FLOURISHING ALONG WITH WATER

LANDSCAPE NETWORK ENHANCEMENT PLANNING IN ZHUJI, ZHEJIANG UNDER WATERSHED PERSPECTIVE

PROJECT STATEMENT

The project explores the feasibility of regional planning from a watershed perspective. The planning area is located in Zhuji, Zhejiang Province, China, and belongs to the middle reaches of the Puyang River basin, with a total area of approximately 2,311 square kilometres. Hills, lakes and ponds, and fertile farmland together form the natural base of Zhuji, forming a resource pattern of "seven hills, one water, two fields". The project takes the watershed as a spatial unit, and regards the water conservancy system as a natural bridge connecting ecological and humanistic elements, and a critical corridor for realising regional land and water linkage.

The project proposes an effective operational framework for watershed spatial planning: firstly, to construct a regional landscape network based on the water conservancy system; secondly, to identify and optimize the linkages and critical spots of scenic, agriculture, and settlement under the watershed perspective; and finally, to delineate the watershed unit, implement the landscape network and critical spots into specific spaces, and construct a project pool for future construction. The project reconstructs the regional linkage network, effectively unites regional components, reshapes the regional landscape characteristics, and provides meaningful references for watershed spatial governance.

PROJECT NARRATIVE AND CONTENTS

PROJECT BACKGROUND

Zhuji, Zhejiang Province of China is located in the middle reaches of the Puyang River basin, with a total area of about 2,311 square kilometres. The Puyang River is known as the "Little Yellow River" of Zhejiang, and has been diverted many times in history. Currently, the main branch of the river spans 67.60 kilometers within Zhuji, encompassing a basin of 2,183.9 square kilometers, which constitutes nearly 94.5% of the city's geographical expanse. Hills, lakes and ponds, and fertile farmland together form the natural foundation of Zhuji, forming a "seven mountains, one water and two fields" resource pattern, which has nurtured rich scenic, agricultural and cultural resources.

By examining the natural environmental changes, demographic changes, floods and the construction of water conservancy facilities in Zhuji over the past two millennia, it is evident that the city's history has been characterized by recurrent flooding. In its early days, people built dykes in small areas, reclaimed lakes, and developed irrigation technology. 400 years ago, the westward flow of the Puyang River lexacerbated flooding in Zhuji, which in turn generated a wealth of mature and extensive knowledge in water management and a complex, well-developed water conservation system. In summary, water safety has consistently affected the ecological environment and human development in Zhuji, and water management has always been the theme of Zhuji's historical development.

By analysing the spatial patterns of the eight time slices in the past 400 years, it is evident that the space of the watershed is based on ecological resources such as hills, fields, lakes and rivers, and that its evolution starts from the shaping of the natural water system, followed by the transformation of water conservancy projects, and is finally shaped by land cultivation and settlement construction. Therefore, water and water conservancy, as a natural link between various ecological and human elements, is the driving force of watershed development.

In the context of China's ecological civilisation era, the internal logic of integrated regional development needs to be thought of more from the perspective of natural ecosystems. The watershed, as a complete and independent natural unit of the water cycle and its accompanying processes, has become an important carrier for the construction of ecological civilisation. In addition, planning with watersheds as spatial units will better reflect the integrity of ecosystems and promote the harmonious development of man and nature. Therefore, Zhuji will serve as a pilot for watershed planning. The project considers watershed as a holistic area of water and land linkages , containing significant ecological and cultural corridors and critical spots. The project proposes an operational framework for effective regional planning from a watershed perspective and, based on it, an action plan for future development to enhance the overall landscape of the watershed.

FRAMEWORK AND STRATEGY

The plan aims to promote regional spatial governance based on the natural water system, using the water conservancy system and the old post roads as corridors, linking the three types of patch space of scenic, agriculture, and settlement. The operation is divided into the following three steps:

STRATEGY1: Landscape Network Construction

The plan constructs a regional spatial network relying on the water conservancy system by identifying various water conservancy elements in the region. By integrating the characteristic elements of roads, scenics, agriculture, settlements in the region, the plan builds a characteristic roads network, including the ancient road exploring route based on history, nature perceiving route based on scenic, farming sightseeing route based on agriculture, cultural studing route based on settlement. Eventually a multi-level nested watershed landscape network linking watersheds is formed

STRATEGY2: Critical Spot Optimisation

Identify Critical Spot in Corridor and patch space that are closely related to river and water conservancy and watershed development, explore their spatial cultural and formal characteristics, and propose targeted optimisation measures. In the water conservancy system, dam space can be optimised as a slow traffic system; hydraulic facilities can be converted as comprehensive service hubs; river bifurcation can be upgraded to landmark ecological-cultural nodes; and important historical water systems can be restored to improve the connectivity network while highlighting their historical and cultural values. In the scenic system, mountain pass nodes can be further strengthened; high-quality mountains, lakes and wetland periphery can be optimised and upgraded to enrich the perception of natural landscapes. In the agricultural system, the territorial agricultural texture such as Lakes and terraces can be upgraded into an ornamental agricultural landscape; the characteristic agricultural irrigation and production methods can be optimised into a space for displaying and experiencing; and the production colonies based on agriculture can be co-developed with agricultural by improving the quality of space and providing experiences, services and other functions. In the settlement system, the nodes of tangible and intangible culture can strengthen the landscape construction and interpretation, and link culture, agriculture, commerce to empower the development. Historical street patterns and important water corridors can be spatially renewed to protect and strengthen traditional patterns.

STRATEGY3: Watershed Unit Delineation

The plan adopts the technical route of watershed zoning based on GIS, integrating the results of catchment analysis with the administrative zoning, on the basis of guaranteeing the function of the watershed unit, further divide Zhuji into 8 watershed units, and each watershed unit watershed has relatively unique ecological integrity and local culture. The plan provides in-depth feature analysis and spatial identification of each watershed unit from five levels: natural landscape, water conservancy system, transport system, agricultural industry, and human settlements. For example, in the Fengqiao River basin, the upstream mountains famous for agriculture and irrigation, the middle reaches of the hills nurturing a rich ancient culture, and the downstream lake area partly preserving the scenery of a field and forming a mature industrial brand, with some area urbanisation being drastic. The plan maps the characteristics of the basin to the optimised space, resulting in a pool of projects that can be implemented on the ground.

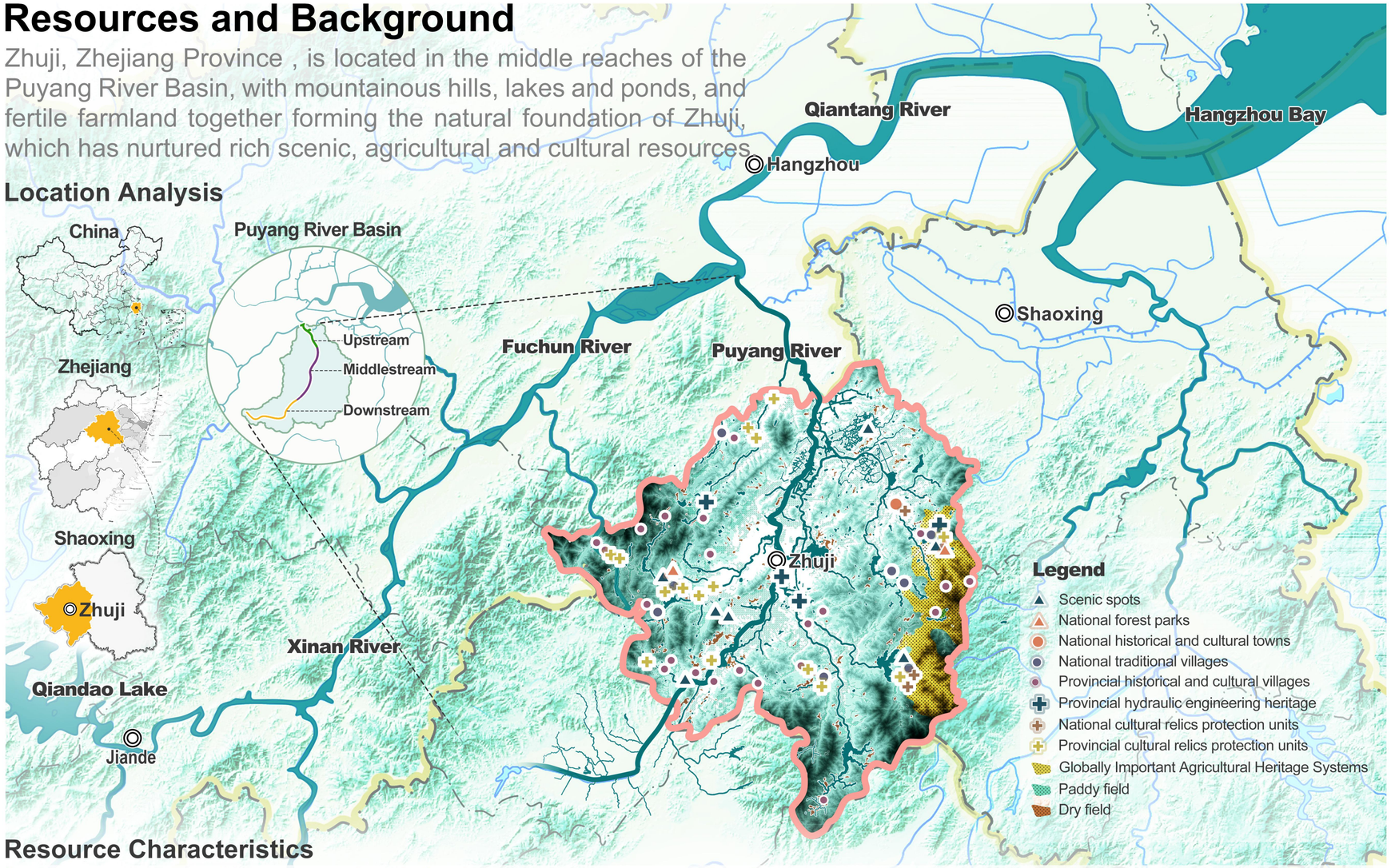
PROJECT SIGNIFICANCET

The project is a forward-looking attempt at regional planning based on watersheds in the context of building an ecological civilisation. Watershed has complete and independent ecosystems and nurture relatively unique scenic, agriculture and culture. The overall planning from a watershed perspective will reconstruct the regional connection network, effectively linking the various elements of the region and reshaping the regional landscape characteristics. The main strategy is to build a landscape network based on water resources, to extract and optimise the critical spots of multiple patch systems, and finally to build a detailed and feasible project pool at the watershed unit scale. The project provides a meaningful reference for watershed spatial governance.

Resources and Background

Zhuji, Zhejiang Province , is located in the middle reaches of the Puyang River Basin, with mountainous hills, lakes and ponds, and fertile farmland together forming the natural foundation of Zhuji, which has nurtured rich scenic, agricultural and cultural resources.

Location Analysis



Resource Characteristics

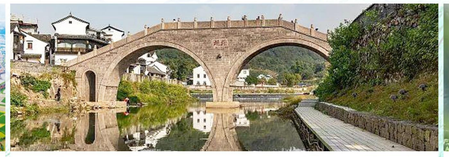
Scenic resources created by water

50km² Provincial nature reserve
7 Scenic tourism zones
2 National forest parks

Agro-industries thriving on water

400km² GIAHS (Globally Important Agricultural Heritage Systems)
27 Provincial modern agricultural parks
73% of world freshwater pearl production

Historic settlements living by water



1 National historical and cultural town
8 National traditional villages
27 Provincial historical and cultural villages

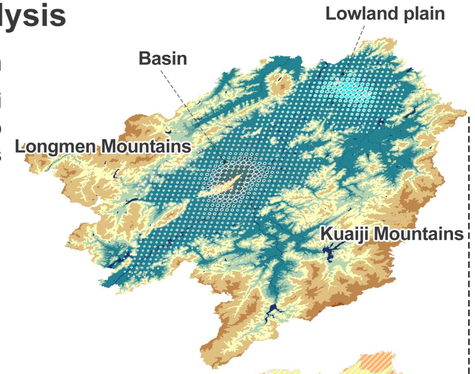
Cultural heritage linked by water

4 Provincial hydraulic engineering heritage
2 National cultural relics protection units
13 Provincial cultural relics protection units

Situation Analysis

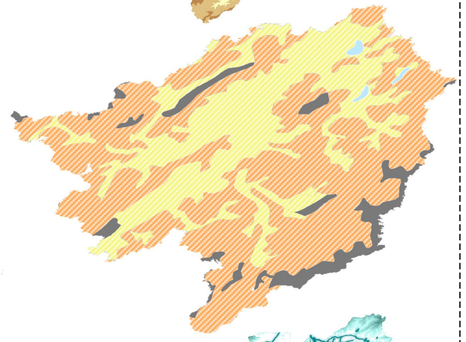
Landform Condition

The landforms in Zhuji are mainly of two types: low mountains and basins.



Soil Condition

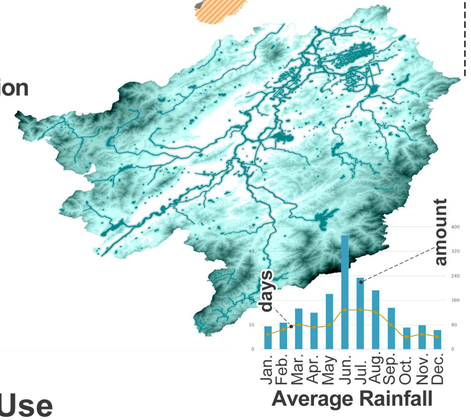
The soil in Zhuji is mainly agricultural and forestry soil suitable for farming, with a few lakes suitable for pearl aquaculture.



Hydrological Condition

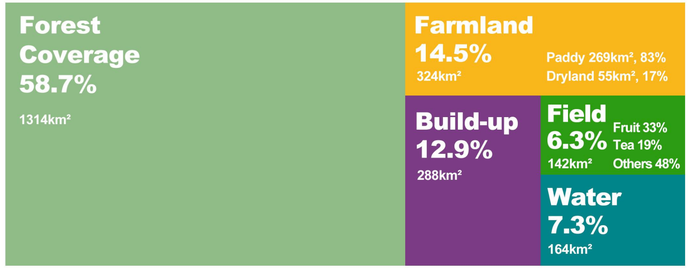
Precipitation in Zhuji is concentrated from May to September.

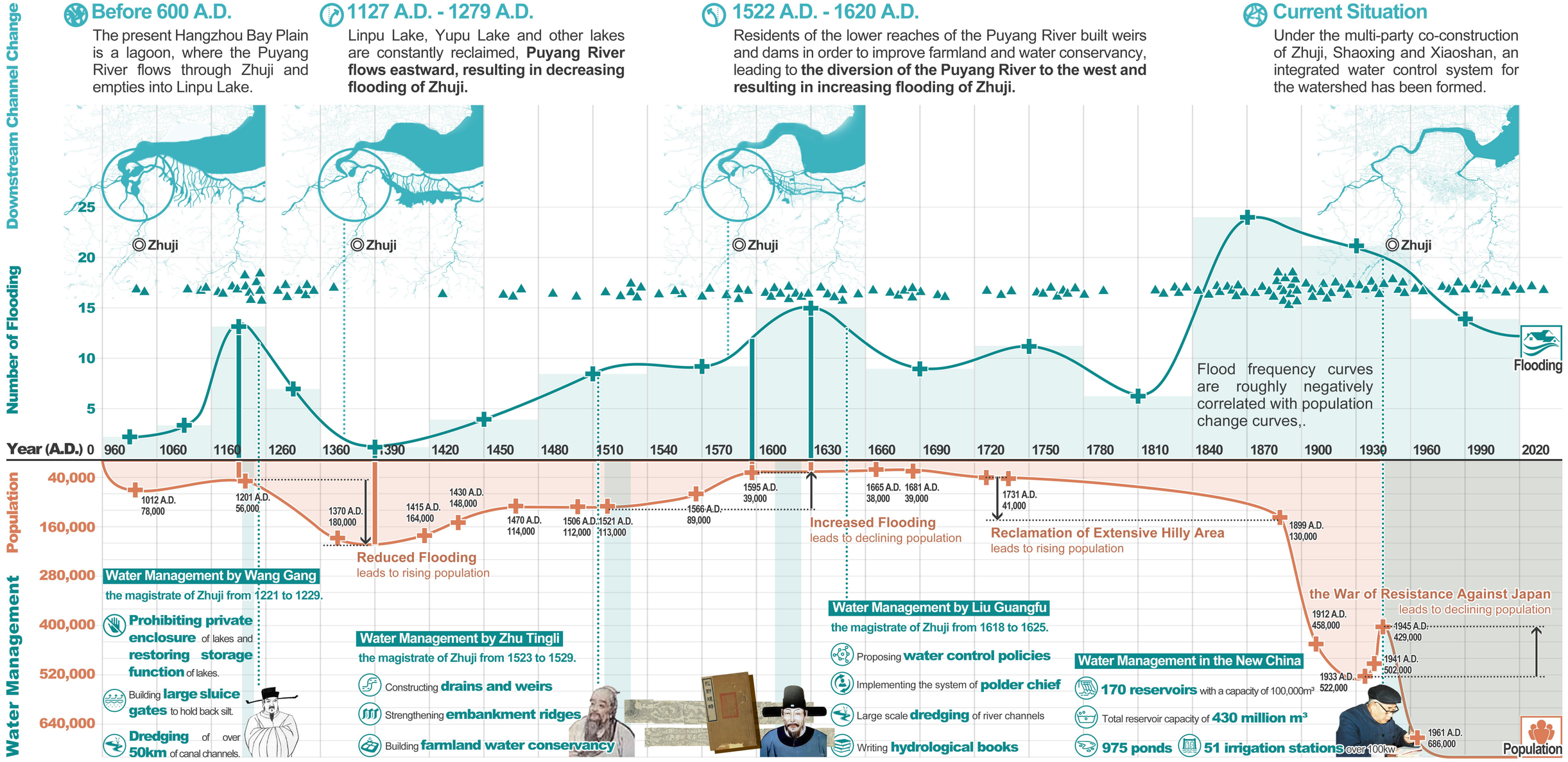
The water system consists of "one main stream, five tributaries, three lakes and many ponds".



Type of Land Use

As the local saying goes, "Seven hills, one water, three fields."

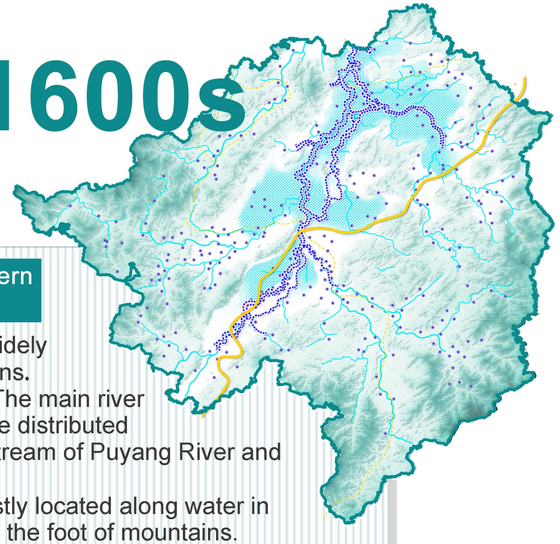




Water Management: the Theme of Historical Development

By examining the evolution of the ecological environment and human settlement in the context of water security, it is confirmed that water management has consistently been a central theme in Zhuji's historical development, spanning from the construction of early water conservancy facilities to contemporary small watershed management practices.

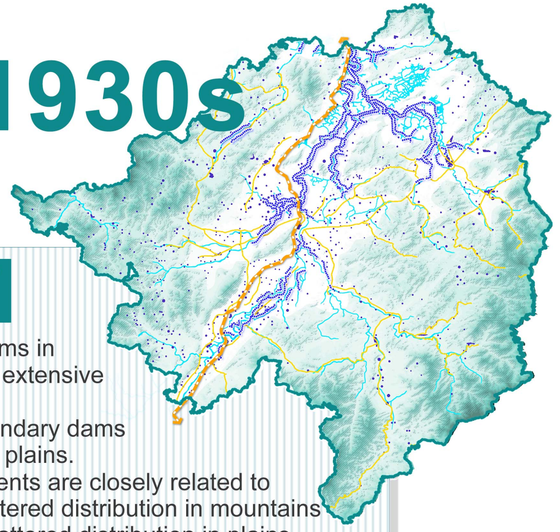
1600s



Landscape pattern is stable

Scenic: Lakes widely distributed in plains.
Infrastructure: The main river embankments are distributed along the main stream of Puyang River and Fengqiao River.
Settlement: Mostly located along water in river valleys or at the foot of mountains.

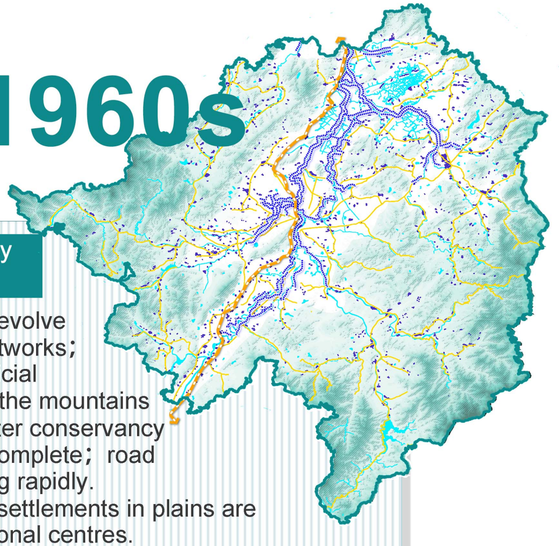
1930s



Water conservancy is taken shape

Scenic: Natural streams in mountainous areas, extensive lakes in the plains.
Infrastructure: Secondary dams are built locally in the plains.
Settlement: Settlements are closely related to water, with more clustered distribution in mountains and smaller, more scattered distribution in plains.

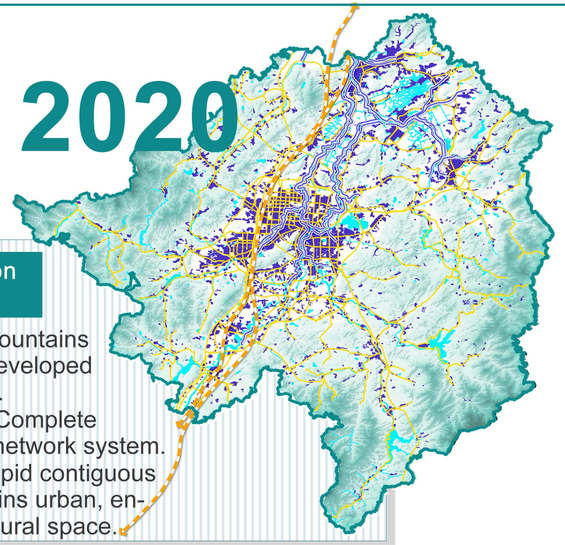
1960s



Water conservancy is optimizated

Scenic: Plain lakes evolve into dense water networks; Construction of artificial reservoirs began in the mountains
Infrastructure: Water conservancy system of basin is complete; road system is developing rapidly.
Settlement: Some settlements in plains are developing into regional centres.

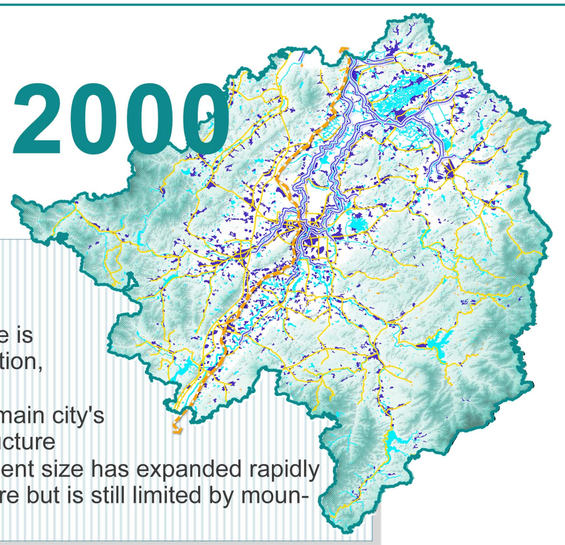
2020



Urban expansion is increasing

Scenic: Some mountains and reservoirs developed as a scenic area.
Infrastructure: Complete multi-level road network system.
Settlement: Rapid contiguous expansion of plains urban, encroaching on natural space.

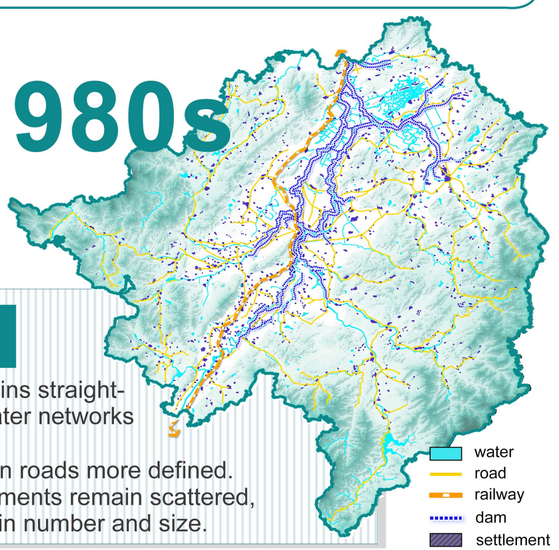
2000



Urban pattern is taking shape

Scenic: Water surface is increasing for production, water storage, etc.
Infrastructure: The main city's roads form a ring structure
Settlement: Settlement size has expanded rapidly along the infrastructure but is still limited by mountains and waters.

1980s



Settlement is developing initially

Scenic: Rivers in plains straightened; secondary water networks formed.
Infrastructure: Main roads more defined.
Settlement: Settlements remain scattered, but have increased in number and size.

Water Conservancy: the Driving Force for Watershed Development

By analysing the spatial patterns of the eight time slices in the past 400 years, it is clear that the spatial evolution of the watershed started from the shaping of the natural water system, followed by the transformation of water conservancy projects, and finally shaped by production and settlement. Therefore, water and water conservancy, as a natural link, is the driving force of watershed development.

Relying on natural river systems to promote regional spatial governance

Space scope:
Transforming from water body to water land linkage

Planning Thinking:
Transforming from Engineering Design to Spatial Design

Space System

Corridor Space

Rivers are natural links connecting various ecological and cultural elements, and the water conservancy system on them can serve as a corridor carrier.

Patch Space

The diverse systems closely related to scenic, agriculture, and settlement systems formed by the influence of water and water conservancy.

Scenic System:
Integrating water conservancy facilities into nature as a scenic element.


Wuxie Scenic Spot


Baita Lake

Settlement System:
Living by the water,settlement formed distinctive pattern by the passage of water systems.


Jiangzao Village

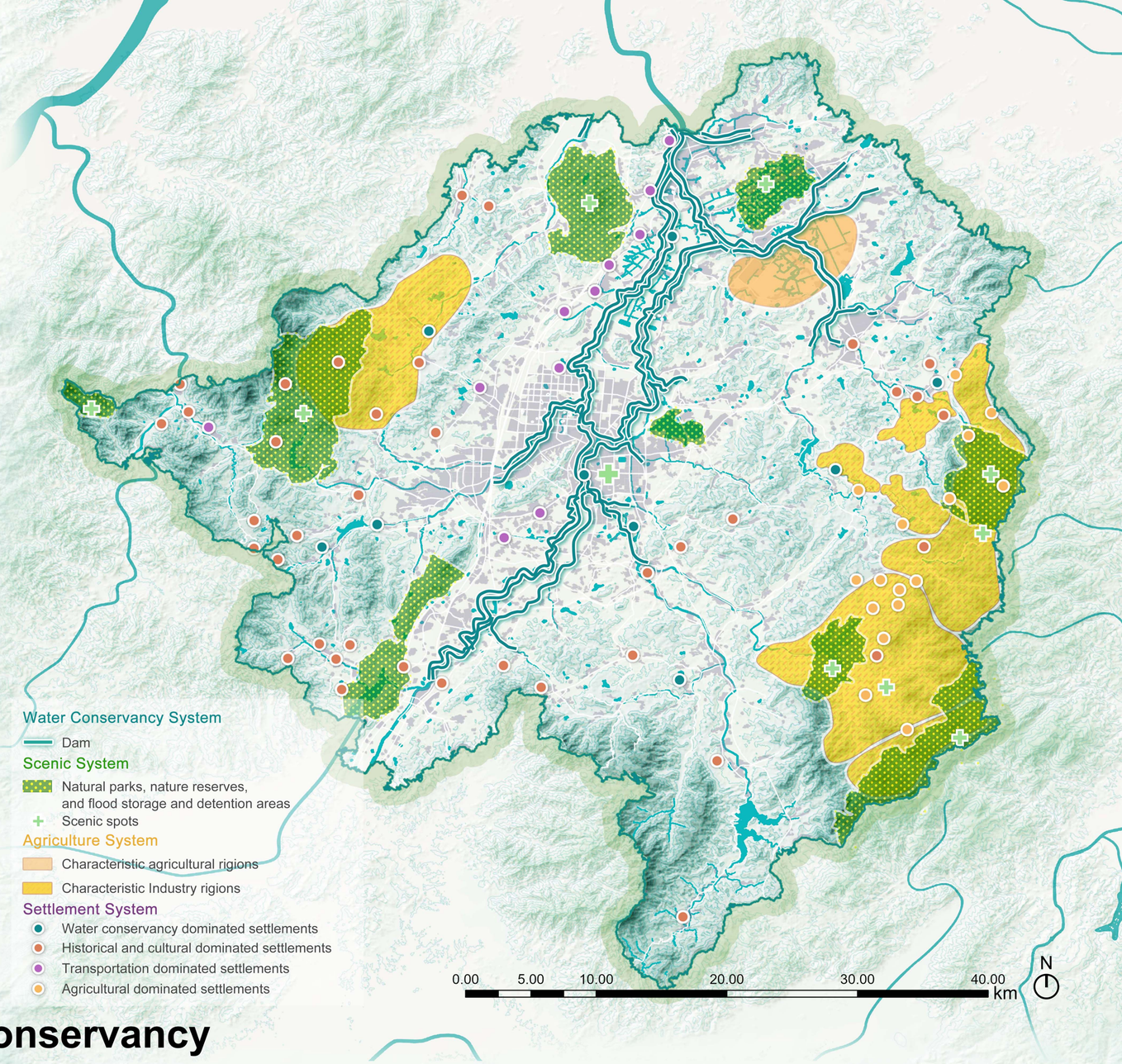

Bugu Village

Agriculture System:
The unique natural environment and tailored water conservancy facilities have formed a variety of agricultural textures.


Terrace


Dryland


Paddy field



Space Systems in Watersheds Linked by Water Conservancy

The space system of watershed takes the water conservancy system as corridor space, and the patches space linked by water is divided into three types: scenic system, agricultural system, and settlement system.

Historical Background

- Resource Characteristics
- Water Management History
- Spatial Evolution of the Basin

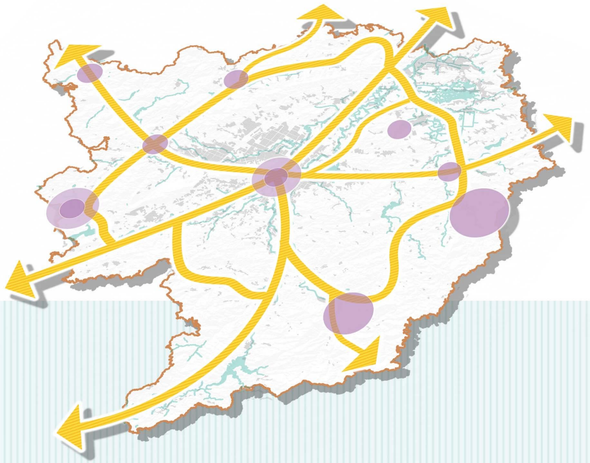
Space Systems

Planning Strategy

Planning Projects Pool

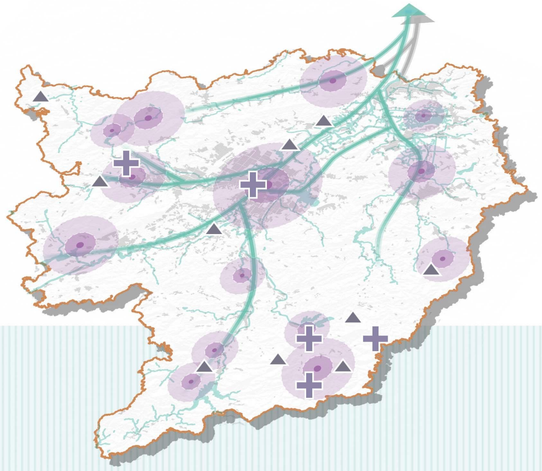
- Water Conservancy System Projects
- Road System Projects
- Scenic System Projects
- Agriculture System Projects
- Settlement System Projects

Landscape Network Construction



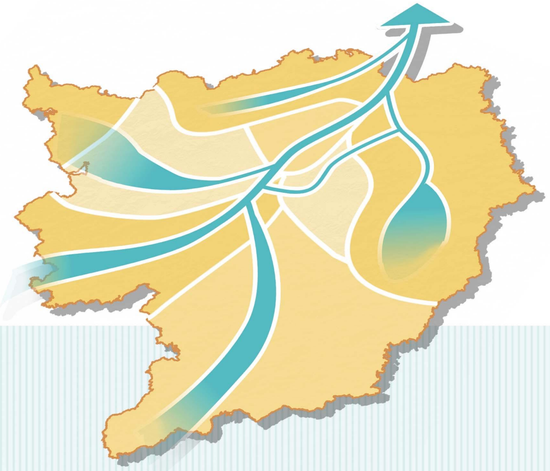
1. Constructing a water conservancy system network at the overall scale
2. Creating a characteristic trail network at the unit scale

Critical Spot Optimisation



1. Linking and optimizing water conservancy corridors
2. Identifying and enhancing patch spaces

Watershed Unit Delineation



1. Analyzing the overall mountain-water relationship
2. Defining watershed zoning units
3. Identifying unit characteristic elements

Planning Pathways and Strategies, with Watershed Perspective

The planning takes a watershed perspecive and aims to achieve regional comprehensive improvement through the use of watr systems. Based on the three levels of line, point and surface, planning strategies are proposed to ultimately form practical and feasible proiect recommendations.

Overall Program

Water Conservancy Routes 164km

Relying on water conservancy facilities such as dykes along the river, lake field ridges, and sluices to carry out rest and sightseeing route planning, Zhuji's hydrological wisdom is transformed into readable landscapes.

Ancient Road Exploring Routes 45km

Following the historical ancient road, connecting the important villages and towns along the way, constructing the historical ancient road walking trail, revisiting the footprints left by the ancestors of Zhuji.

Nature Perceiving Routes 97km

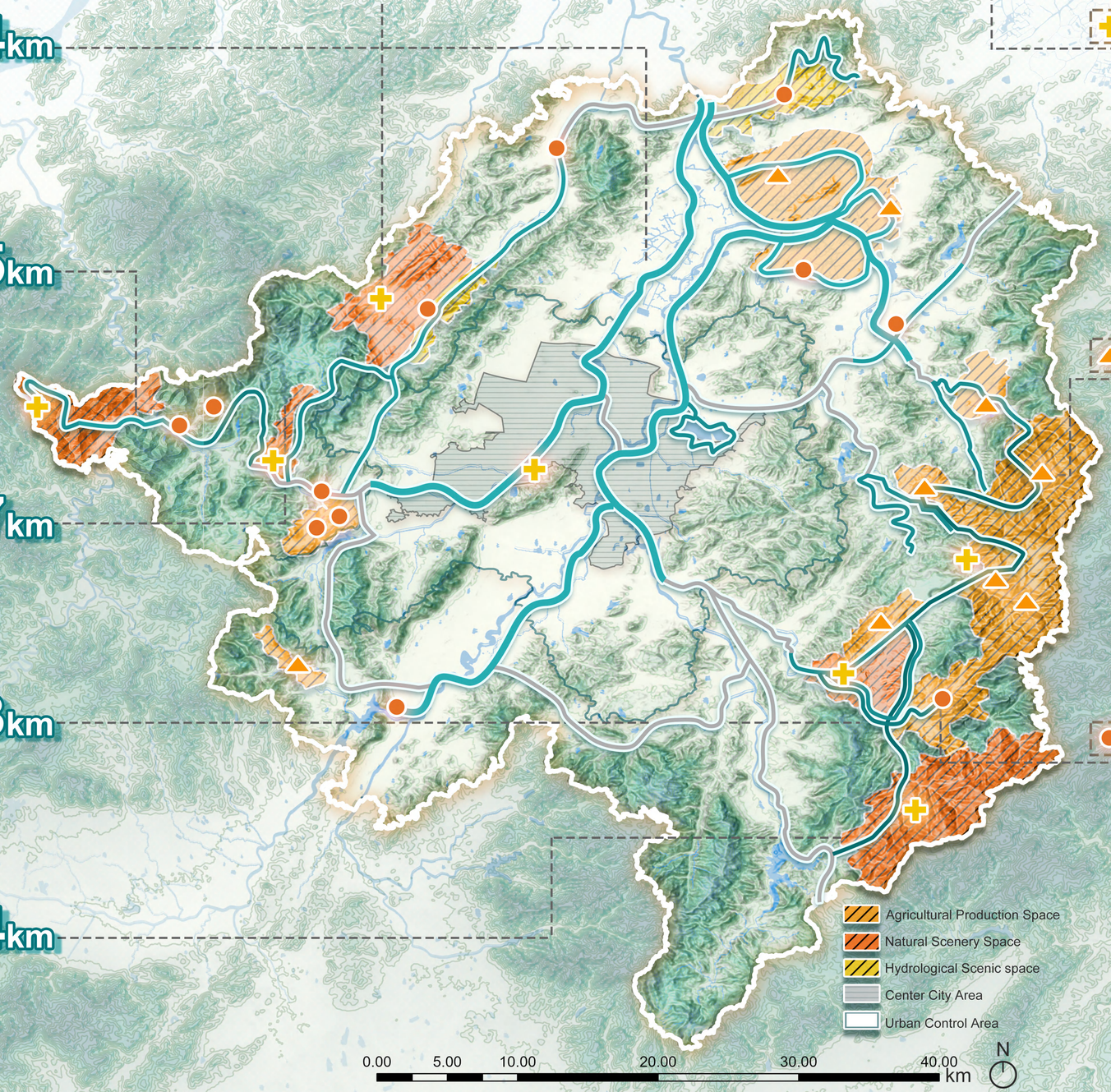
Planning and construction of natural beauty trails in water bodies and mountainous areas with favorable natural conditions and beautiful scenery.

Cultural Studying Routes 23km

Linking the ancient architecture of Taimen, clan ancestral halls, celebrity hometowns and other cultural elements, to create a cultural path of exploration that fully highlights the regional characteristics of Zhuji.

Farming Sightseeing Routes 64km

Linking the major specialty agricultural experience gardens in the southeast of the city to form a comprehensive agricultural leisure tourism route across the region.



7 Scenic System Project

On the premise of protecting the ecological environment, upgrading the level of internal construction and supporting service facilities in natural scenic areas.

9 Agricultural Systems Project

Enhancing the quality of agricultural landscapes.Relying on Zhuji Cephalotaxus, tea and other specialty crops in the relevant villages to create a specialty agricultural products experience park, to carry out such as picking experience, craft demonstrations, parent-child interaction and other planning and construction, to enhance the attractiveness of agro-tourism.

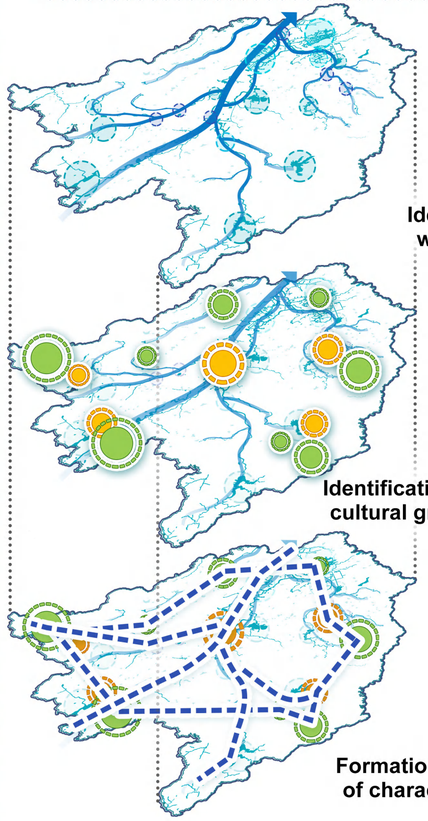
12 Village System Project

In traditional village areas, relying on water conservancy heritage, agricultural industry processing, trade and commerce interaction, history and culture to link important nodes, improve spatial quality, strengthen the historical pattern, and enrich the interactive experience; in modern towns and cities, attention is paid to the improvement and upgrading of infrastructure, such as open green space and rainwater pipe networks.

How

Building an overall landscape network based on the water conservancy system

Identifying the water element



Identification of water networks

Identification scenic and cultural group elements

Formation of a network of characteristic roads

What

Linking multiple spaces in the watershed based on characterizing elements

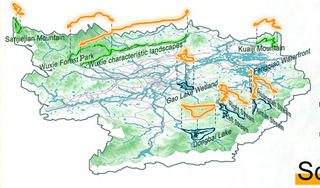
Water Conservancy Network

- Levee Slow Path
- Waterfront Slow Path

Characteristic Roads Network

- Traced Ancient Roads
- Untraced Ancient Roads

History-oriented Routes



- Waterside Promenade
- Mountain Promenade

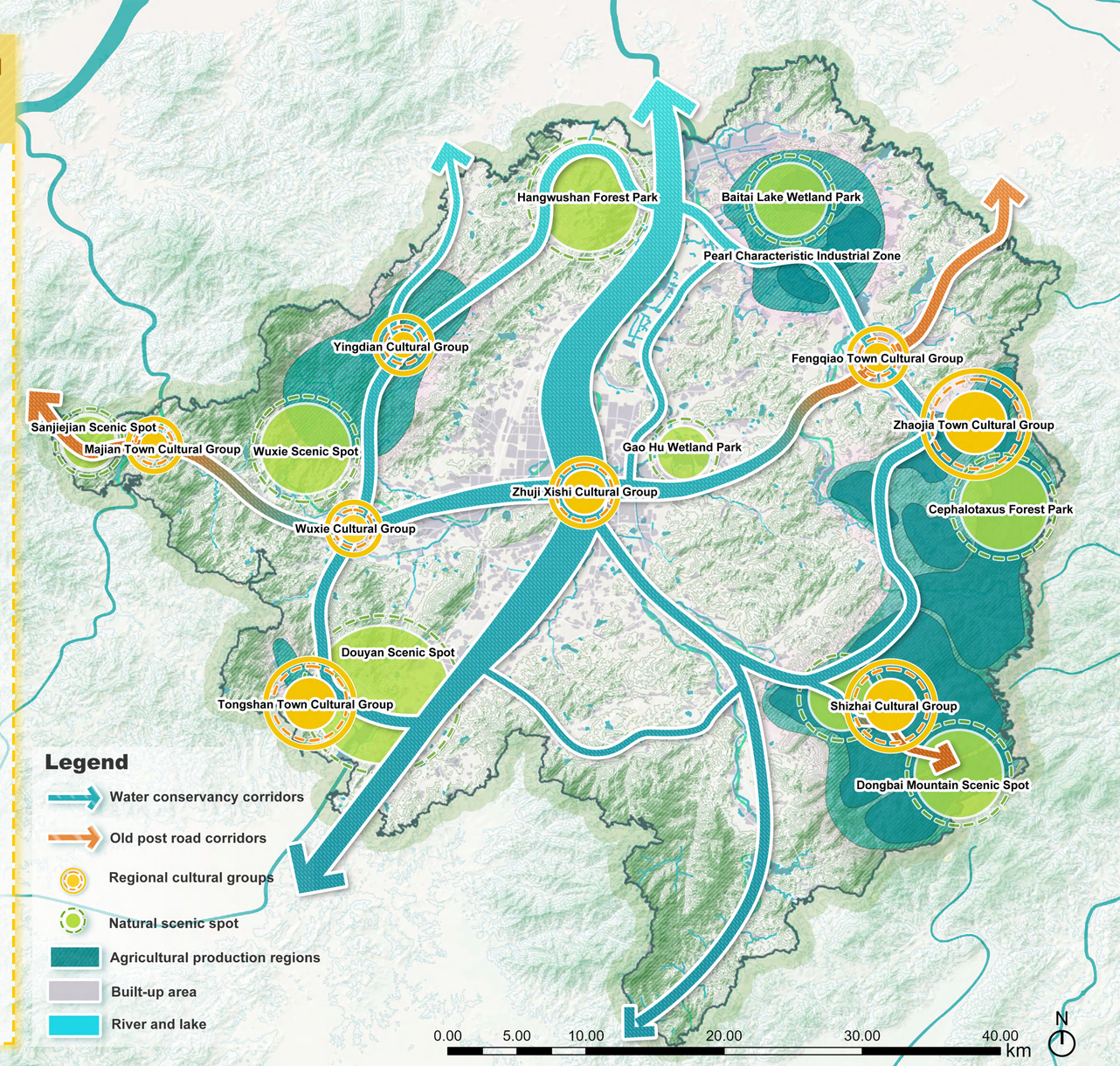
Scenic-oriented Routes

- Regional Agritourism Line
- Specialty Agriculture

Agricultural-oriented Routes

- Cultural Discovery Trail
- Cultural Landscape

Cultural-oriented Routes

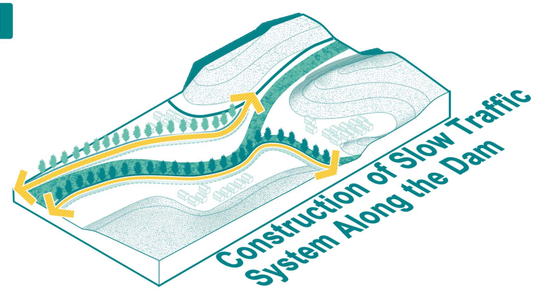


STRATEGY Ⅰ： Landscape Network Construction

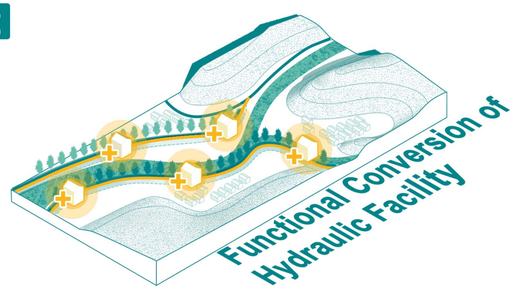
The water conservancy system consisting of rivers and water conservancies becomes the backbone of the regional network, and a network of characteristic roads linking farmland, scenic spots, villages and towns is superimposed on it to form a multilevel nested landscape network.

01 Water Conservancy System

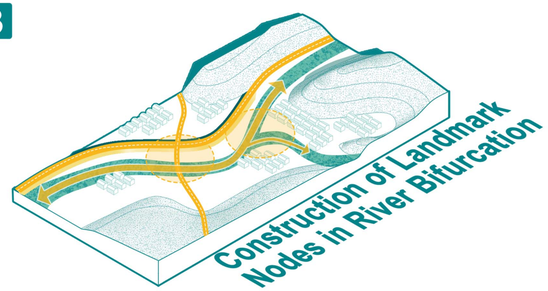
1



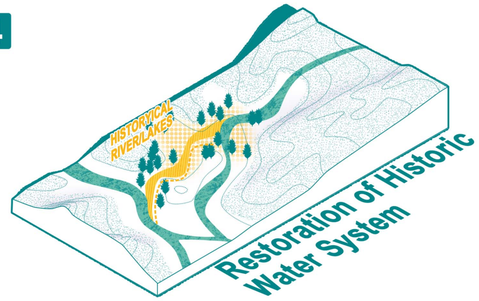
2



3



4



02 Scenic System

1

2

03 Agriculture System

1

2

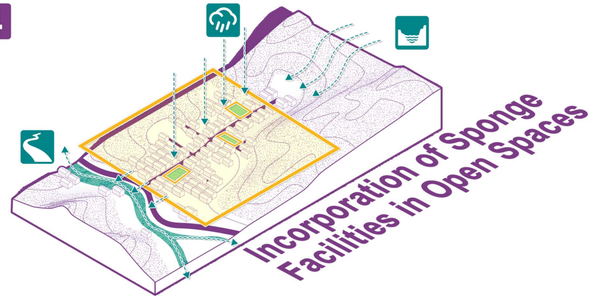
04 Settlement System

1

2

3

4

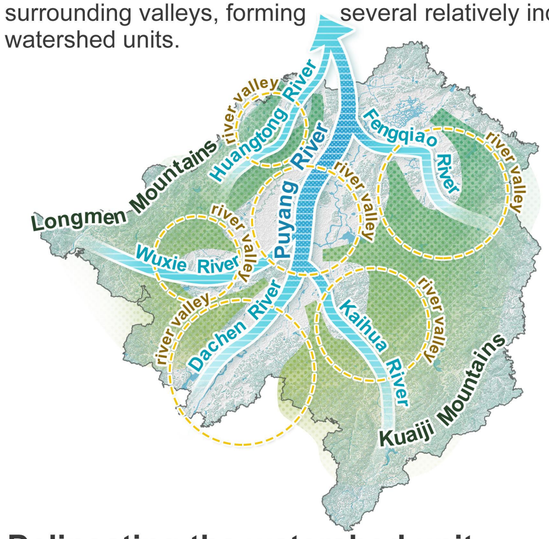


STRATEGY Ⅱ： Critical Spot Optimisation

The space system of watershed takes the water conservancy system as corridor space, and the patches space linked by water is divided into three types: scenic system, agricultural system, and settlement system.

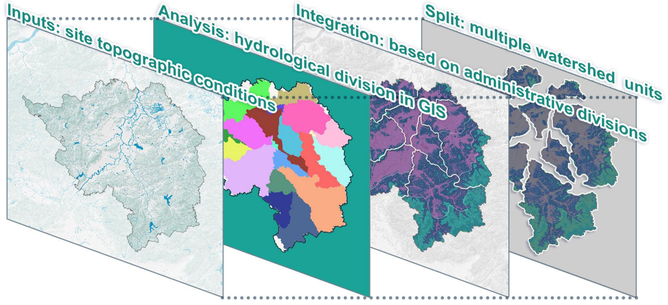
① Analyzing the overall landscape relationship

Numerous tributaries join the main river channel from the the surrounding valleys, forming several relatively independent watershed units.



② Delineating the watershed unit

Spatial governance units based on catchment area identification with reference to administrative boundaries.



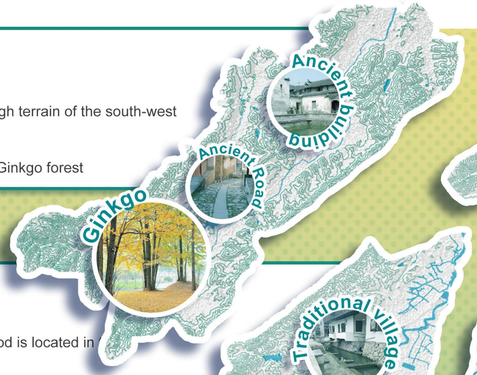
③ Identifying watershed units typical features

Huangtong-River-Basin

170.25km²

Water conservancy facilities
Terraced weir and culvert conservancy systems adapted to the high terrain of the south-west

Regional characteristics
Yingdian ancient post road, Ancient building complexes, Ancient Ginkgo forest



Puyang-River-Basin

90.70km²

Water conservancy facilities
The coherent system of dykes preserved from the traditional period is located in central and eastern plains

Regional characteristics
Characteristic historic villages

Fengqiao-River-Basin

545.45km²

Water Conservancy Facilities
Weirs and wells in the upper reaches are used for water storage and irrigation. A series of well-formed dykes In the middle and lower reaches are used to hold back floodwaters.

Regional Characteristics
World Pearl Town, Ancient Yue culture, Zhuji shadoof irrigation system(World Irrigation Heritage), Torreya grandis, Tea crops

Water conservancy facilities
The dyke system is located along the river in the western lowlands. Gao Lake are located in the foothills of the eastern highlands and are used to store water for flood diversion.

Regional Characteristics
Gao Lake Wetland Scenic spot, Speciality Fruit Growing

93.60km²

Puyang-East-River-Basin

Water conservancy facilities
Wuxie Reservoir is located in the eastern highlands

Regional characteristics
Wuxie Scenic spot, the Qinhuang Ancient Road, Liji Ancient Street, Traditional Village Culture and Historic Architectural Heritage, Specialised paper-making techniques（Intangible cultural heritage）

585.8km²

Wuxie-River-Basin

Water conservancy facilities
Typical Hierarchical Ponds Conservancy System and coherent dykes system

Regional characteristics
Tongsan Shochu, Terraced farmland

278.84km²

Dachen-River-Basin

Water conservancy facilities
The unit's high topography serves as a water source for the south-east, including reservoirs, weirs, dams,and mountain ponds.

Regional Characteristics
Dongbai Lake Nature Reserve, Alpine wetland landscape, Dendrobium, Tea crops, Ancient building complexes

603.35km²

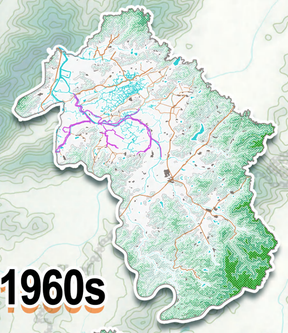
Kaihua-River-Basin

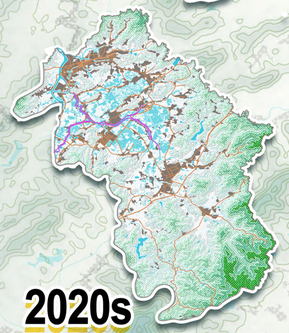
STRATEGY Ⅲ： Watershed Unit Delineation

On the basis of guaranteeing the function of the watershed unit, further divide the watershed unit based on GIS. Based on the resource characteristics of each watershed unit, specific planning projects are proposed to build a pool of projects that can be implemented on the ground.

Landscape Networks in the Fengqiao River Basin

The Fengqiao River Basin is one of the watershed units of Zhuji, with the upstream mountains famous for agriculture and irrigation, the middle reaches of the hills nurturing a rich ancient culture, and the downstream lake area partly preserving the scenery of field and forming a mature industrial brand, with some urbanisation being drastic.





5m 830m

545.45 ㎢ Area

5 Townships

Compared to the **1960s**

The **settlement area** increased by **6.8** times

The **water area** increased by **3.1** times

Waters

Settlement

Basin Boundary

Sub-basin boundary

0.00 5.00 10.00 20.00 km

N

·Lower Reaches

Plain

Rapid urbanisation has resulted in a modern urban pattern major transport hub

Important transportation nodes

· Lower Reaches

Lakes

A comprehensive dam system

World Pearl Town:Unique Pearl Lake Field and Pearl Industry

Featured Wetland Scenic spot

· Middle Reaches

Low Hills

Rich history and culture with many historical celebrities

Typical village pattern

Historically important transport nodes

·Upper Reaches

Mountains

Unique agricultural environment

The ancient straw well irrigation system

I Activating and Utilizing the Water Conservancy

- 01 Planning Project of **Eco-sponge** for Diankou Town's rainwater utilization
- 02 Planning Project of **Zhuji shadoof irrigation system** experience park
- 03 Planning Project of **Landscape Belt on the dam** of Fengqiao River
- 04 Planning Project of Featured **Pearls Tour Route** in Shanxia Lake
- 05 Enhancement Project of **Wetland Tourism Route** in Baita Lake
- 06 Planning Project of **Slow Walking greenway** along the Huangtan Stream
- 07 Restoration Project of **Historic Water System Pattern** in Fengqiao Ancient Town
- 08 Planning Project of **Landmark Park** in the River Bifurcation of Fengqiao River

II Revitalizing the Settlement Distinctive Patterns

- 09 Conservation and Micro-Renewal Project of **Traditional Ancient Village** in Diankou and Meichi Communities
- 10 Renewal Project for Functional and Spatial of **Pearl-themed Village Cluster** in Shanxia Lake and Baita Lake Area
- 11 Restoration and Revitalization Project of **Historic Cross Street Commercial Area** in Fengqiao Ancient Town

III Enriching and Improving Transportation Corridors

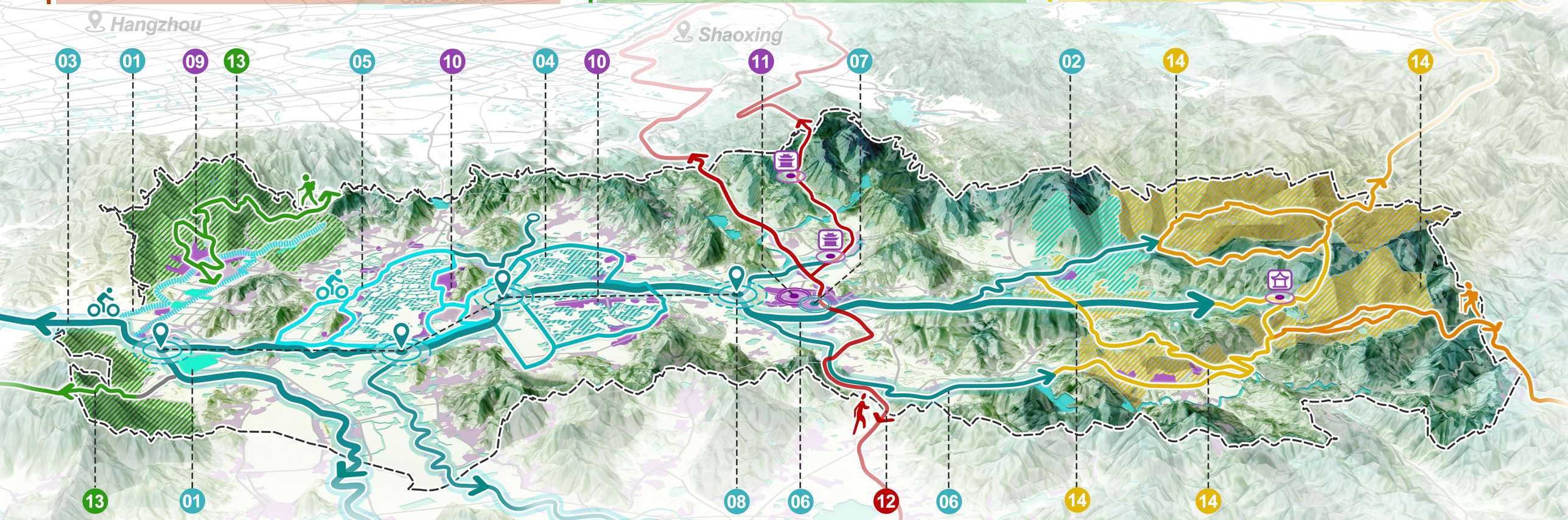
- 12 Conservation and Utilization Project of **Fengqiao Ancient Post Road**

IV Protecting the Scenery Ecological Patterns

- 13 Planning Project of **Forest Trail** in Hangwu Mountains Scenic spot

V Enhancing the Agricultural Tourism Experience

- 14 Planning Project of **Special Torreya grandis Agriculture Park**



Planning Projects Pool in the Fengqiao River Basin

The plan is closely linked to the river and water conservancy, thus integrating natural, agricultural, settlement and other types of resources, realising integrated spatial use, and shaping a continuous and complete landscape network with a feasible project pool.