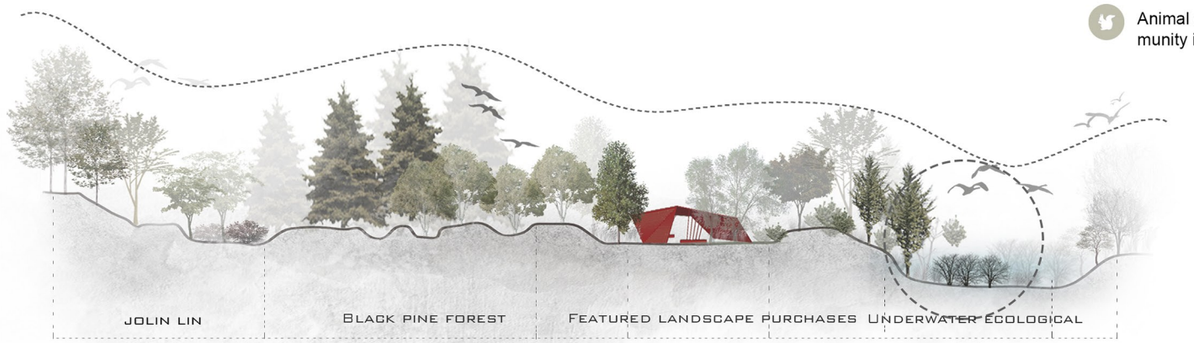
ICON



Floating island

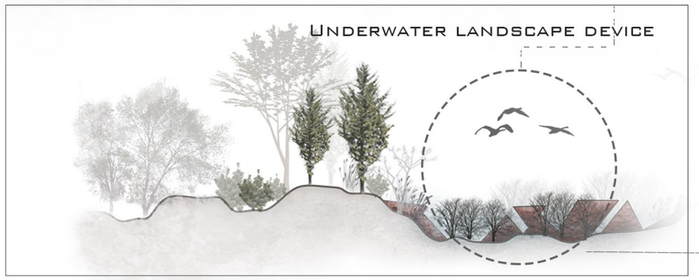


BREATHE UNTRAMMELED 3



The ecological landscape device adopts special waterproof materials and is placed in water. With the ebb and flow of water, different landscape effects will emerge, which will stimulate the desire of tourists to see and increase the participation of the people;

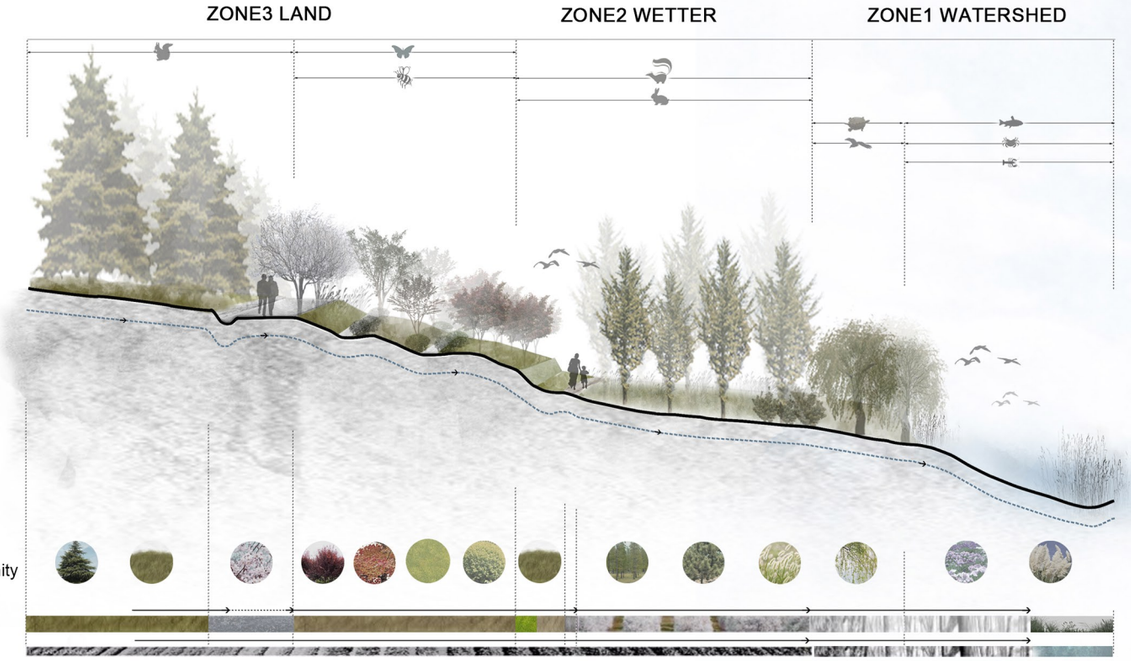
secondly, the ecological organic materials in the materials can increase. Oxygen exposure to avoid sludge build-up due to eutrophication of plants and reduced water storage capacity



Animal community icon

Plant community icon

Rock layer



According to the plant species, as well as the different geology to introduce suitable animal species. The water area can produce certain economic benefits by raising fish, shrimp and crabs, and at the same time it can bring out a silt and increase water storage capacity. Regions 2 and 3 can attract some squirrels, weasel and other animals, increase species diversity, and the ecosystem will also More stable.

Plants that choose native species cannot introduce foreign species too much. On the contrary, they will waste a lot of money and will not get the corresponding landscape effect. At the same time, the plants can be planted according to the preferences of the introduced animals, and the animals will only survive and the ecological structure will be stable. If the reeds grown in the waters grow too fast, some handicrafts can be produced by the reeds, and the participation of the people will increase correspondingly.

Ecological weaving wicker twigs can be used around the revetment to suppress the excessive speed of reeds and prevent the silt from accumulating too quickly

DESIGN DESCRIPTION:

The fold line revetment is used to cut the curved line shape of the original bank. The structures on roads are in line with a triangular floating island which accumulate by silt . The floating island is planted with multiple types of plants, and consumers at all levels are introduced to improve the ecosystem.Improve the stability. The plants on the revetment weaken the sharpness of the zig-zag line, and the revetment was woven with branches to inhibit the growth of plants such as reeds. Design aims to improve the water storage capacity by silt and make the site more resilient to floods.

Country / City	China
University / School	Qingdao Technological University, Architecture and Urban Planning College
Academic year	3rd
Title of the project	The Circle of Life-Ecological Restoration of Shaohai Wetland
Authors	Wenli Yu, Xiaoming Zhong, Mengjiao Zhang, Xiaoxia Yang

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Avenida Diagonal, 649 piso 5
08028 Barcelona-Spain

TECHNICAL DOSSIER

Title of the project	The Circle of Life-Ecological Restoration of Shaohai Wetland
Authors	Wenli Yu,Xiaoming Zhong,Mengjiao Zhang,Xiaoxia Yang
Title of the course	Landscape Planning and Design II
Academic year	3rd
Teaching Staff	Sen Liu,Fei Qi,Yiping Zhang
Department/Section/Program of belonging	Landscape Architecture
University/School	Qingdao Technological University,Architecture and Urban Planning College

Written statement, short description of the project in English, no more than 250 words

Jiaozhou is close to Huanghai. During the rainy season, the tides backflow makes it easy to flood. The Shaohai wetland is a city flood-control wetland. Since 2006, the government has invested nearly 700 million yuan to develop it, leading to a large number of fishermen lost their home.

However, excessive investment is harmful to Shaohai. Severe water pollution causes the reeds growing wildly and the death of creatures. Organic matter can't be consumed timely and silt accumulates too fast, so the flood-control function is weaker and weaker.

The results of several investigation have proved that the only way to save shaohai wetland is return to nature. We design ecological dam to lead water to impact and form a wetland. Then we design floating-island and establish the land-wetland- dam-floating island multi-level purification system to improve the water quality and increase the biodiversity. Finally breed mussels in wetland to purify water, and develop pearl economy and ecological tourism to bring income and jobs to relocated-fishermen. Landscape is not a weapon to against nature but a language to communicmate with nature. Landscape design should return to nature.

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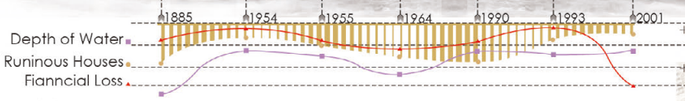
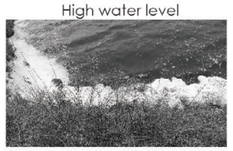
History



Problem

High water level

Scarce vegetation

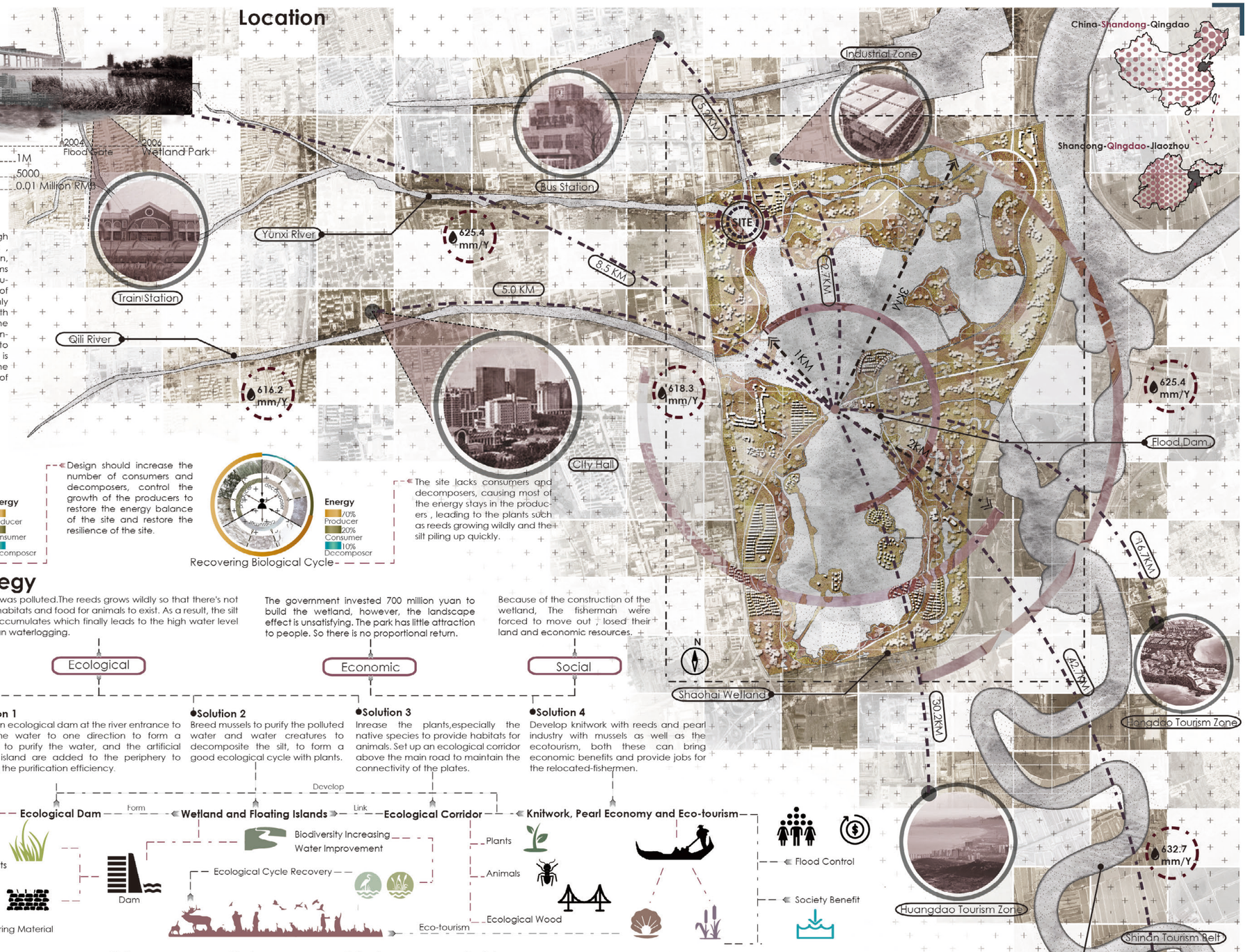


Water pollution

Biological death

Shaohai wetland has high water level all the time , and the water pollution, reed growing problems lead to constant accumulation of silt, the thickness of the silt increased 2mm only within a year, with creatures death at the same time, the environment continues to deteriorate. So it is necessary to restore the ecological environment of the site.

Location



Concept

Ideal Biological cycle

The ideal ecological cycle should meet the energy balance between the producers, consumers and decomposers to keep the balance of biomass.

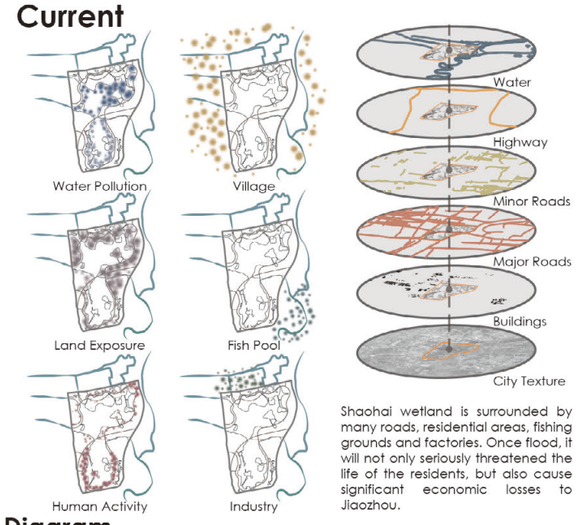
Current Biological Cycle

Design should increase the number of consumers and decomposers, control the growth of the producers to restore the energy balance of the site and restore the resilience of the site.

Recovering Biological Cycle

The site lacks consumers and decomposers, causing most of the energy stays in the producers , leading to the plants such as reeds growing wildly and the silt piling up quickly.

Current



Shaohai wetland is surrounded by many roads, residential areas, fishing grounds and factories. Once flood, it will not only seriously threatened the life of the residents, but also cause significant economic losses to Jiaozhou.

Strategy

The lake was polluted.The reeds grows wildly so that there's not suitable habitats and food for animals to exist. As a result, the silt rapidly accumulates which finally leads to the high water level and urban waterlogging.

The government invested 700 million yuan to build the wetland, however, the landscape effect is unsatisfying. The park has little attraction to people. So there is no proportional return.

Because of the construction of the wetland, The fisherman were forced to move out , losed their land and economic resources.

Ecological

Solution 1
Design an ecological dam at the river entrance to guide the water to one direction to form a wetland to purify the water, and the artificial floating island are added to the periphery to increase the purification efficiency.

Solution 2
Breed mussels to purify the polluted water and water creatures to decomposite the silt, to form a good ecological cycle with plants.

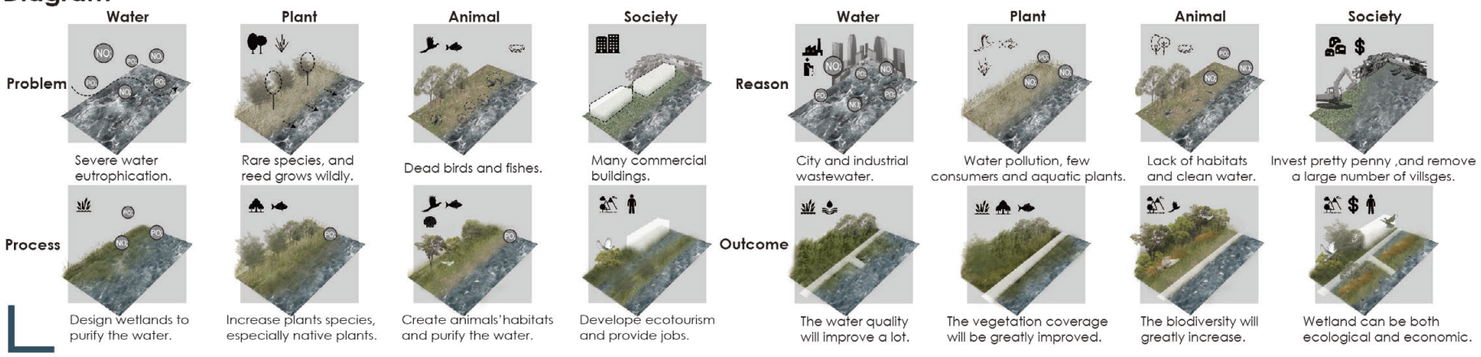
Economic

Solution 3
Inrease the plants,especially the native species to provide habitats for animals. Set up an ecological corridor above the main road to maintain the connectivity of the plates.

Social

Solution 4
Develop knitwork with reeds and pearl industry with mussels as well as the ecotourism, both these can bring economic benefits and provide jobs for the relocated-fishermen.

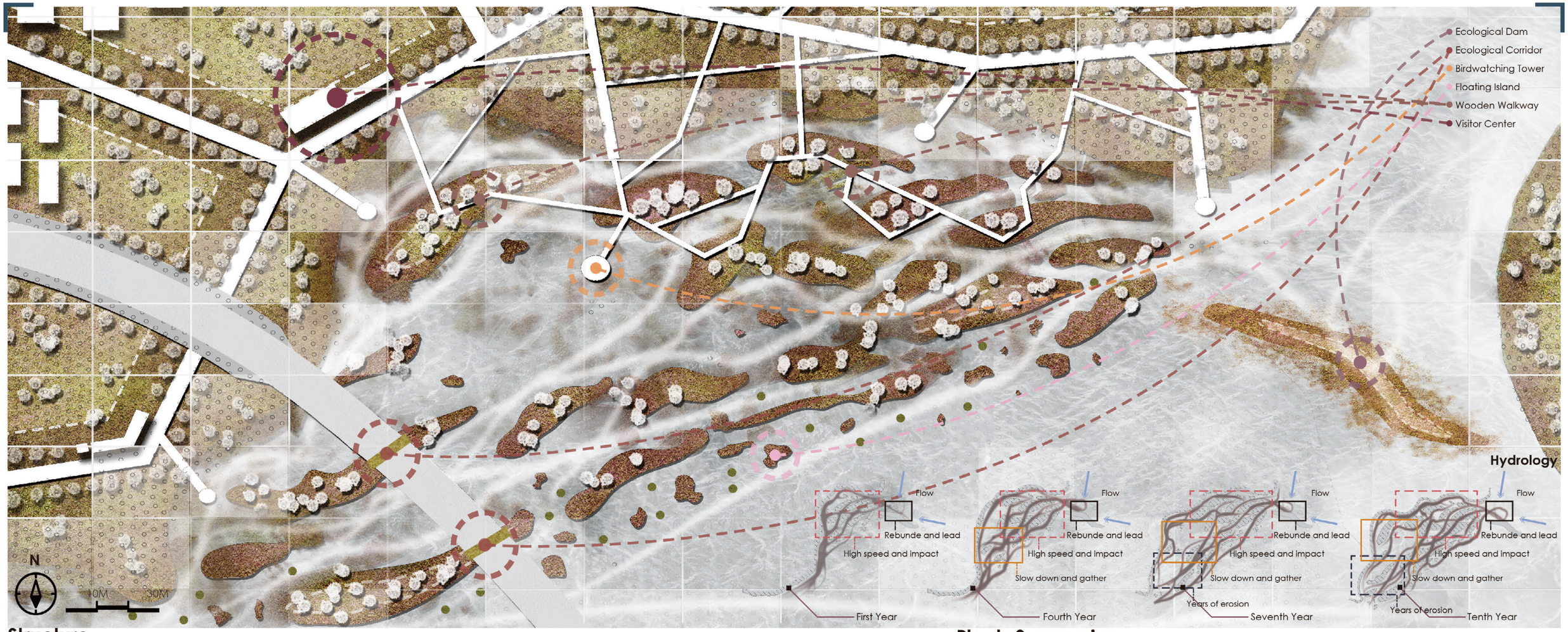
Diagram



Introduction

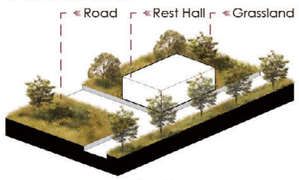
The wetland is a city flood control wetland. In 2001, the flood caused an economic loss of 120 million yuan,and made more than 30 foreign companies withdraw investment , brought huge losses to Jiaozhou.Since the government has invested nearly 700 million yuan to develop it, leading a large number of fishermen lost their land.However, excessive economic investment is harmful to Shaohai in fact. Severe water pollution ,growing reed, animals' death,and silt accumulation make it weaker and weaker.

so we come up with the solution. we can establish the land-wetland-dam-floating island multi-level purification system to improve the water quality and increase the biodiversity to restore the wetland's ecology. Then we breed mussels in wetland to purify water as well as developing pearl economy which can bring economic income and jobs for the relocated-fishermen. Finally, we can restore the ecological resilience of the site and build a social - economic - and ecological resilience cycle.



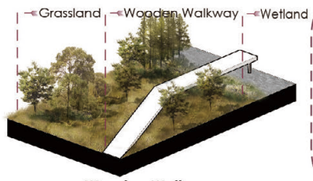
Hydrology

Structure



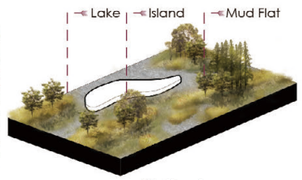
Road

The land system is connected with the wooden walkway, and the buildings are built for people to rest, such as tourist center and leisure pavilion.



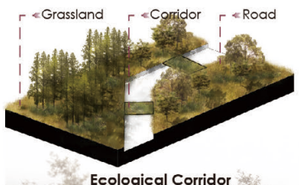
Wooden Walkway

An wooden walkway is connected with the land road above the wetland, and the viewing platform and birdwatching tower are set up. Reduce the impact of human activities to wetland while ensuring visitors experience.



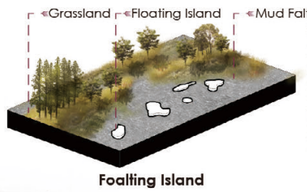
Wetland

Through the artificial filling and the natural impact of water to form large wetland islands, increase vegetation species and habitats, enhance the site's ability of water purification.



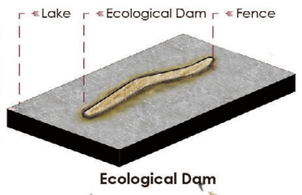
Ecological Corridor

Above the road through the wetland, the ecological corridors are set up with local timber to ensure the connectivity between the patches in the landscape ecology and prevent the fragmentation of biological habitats.



Foalting Island

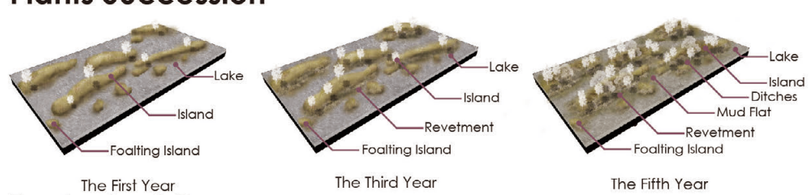
Artificial floating islands are designed on the periphery of wetlands to form the intermittent boundary, and the floating islands use water purification plants and simple aeration devices to greatly increase the efficiency of water purification.



Ecological Dam

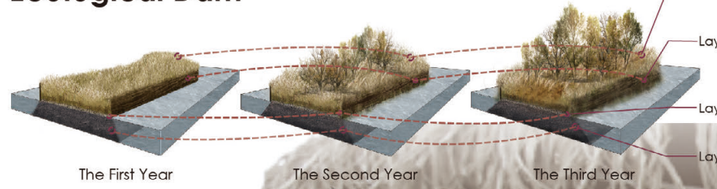
An ecological dam is set up by the main water inlet. The fence surrounding the plant is formed by willow. The ecological dam can lead flow direction as well as purifying the water, so that the water flows gather to form a wetland.

Plants Succession



Plants' species are increased by artificial seeding, through the natural transmission of plants to increase the vegetation coverage, then form good landscape, and provides livable habitats for animals.

Ecological Dam



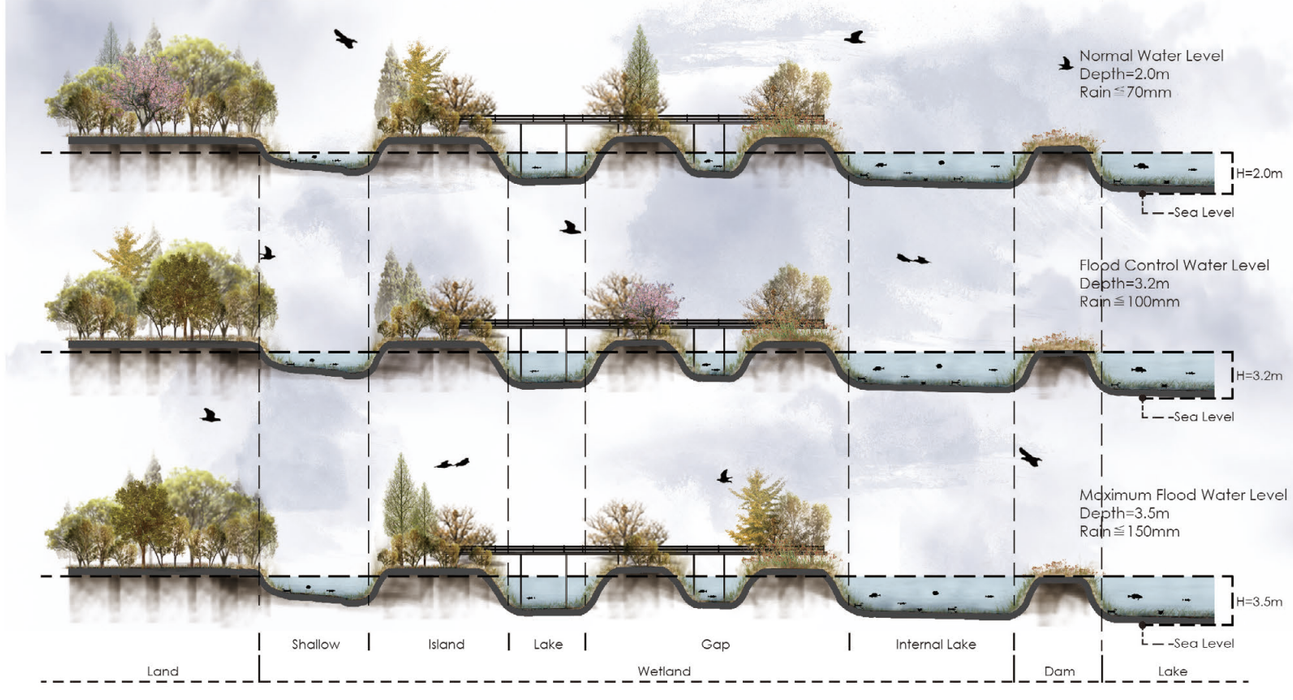
Plant reeds, calamus, canna and other plants inside , to make them grow naturally.

The fence is made of willow branches, which can keep the water permeable and prevent reeds from growing.

Use gravel and other debris to fix the plants while filtering the water's impurities.

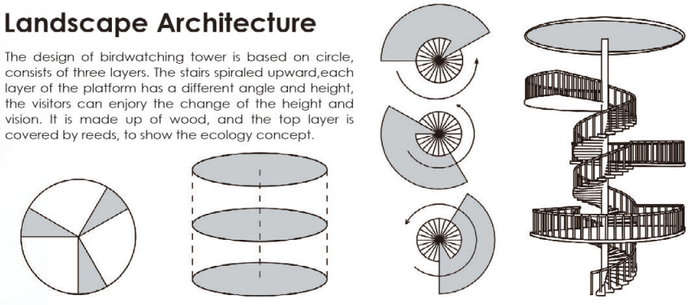
Use abandoned silt to build up the basement, and provide a environment for plants.

Water Level



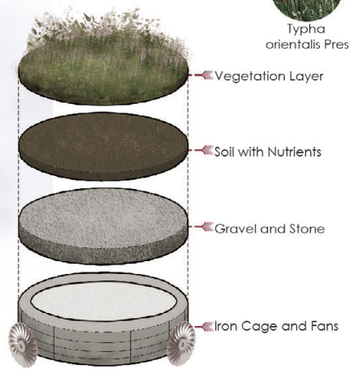
Landscape Architecture

The design of birdwatching tower is based on circle, consists of three layers. The stairs spiraled upward,each layer of the platform has a different angle and height, the visitors can enjoy the change of the height and vision. It is made up of wood, and the top layer is covered by reeds, to show the ecology concept.



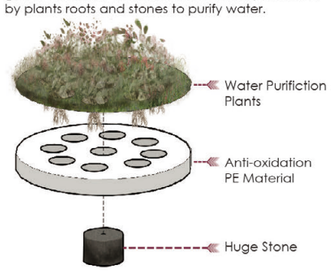
Step 1 Step 2 Step 3 Step 4

Floating Island

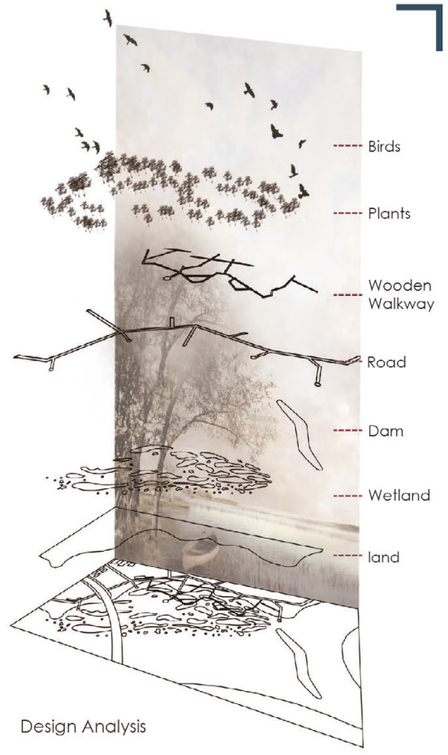


Type 1

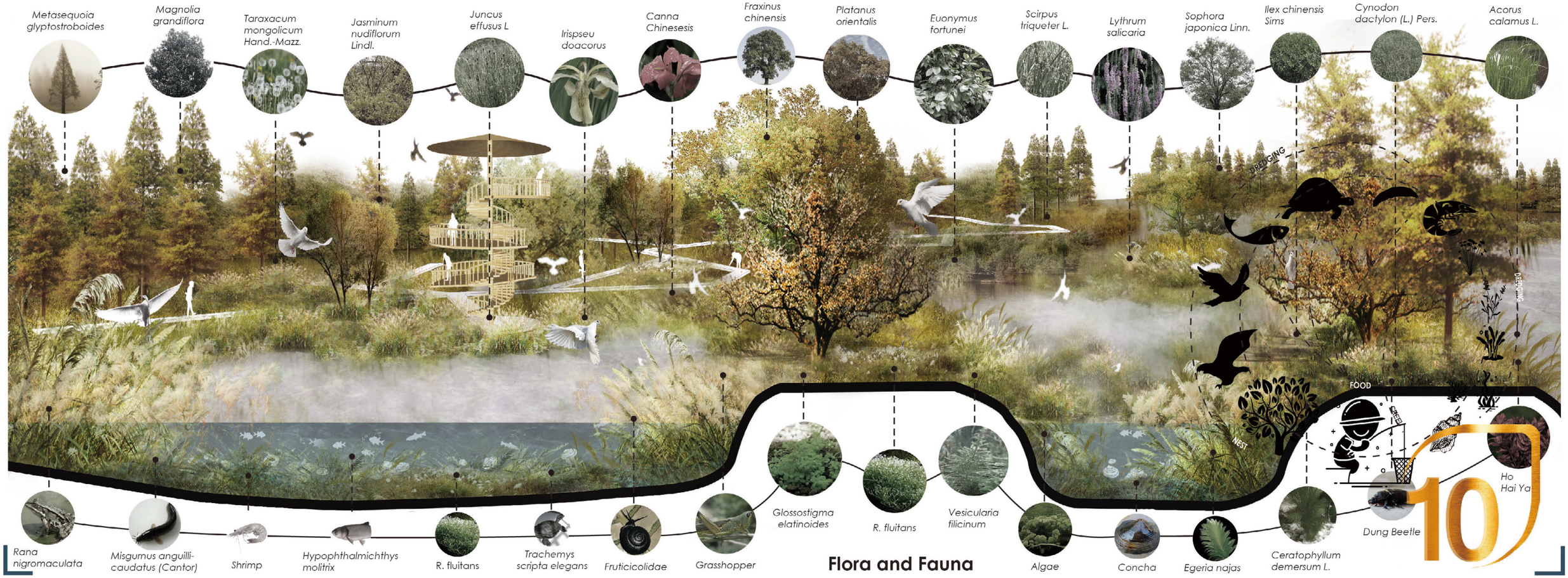
Combine the plants and antioxidant flooring, or gravel and fans, use natural antibiotics produced by plants roots and stones to purify water.



Type 2



Design Analysis



Flora and Fauna

Country / City	Qingdao China
University / School	Qingdao University of Technology
Academic year	2017-2018
Title of the project	Mountain Reservoir:Flood Prevention,Water Storage,Mountain Restoration
Authors	Sun Shiping,Wang Mixue,Jiang Yanlin,Yuan Liyun,Liu Xinhe

PERFORMATIVE NATURE

Barcelona International Landscape Architecture Biennial

September 2018 Barcelona

SCHOOL PRIZE

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Máster d'Arquitectura del Paisatge -DUOT - UPC
ETSAB- Escola Tècnica Superior
d'Arquitectura de Barcelona
Avenida Diagonal, 649 piso 5
08028 Barcelona-Spain

TECHNICAL DOSSIER

Title of the project	Mountain Reservoir:Flood Prevention, Water Storage, Mountain Restoration
Authors	Sun Shiping,Wang Mixue,Jiang Yanlin,Yuan Liyun,Liu Xinhe
Title of the course	Landscape Planning and Design
Academic year	2017-2018
Teaching Staff	Liu Sen,Qi Fei,Zhang Yiping
Department/Section/Program of belonging	College of Architecture and Urban Planning
University/School	Qingdao University of Technology

Written statement, short description of the project in English, no more than 250 words

Mountain Fu is located in Qingdao, Shandong, China, north of the Yellow Sea. The top of the mountain is full of fog and air humidity, but there are problems of soil erosion and drought. At the same time, the serious destruction of vegetation is due to historical reasons and artificial quarrying. Cause the fact that precipitation in Qingdao is mostly concentrated in July and August, it is prone to flooding in summer and drought in other seasons. The phenomenon threatens the safety of surrounding residents.

The issues that need resolving: First, Incomplete plant community and poor water storage capacity. Second, The effect of the interception of vegetation is poor, and the flood season is prone to flood disasters. Third, Residents who have been displaced because of the destruction of the mountain environment have always wanted to relocate their homeland.

Our design idea: First of all, use water collection devices to collect the vapors from mist and tidal winds for plant growth and groundwater recharging.After that planting pioneer species to restore vegetation, attract animals, improve biodiversity, and form a complete food chain.Then establishing urban farms to provide conditions for residents to return.Finally the complete ecosystem has improved the flood control and storage capacity of Mountain Fu. Then it becomes a huge reservoir. During the rainy season, water can be stored to prevent floods. During the dry season, the reservoir provides water to relieve the drought.

For further information
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Consult the web page http://landscape.coac.net/

History

in the Cretaceous
Mountains Fu formed by some plate movement

in the 1600
The mountain is named "Mountains Fu "

in the 1953
A large number of Quarry is built in the mountain fu

in the 1995
Urban development rapidly around the mountain fu

now
The mountain was destroyed

Problems

Most of the water intakes are close to dry, with only a small amount of water but very little water.

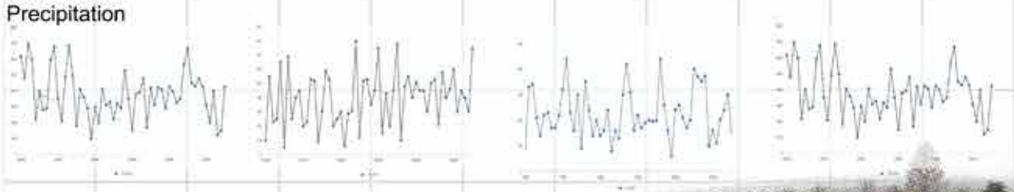
There is more rain in summer, and the soil and water loss due to vegetation destruction.

Due to the presence of quarries, large areas of vegetation have been damaged and exposed.

The discharge of domestic sewage industrial wastewater leads to serious pollution of water storage.

The stone pits and rock walls left behindby the quarry severely damaged the landscape.

Precipitation



Development trandence

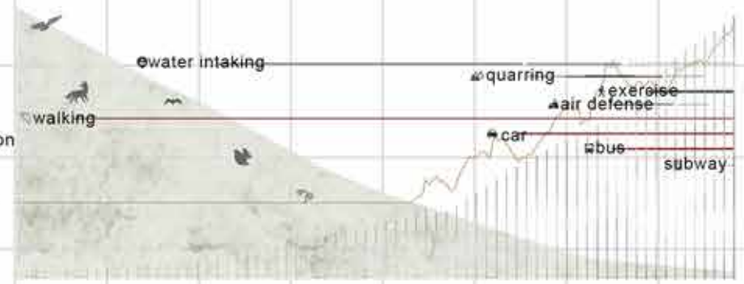
Ecology

Activity

Transportation

House price

Population



Vegetation system status

Distribution status of Bare rock

Distribution status of Meadow

Distribution status of Bush

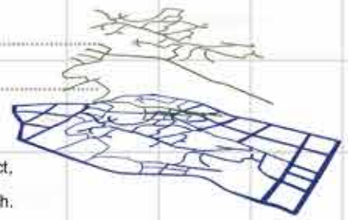
Distribution status of Trees

The richness and coverage of vegetation are not enough to support a completeecosystem. due to the lack of some types of vegetation, some or some parts of the ecological cycle are defective, which leads to more serious soil erosion, destruction of mountains and finally turns into a vicious cycle.

Road system status

Distrubution status of Climbing road

Distrubution status of Ring road



The content of the road system seems to be perfect, but in fact climbing roads obviously lack security protection measures and accessibility is not enough.

Location

Hdrology system status

The ponds and reservoirs that will not disappear at any time stay around the mountain Fu.

the flooding talways occur in summer that is hot and rainy.Because of imperfect ecosystem soil iseasily flushed by surface runoff that has accumulated in a short time to form floods.

Intention to change

Natural rain garden

Year 0

The low vegetation coverage of the mountain resulted in poor water storage.

Year 5

Gradually establish a complete ecosystem by planting pioneer trees.

Year 10

Small shrubs become dominant species, and their water conservation ability is enhanced.

Year 15

Natural grassland becomes a rain garden,reducing the surface runoff and storing water.

Urban farm

Year 0

Exposed rock
sparse vegetation
incomplete ecological cycle

Year 5

The water provided by the water collecting device makes the herb grow fully.

Year 10

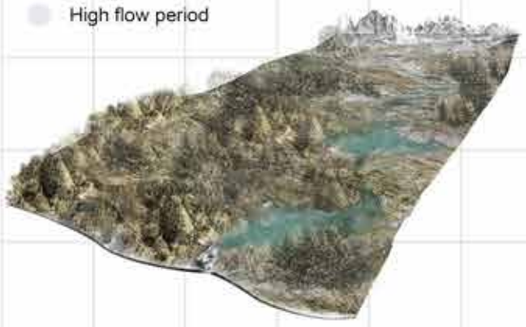
The environment has improved, and farmers returning to the area need farms to maintain their lives.

Year 15

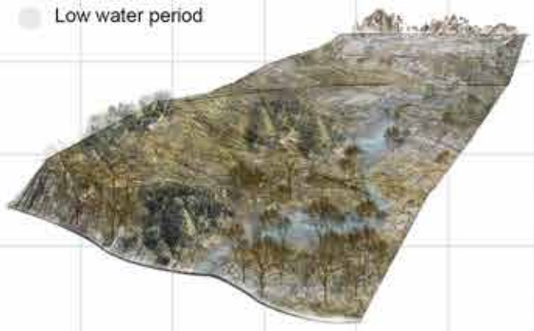
Urban farm with complete ecosystem also improve Social and economic benefits.

Axonometric

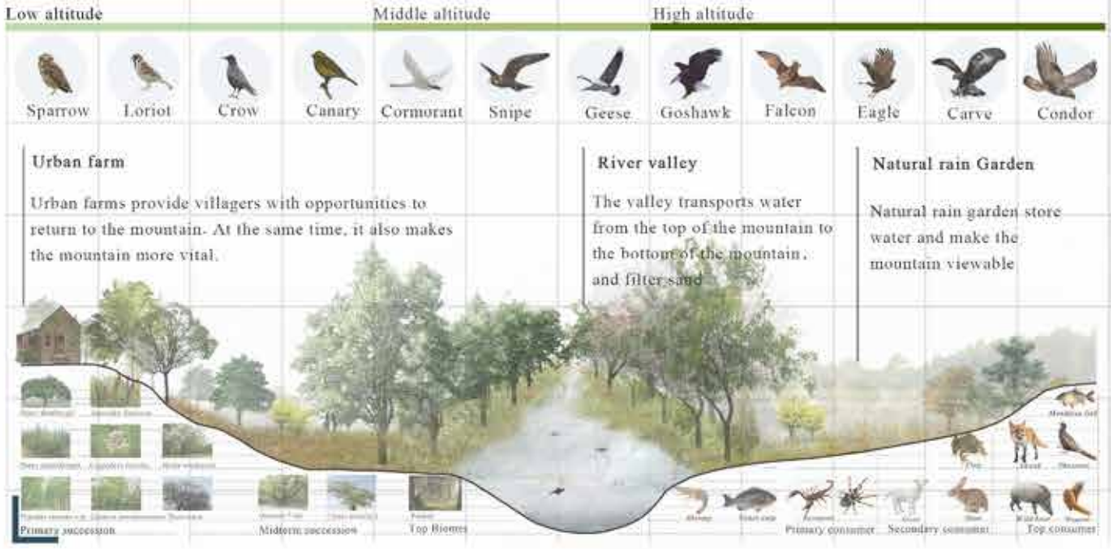
High flow period



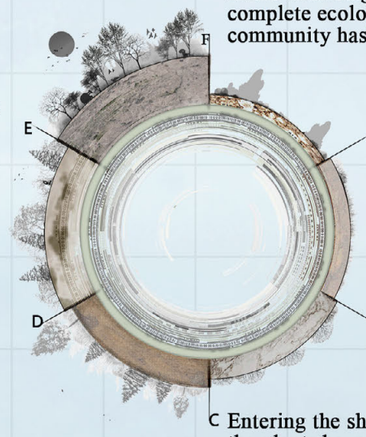
Low water period



Food chain Ecosystem



Vegetation Succession



In the final stage, the most complete ecological community has been formed.

The stress tolerant species occupied the top of the canopy.

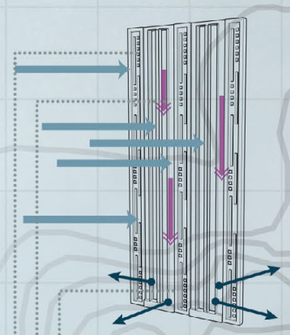
The rock exposed.And the ecological deterioration of Mountain Fu is serious.

The community level differentiates into herb, shrub and tree layers.

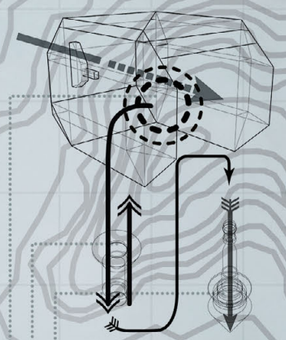
Herbs predominate usually lacks obvious hierarchical.

Entering the shrub stage, the plants have a stronger ability to retainwater.

Water collecting device

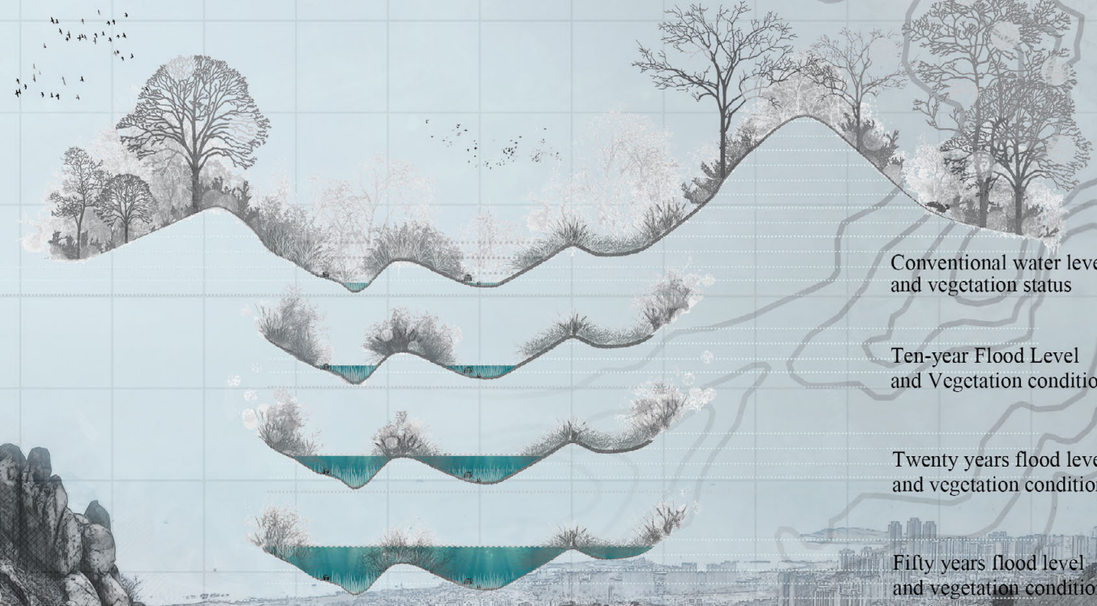


Mist nets collect water from tidal winds and
Condensation in the pipeline using
Infiltration of soil, growth of arch plants



Inhalation of tidal winds and mists for compression
Condensate in the pipe and filter it initially
Store condensate for use in the dry season

Flood submerged



Conventional water level and vegetation status

Ten-year Flood Level and Vegetation conditions

Twenty years flood level and vegetation conditions

Fifty years flood level and vegetation conditions