

# Green Infrastructure Practices of Guangzhou City and Panyu District

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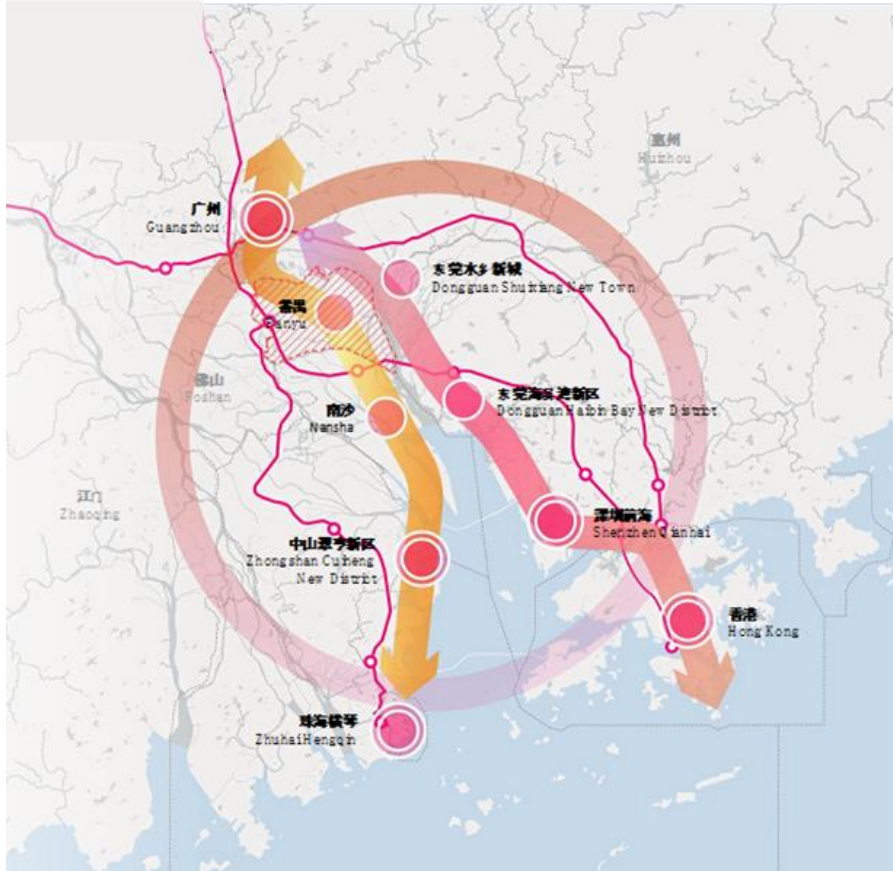
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Director

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# A Strategic Node on the Greater Bay Area in China



**Guangzhou:**

**Population: 18+ million in 2022**

**Area: 7434 km<sup>2</sup>**



# Panyu District Context

- Founded in 214 BC, one of the origin on the “Maritime Silk Road” .





# Guangzhou's Natural Ecological Resources



- **Panyu District:**

**530** km<sup>2</sup>

**3** million population

Over **50%** Area of Natural and Rural Area

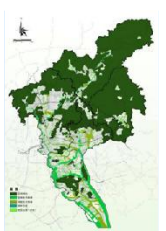
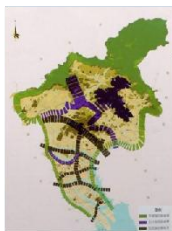
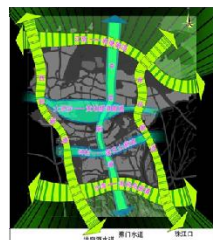
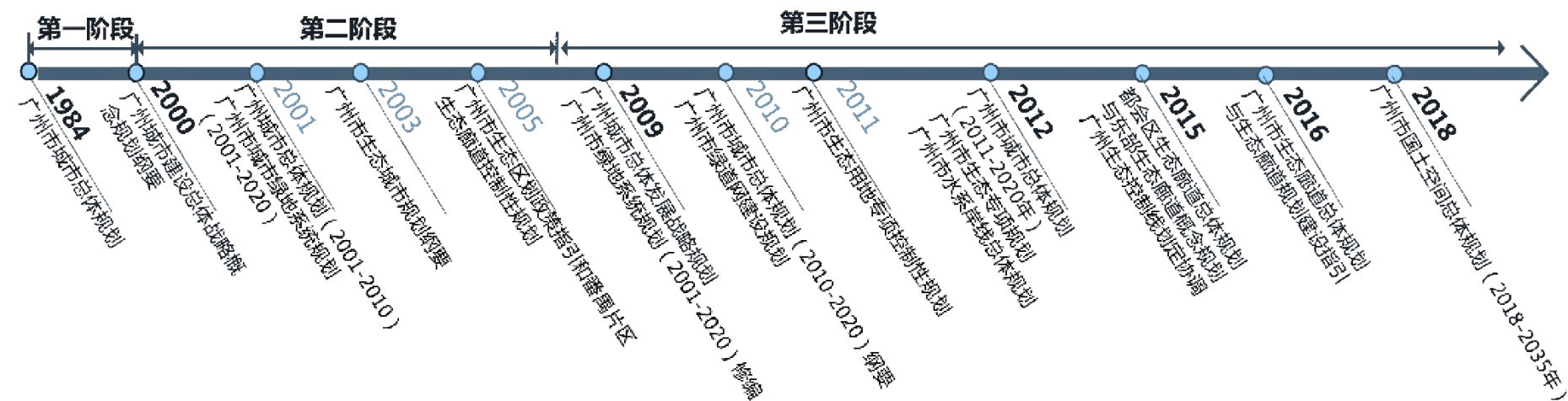
**2** Vibrant Sub Centers



# Urban green space as important element of long term city strategy

Ecological and Low-carbon city, Cool Cities, the Green and Beautiful Province

## Green Infrastructure



# Green Infrastructure:

## A multi-functional, natural-based, resilient network

### Eco Benefits & Climate Adaptation

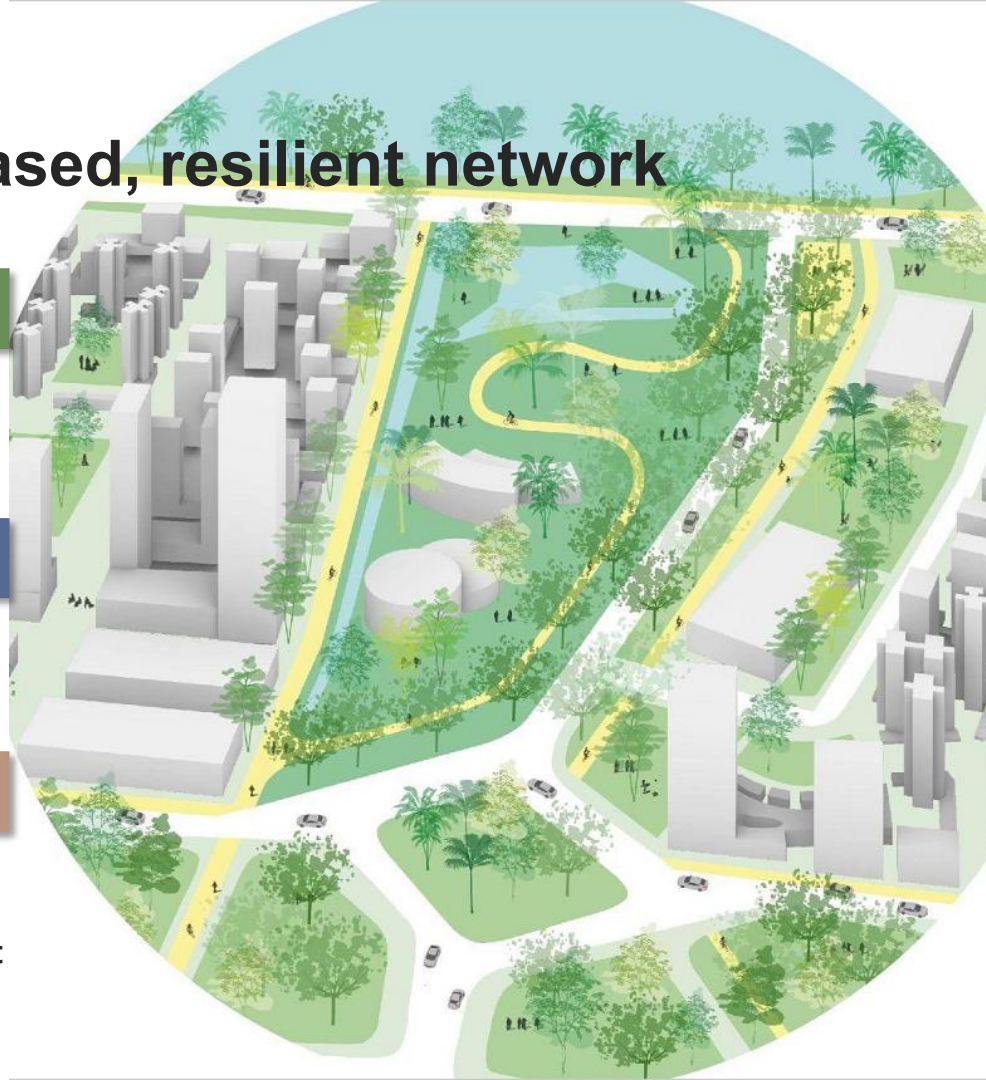
- Enhance ventilation
- Adapt to rainstorm risks
- Biodiversity
- Mitigate air pollution

### Social Benefits

- Improve physical health
- Mental health
- Educational function
- Cultural diversity

### Economy Benefits

- Enhance land value
- Create new jobs
- Attract investment
- Lower construction cost





## Selected project cases being implemented as GI elements From Eco-Corridor to the urban Emerald Ring

# Ecological Ring

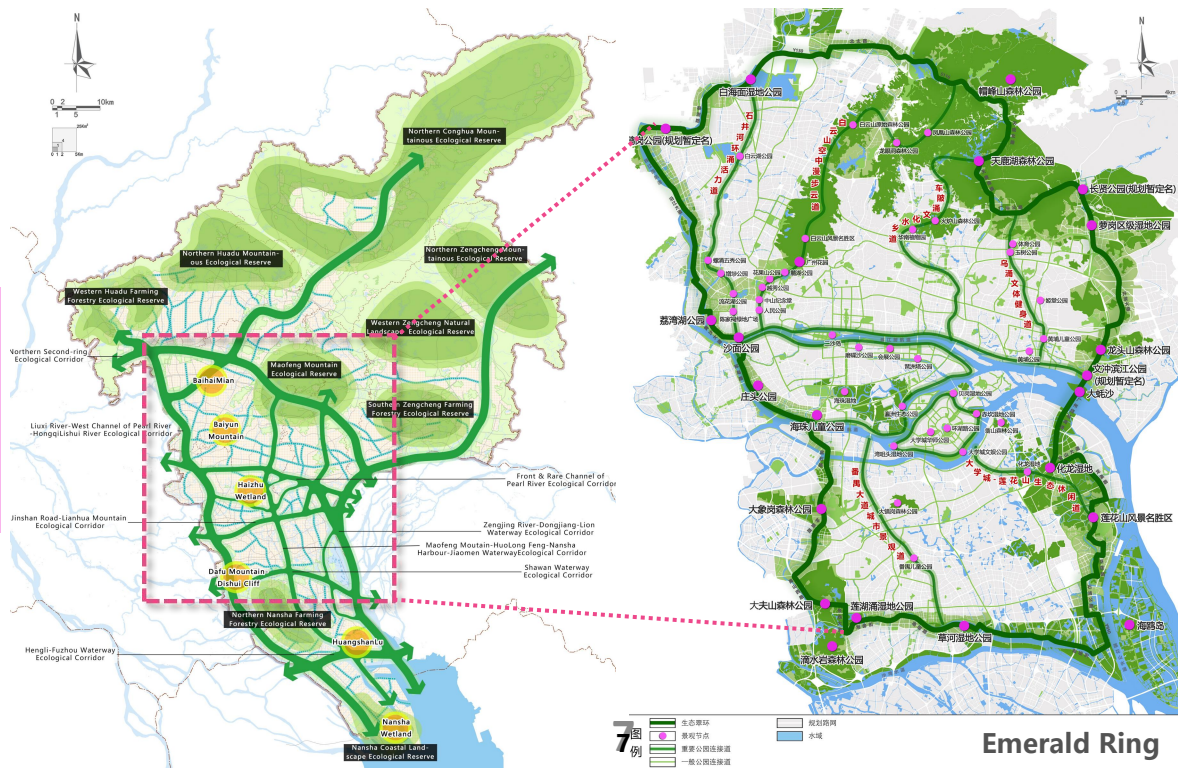
**Part of the beautiful China  
Action  
3 categories 10 ecological  
strategies**

# Enjoyable Ring

Create 160km "Challenger" belt road, 6 themed emerald trails, 24-hour dynamic experience

# Valuable Ring

## Innovative 9 types of green consumption scenarios





# 4000km greenway system, connecting over 500 green parks



Forest Greenway



Lakeside Greenway



Reservoir Greenway



# 2000km waterways system, a variety of waterfront recreation spaces



Dragon Boat in Panyu Greenway



# Citywide cycling trails connecting mountains and ocean

## 520 KM: 190 KM finished, 288 KM to be further upgraded

### 5 KM of key connectors

### 32 KM being planned



Green transformation of space under viaduct





# Building a Park City Based on the South China Botanical Garden Park System.

- Building special plant display garden and ecological education spots.



South China Botanical Garden Park



Guangzhou Orchid Garden



Metasequoia forests



Huadu Lake Wetland



# Haizhu Wetland: biodiversity and natural cooling source at metropolitan center





**To fulfill the vision of**

**Harmony between Humanity and Nature**

**Also as a lighthouse city in Urban Nature Program**

**Guangzhou is now exploring for more Holistic and Integrated Approaches**

**Panyu GI project is the first Pilot District**

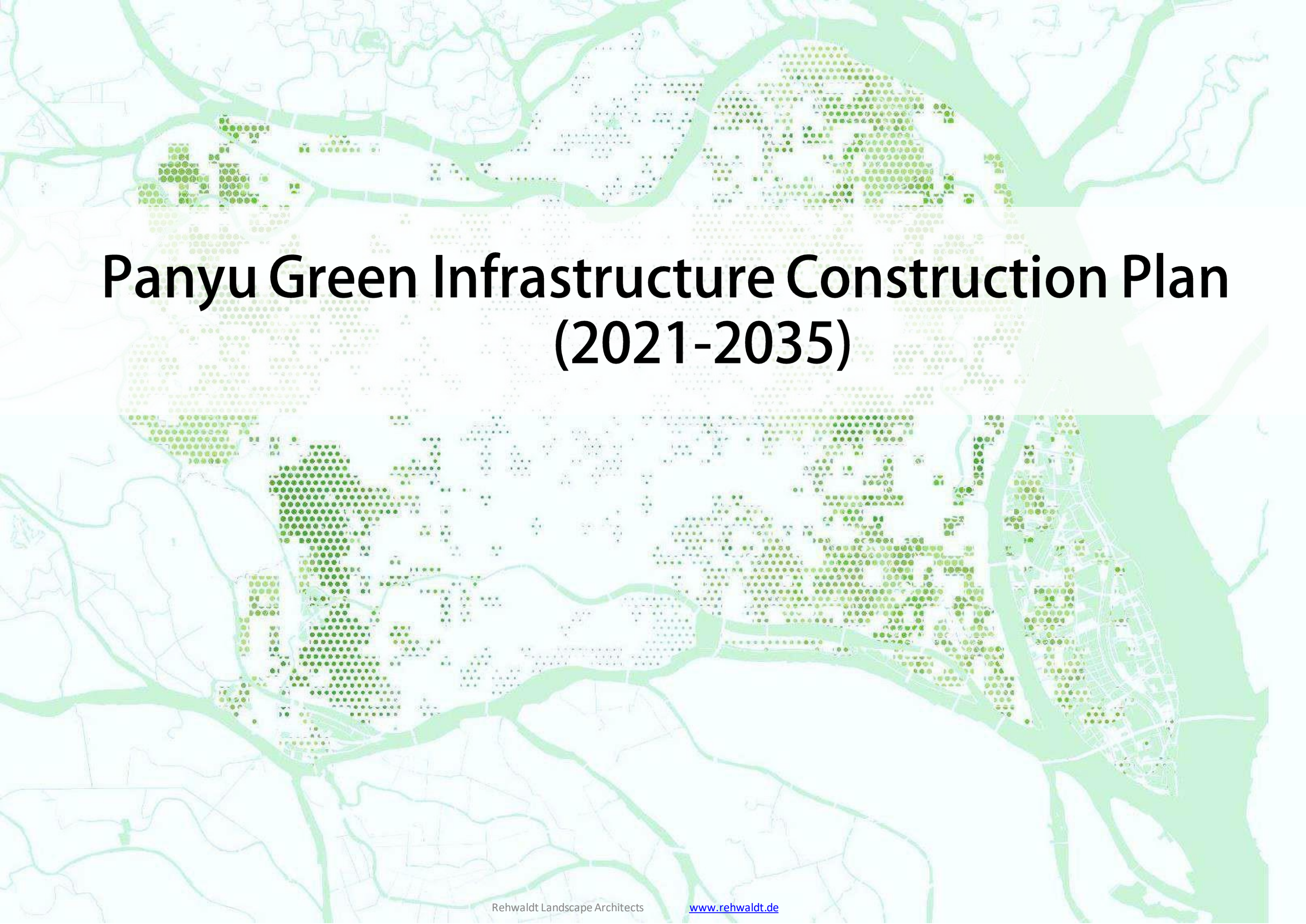
# **Introduction of Panyu Green Infrastructure Planning**

Introduced by REHWALDT



**Thank You!**





# Panyu Green Infrastructure Construction Plan (2021-2035)



# Why a green Infrastructure planning for Panyu?



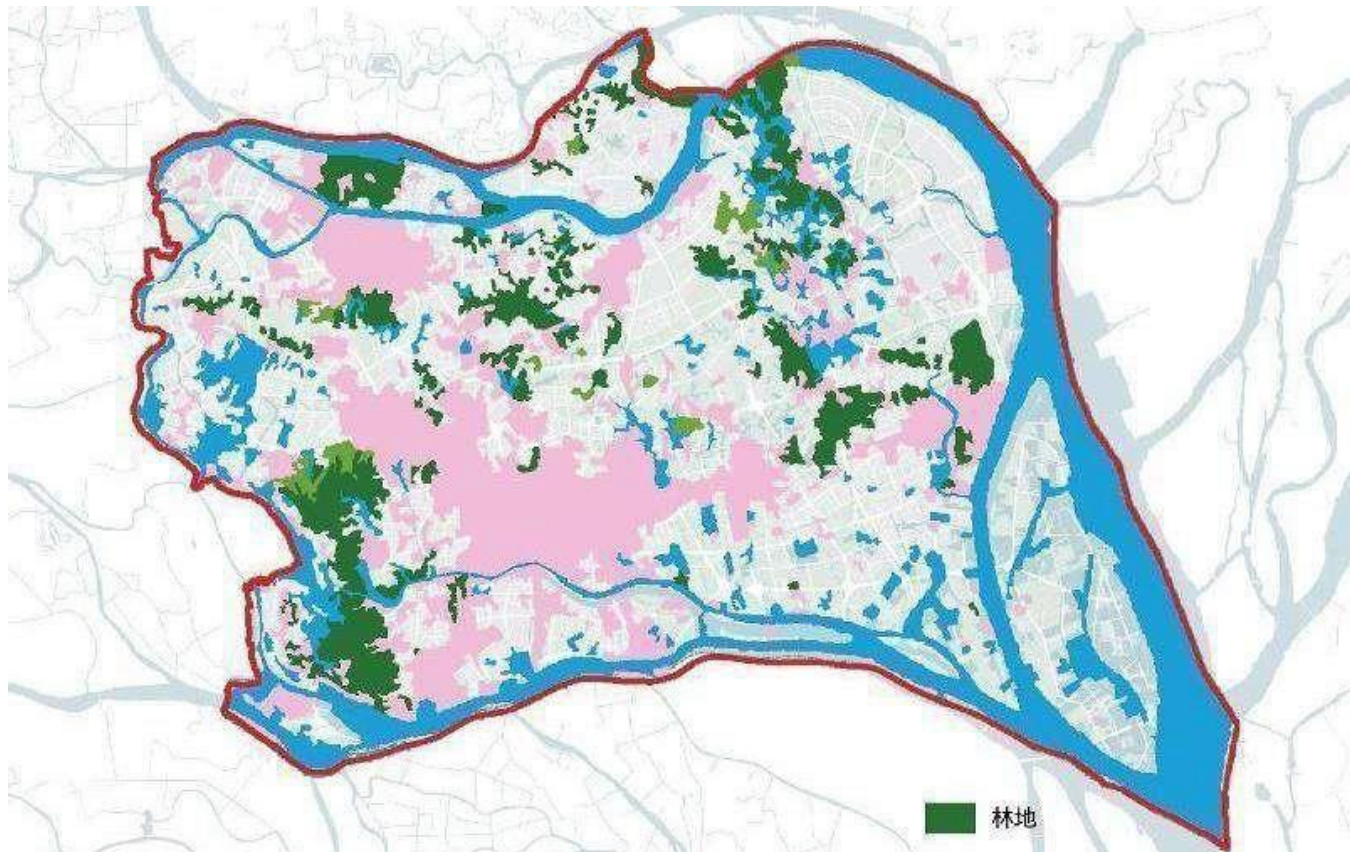


# Some quantitative Challenges

**Increase in the built-up area,**

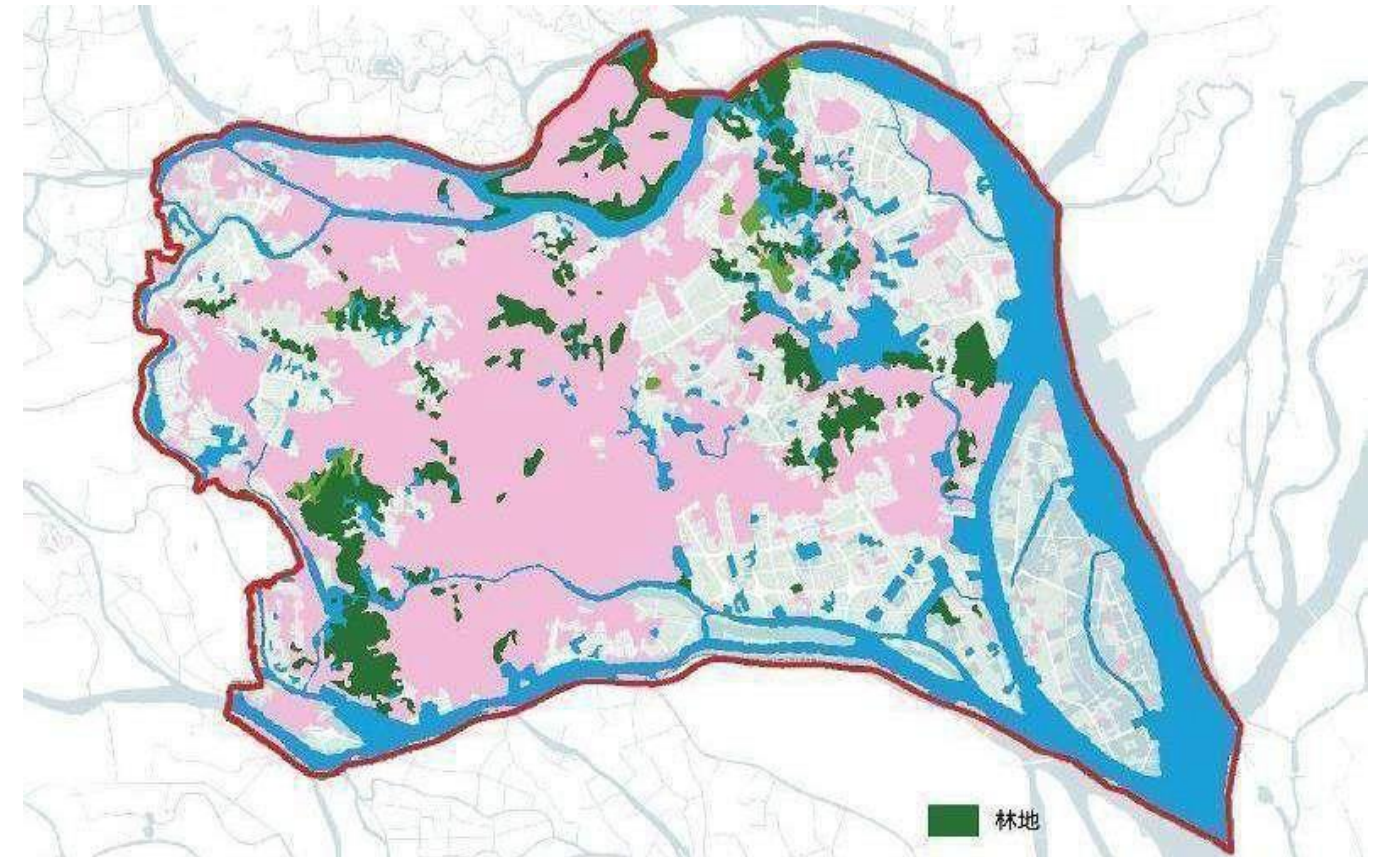


**Decrease of undeveloped and ecological space**



**2000**

Pink: built up areas



**2020**

Pink: built up areas

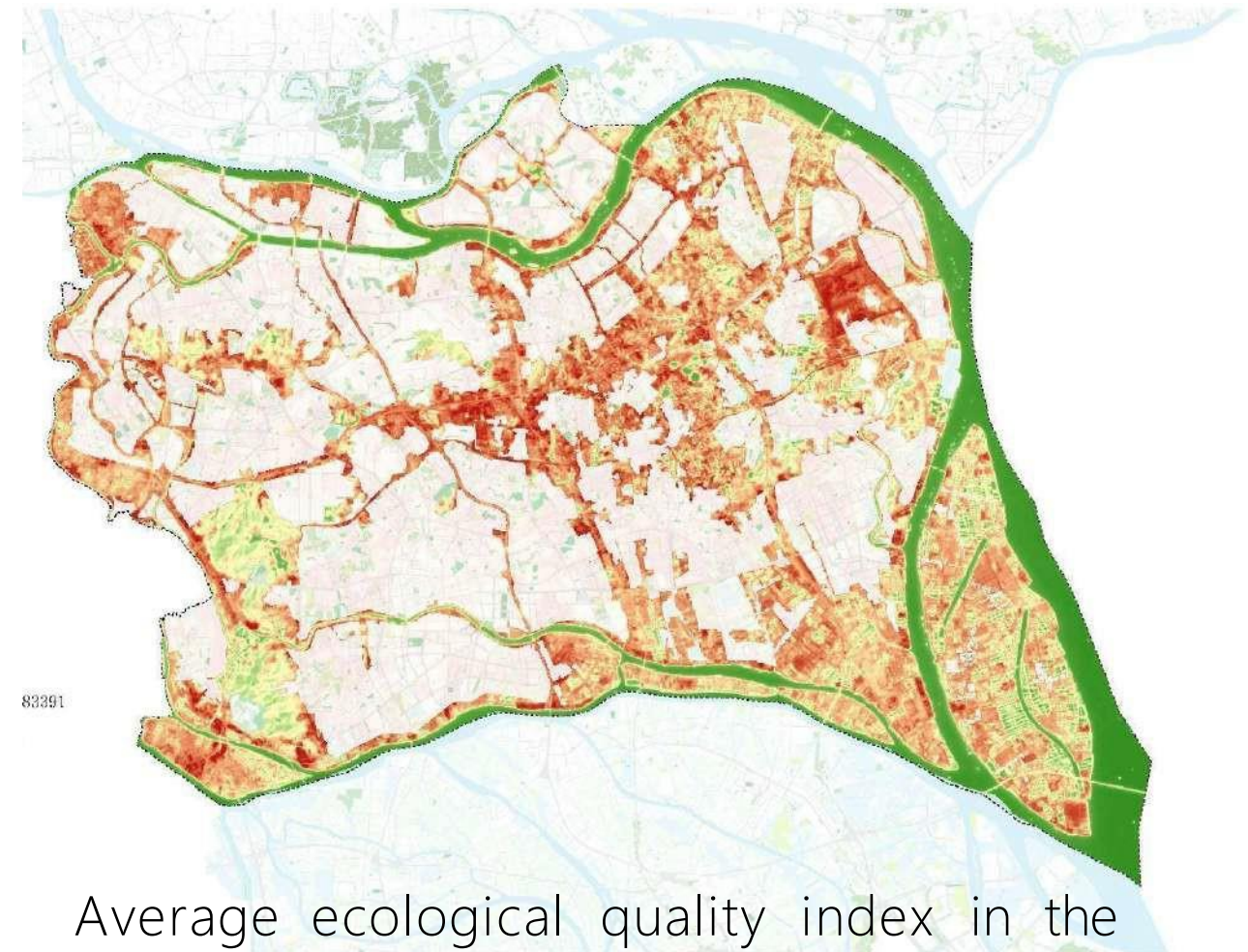


# Some qualitative Challenges

**Ecological quality index (RESI) decreased**



Average ecological quality index in the corridor in 2013



Average ecological quality index in the corridor in 2021



# The Concept of Green Infrastructure

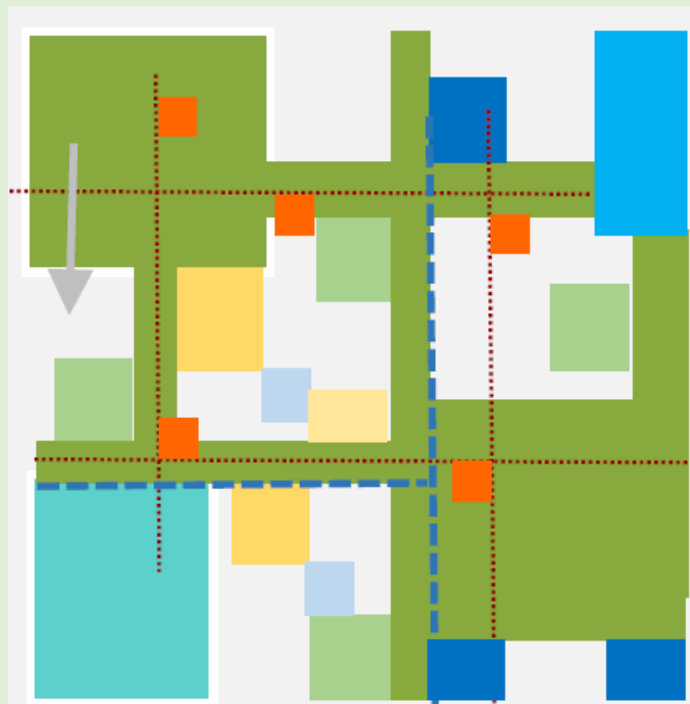
## EU Strategy for Green Infrastructure

- Provision of food, water and materials
- Climate regulation
- Attractive/healthy living conditions
- Biodiversity



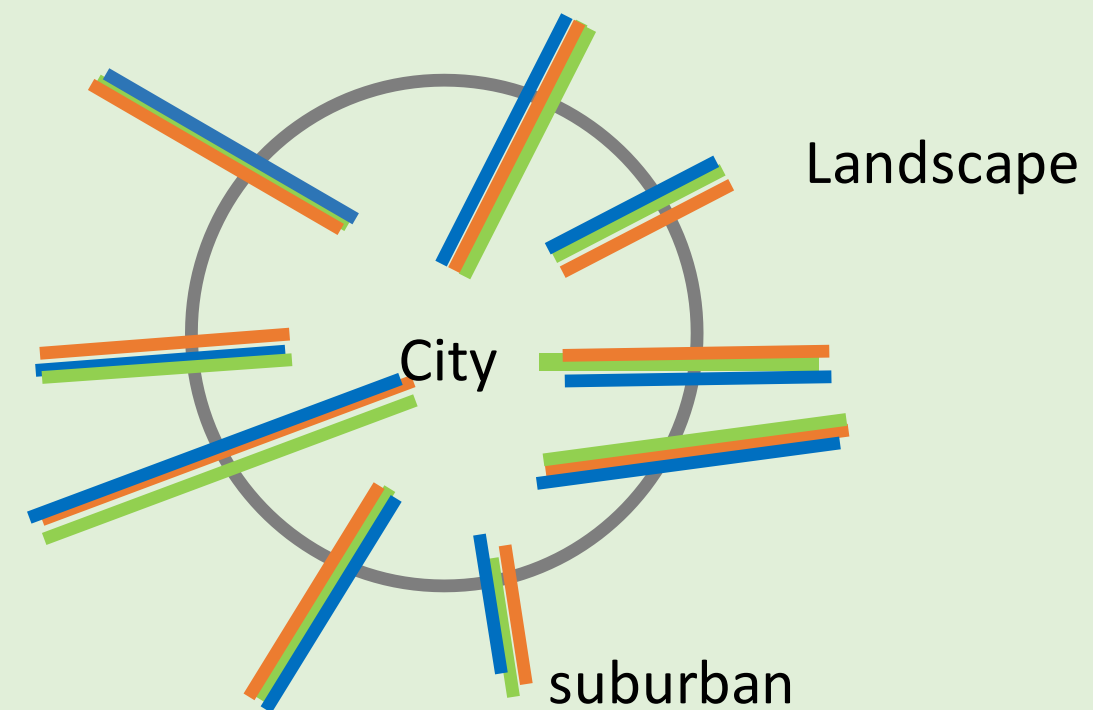
# The Concept of Green Infrastructure

## Multifunctional Network



- Corridors
- Core Areas
- Stepping stones

## Multifunctional connections



Urban Nature  
Biodiversity  
People and  
Transportation

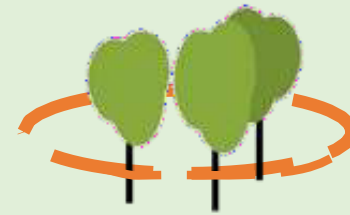


# Planning of Green Infrastructure Concepts

## Approaches (Selection)



Enhancing Quality



Protection/Preservation



Initialisation



Nature based solutions



Management



Multifunctionality



Restoration



Sponge city

# Overall technical route

Establishing a Comprehensive Implementation Plan for Goals, Strategies, Indicators, and Action Plans Throughout the Entire Cycle, Following the Principles of Strong Coordination, Promotion of Linkages, and Multifunctionality.



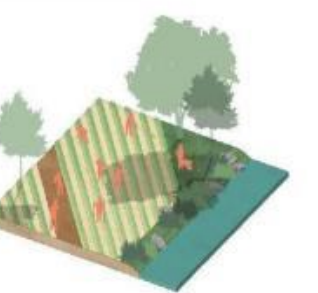









Planning Background	<div>New era and new requirements of ecological civilization (2049 Strategy + South China National Botanical Garden + green and beautiful Guangzhou + Shanghai and sea belt)</div> <div>Response to era development and global issues: the introduction of green infrastructure planning methods and implementation paths</div>			
Theoretical Transformation Coordination and Integration Strategic Framework Current Issues	<div>Theoretical Construction</div> <div><ul style="list-style-type: none"><li>The International Definition of Green Infrastructure</li><li>Green infrastructure in Guangzhou redefinition</li><li>Green infrastructure elements constitute</li></ul></div>	<div>Higher-level planning</div> <div><ul style="list-style-type: none"><li>2049 Strategic planning / national spatial planning</li><li>Lvmei Panyu / Greenland system</li><li>Panyu whole soil whole</li><li>South China Botanical Garden system</li><li>Guangzhou natural protected area system, etc</li></ul></div>	<div>Current characteristics</div> <div><ul style="list-style-type: none"><li>Source from the Pearl River, the sea and land crisscross</li><li>Central platform, surrounded by a water network</li><li>Land and sea coordination, ecological hub</li><li>Complete in elements, rich in resources</li></ul></div>	<div>Issues and challenges</div> <div><ul style="list-style-type: none"><li>Non-construction land has decreased year by year</li><li>Broken distribution of natural resources</li><li>Slow traffic system is not fully connected</li><li>Park green space supply and demand imbalance</li></ul></div>
1 Goal and Vision 2+1Network Construction 6 Strategies	<div>Goal and Vision, Network Construction: Green Network , lively Panyu</div> <div>Coupling of Green Network, Blue Network, and Slow Traffic Network</div> <div><div>Green Netzwok</div><div>Blue Netzwrok</div><div>Slow Traffic System</div></div> <div><div><ul style="list-style-type: none"><li>Ecological construction strategy: green mountains and beautiful waters, and ecological return</li><li>Pastoral landscape strategy: the elements are integrated, the earth landscape</li></ul></div><div><ul style="list-style-type: none"><li>City garden integrated strategy: the world banyan garden, all things in harmony</li><li>Production park culvert green strategy: industry and city integration, green intelligent innovation</li></ul></div><div><ul style="list-style-type: none"><li>Clear water run city strategy: dynamic water, safety and maintenance</li></ul></div><div><ul style="list-style-type: none"><li>Slow traffic first strategy: connectivity, integrated into nature</li></ul></div></div>			
6 Group of Indicators	Green Space Indicators, Agricultural Landscape Indicators, Quality of Life Indicators, Urban Biodiversity Indicators, Blue Space Indicators, Slow Travel System Indicators			
5 Tools	Ecological Space Nurturing Action, Aquatic Ecology Improvement Action, Agricultural Landscape Construction Action, Slow Travel System Construction Action, Green Open Space Construction Action			
Actionplan Design guidance Monitoring tool	<div>"One" planning and design guideline + "Three" Demonstration area designs</div> <div>One map, one table + safeguard implementation mechanism</div>			



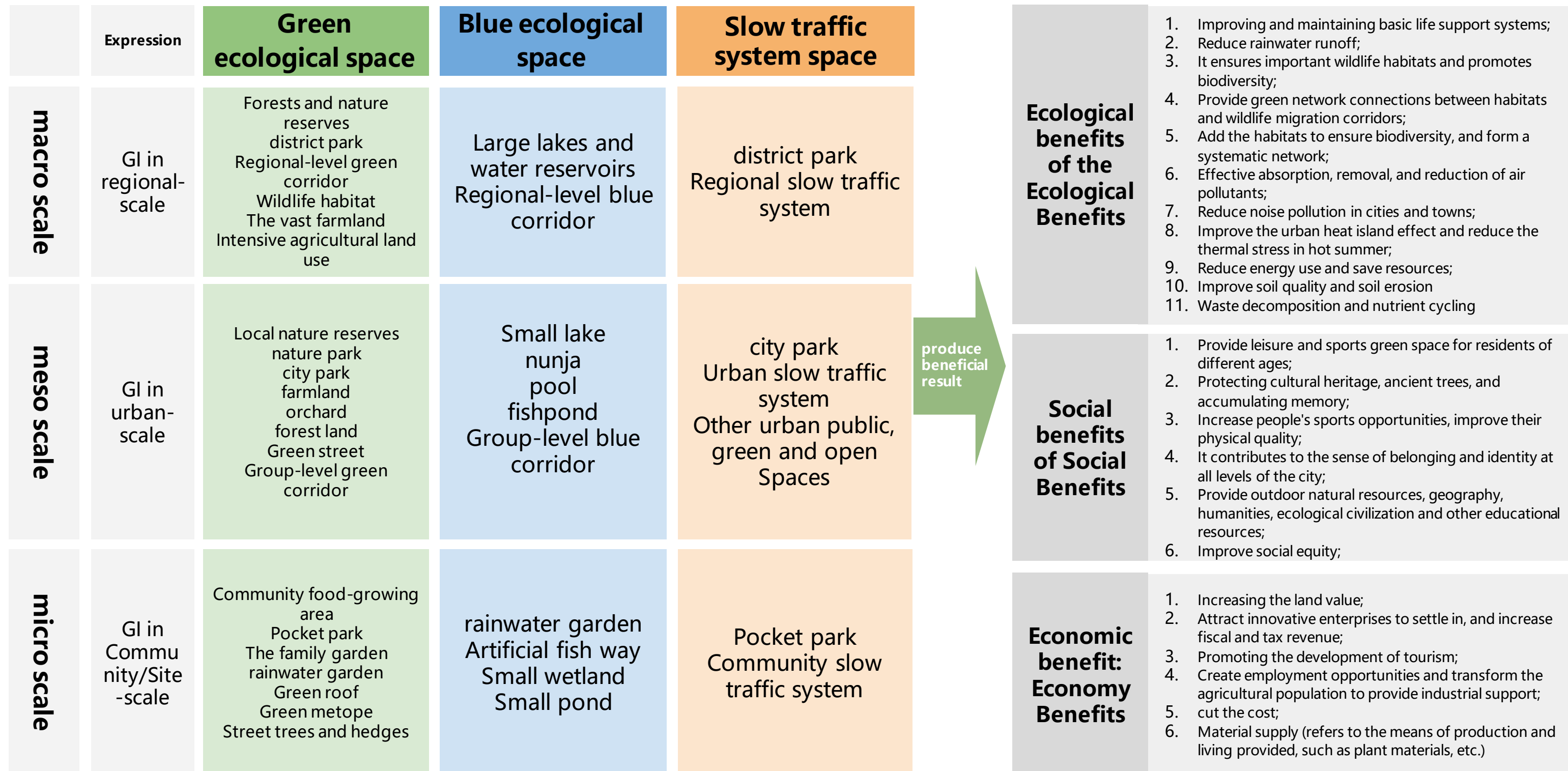
# GI-Planning for Panyu: 3 thematic pillars

## Elements of the green infrastructure Constituent Elements of Green Infrastructure

Green network elements	Blue network elements	Slow traffic Network Elements
------------------------	-----------------------	-------------------------------

 forest	 Nature-protected areas	 farmland	 dyke	 River chung	 nunja	 Slow traffic system
 Street trees and hedges	 meadow	 park	 water channel	 Reservoir / mountain pond		

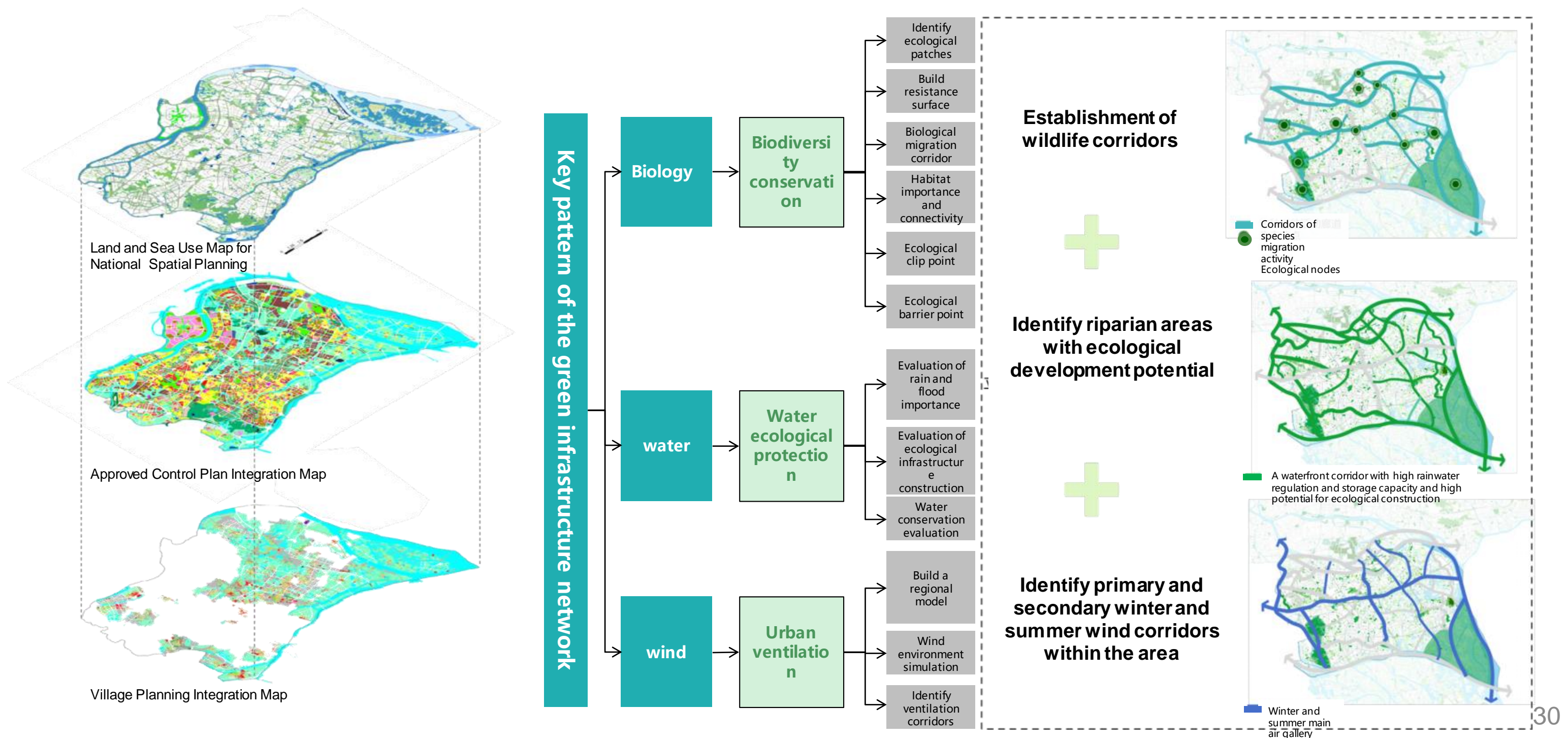
# Elements and benefits on 3 different scales





# Evaluation of blue and green key patterns

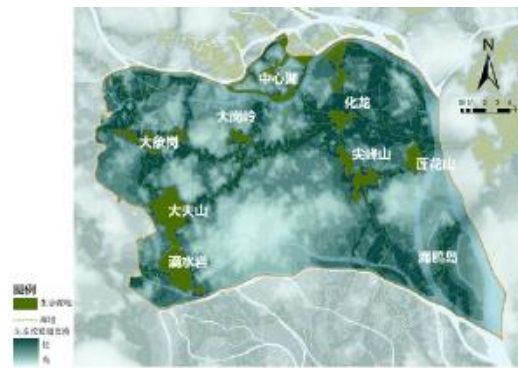
Based on the ecological land from land and sea use map, approved control plans, and village plans, conduct a sub-assessment of ecological functions related to biodiversity, water, and wind. This will serve as the foundational map for green infrastructure work and further identify key patterns in the green infrastructure network in Panyu District.



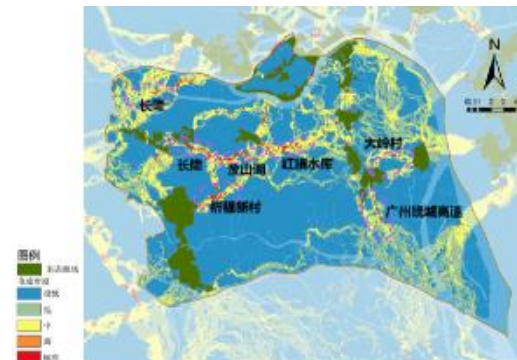


# Constructing the Green Infrastructure Master Plan from the Blue-Green Network and Slow Transportation Systems

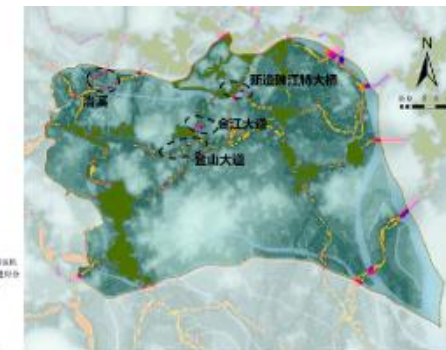
## Green network



A Schematic representation of the biological migration paths



Schematic representation of ecological clips based on circuit theory

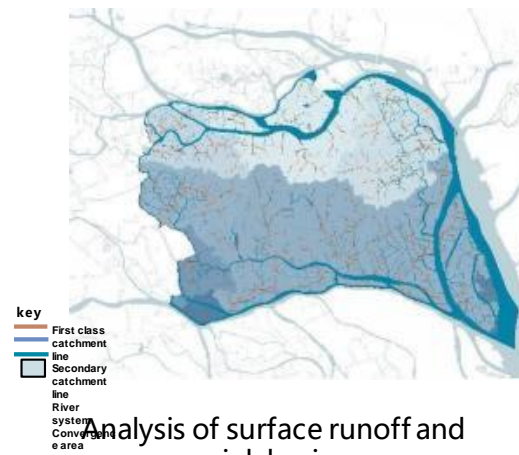


Schematic diagram of ecological barrier points based on circuit theory



Green network construction

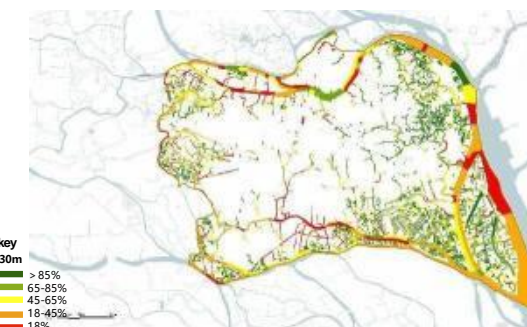
## Blue network



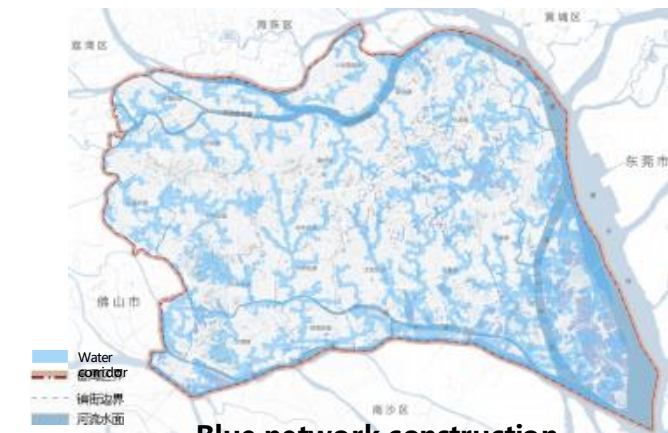
Analysis of surface runoff and sink basin



Evaluation of rainwater regulation and storage sensitivity



Evaluation of ecological construction conditions



Blue network construction

## Slow traffic system



Blue way



greenway



Rural style belt



Slow traffic network construction



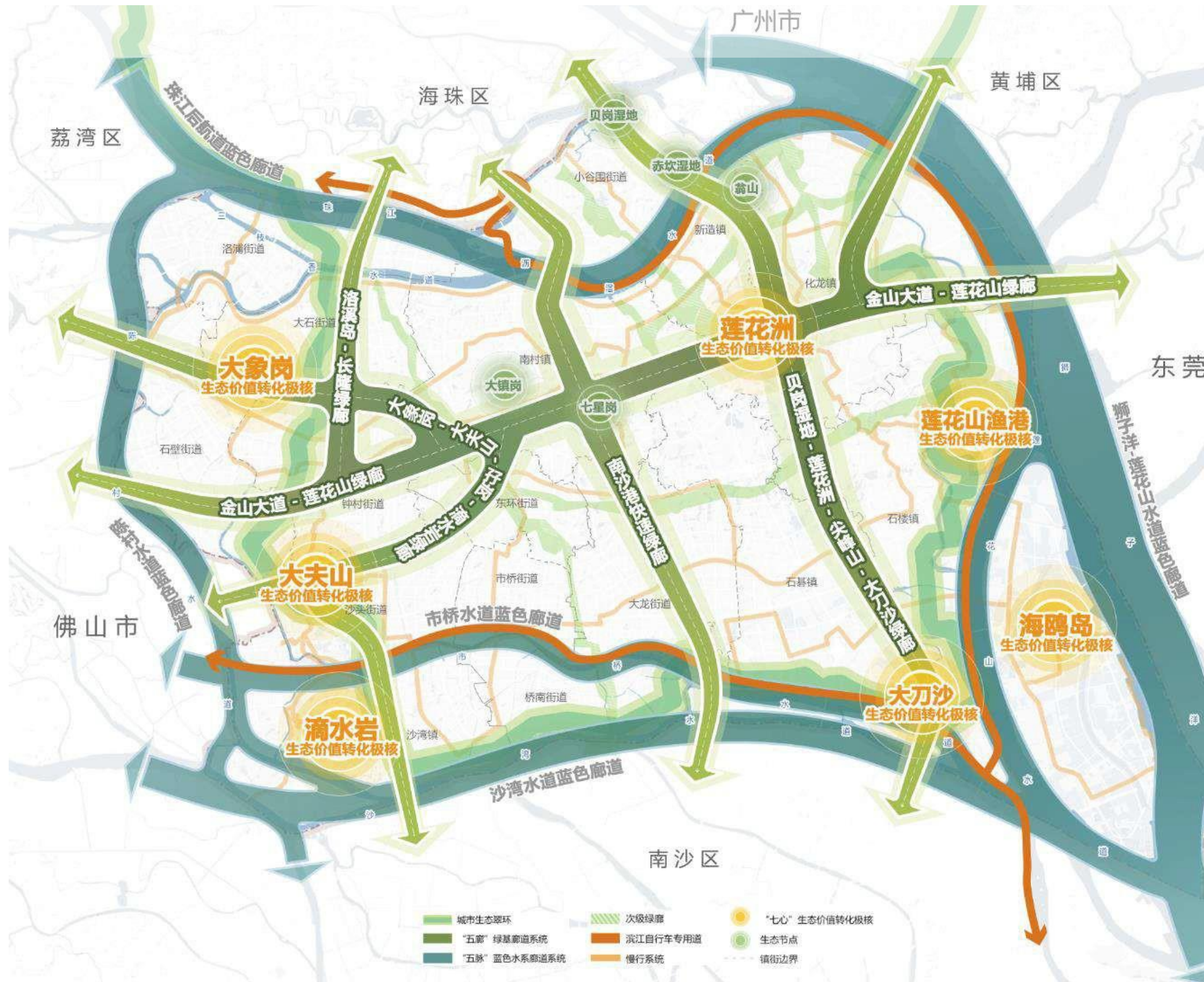
# Panyu Green Infrastructure General Map

Land use





# Green Infrastructure Slogan Map



## GI-NETWORK

**5** Veins supply the blue system

**5** Green corridors connect the network

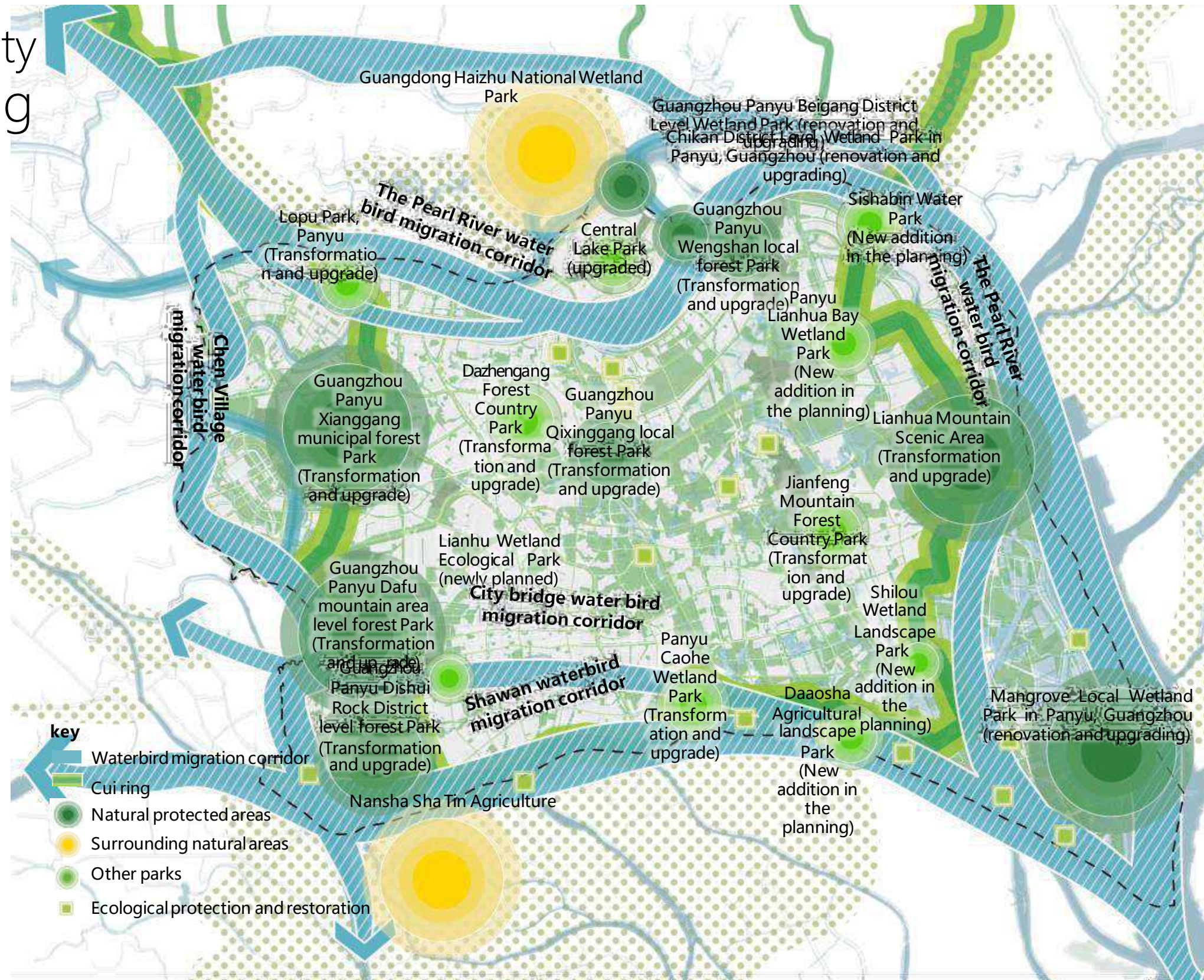
**7** Hearts for ecological transformation



# Blue - Green Network

## Measure group: Biodiversity Eco-Functional Planning

- Ecological Source area
- Green base corridor
- Ecological Stepping-stone planning
- Current reservoir river
- Water safety retention area

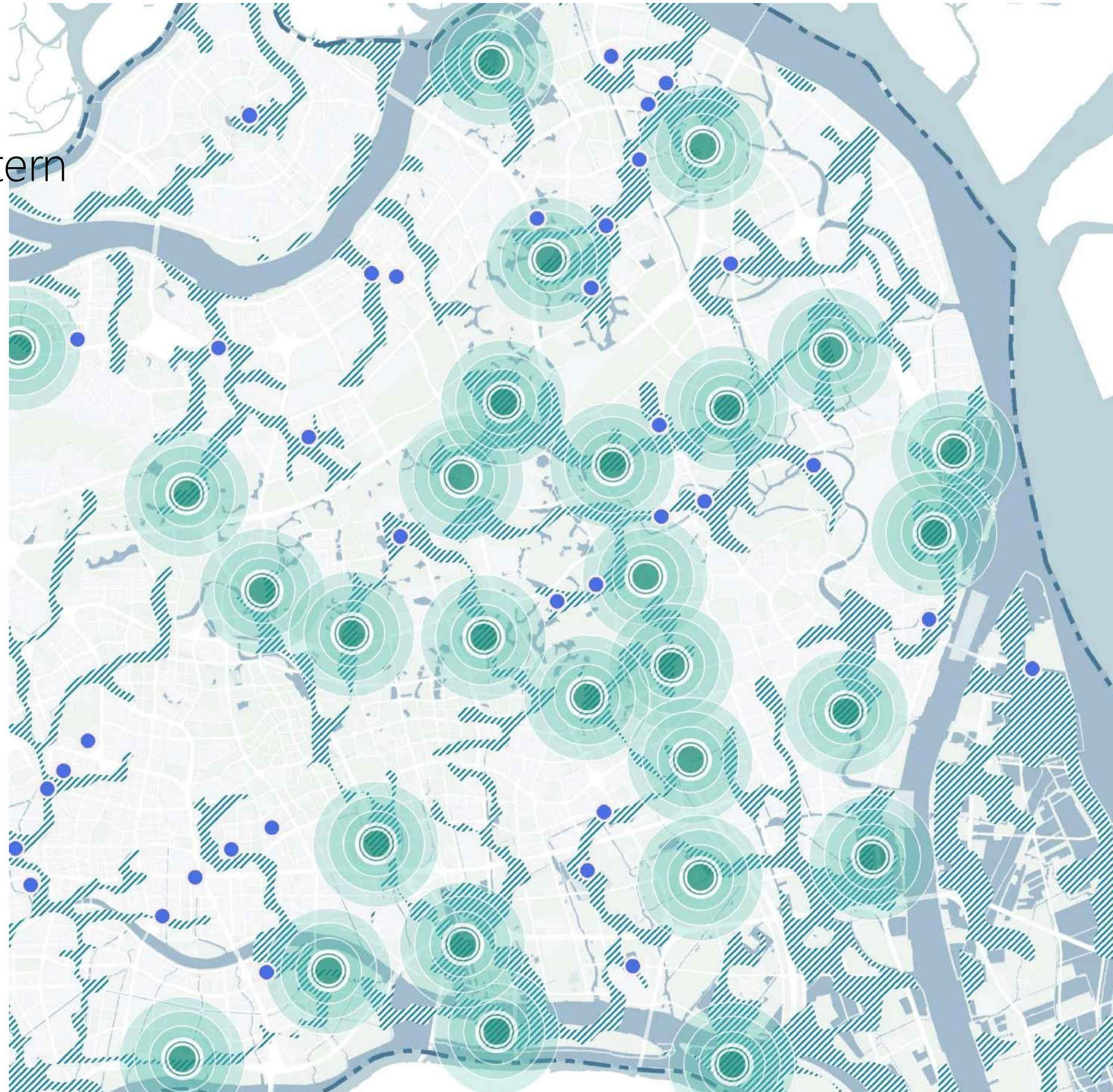




# Blue - Green Network

Measure group: Ecological Pattern  
Water body development  
concept

- 17 links for Rivers and channels  
(river and Chung water system)
- 24 Small micro wetlands
- Wetland Parks
- Urban sponge storages areas

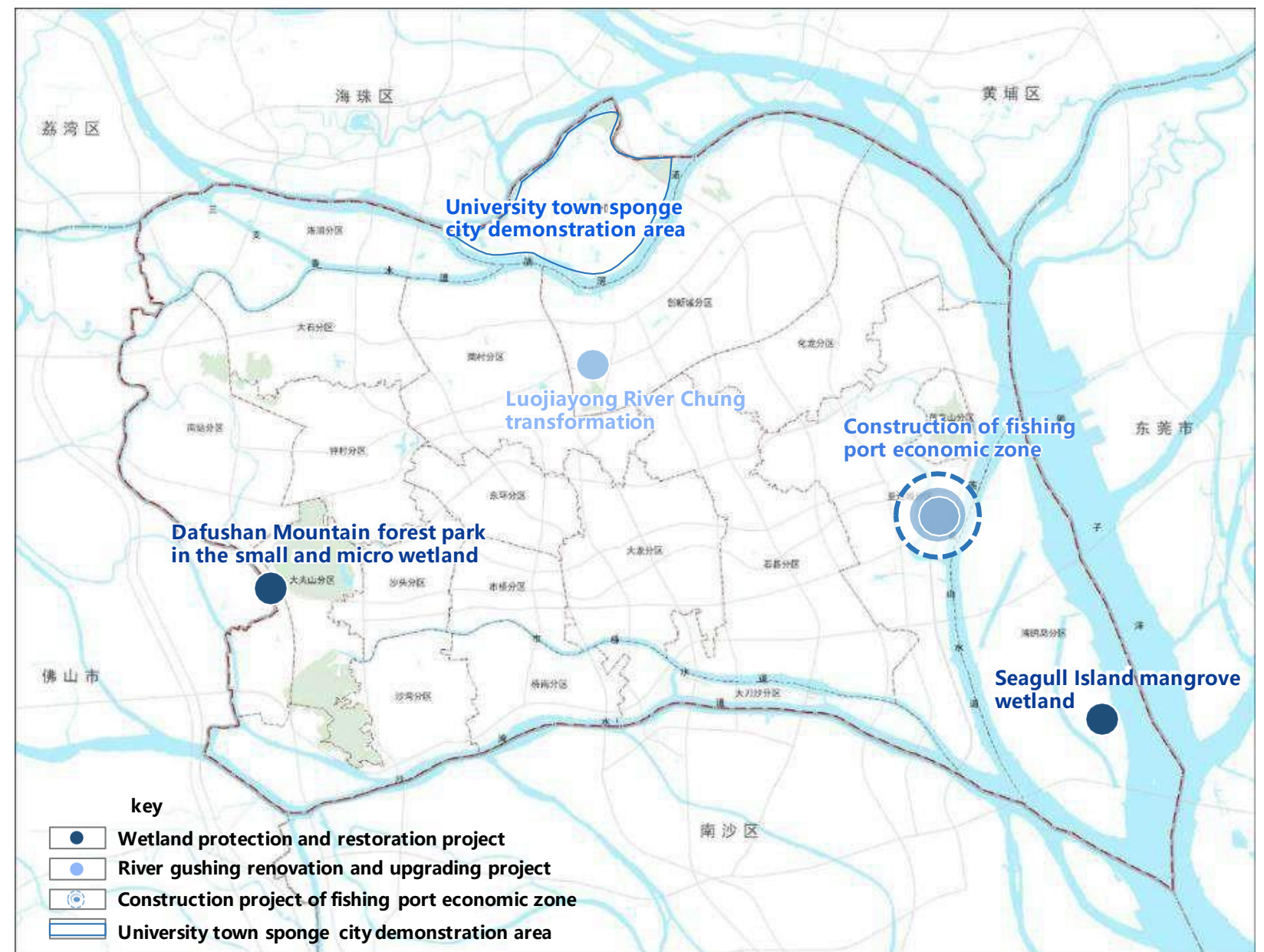




# Blue - Green Network

Measure group: Ecological Pattern  
Water body development  
concept

1. Wetland protection and restoration (2 projects)
2. River regulation
3. Construction of the start-up area of the fishing port Economic Zone
4. University City Sponge City Demonstration Area (21 projects)



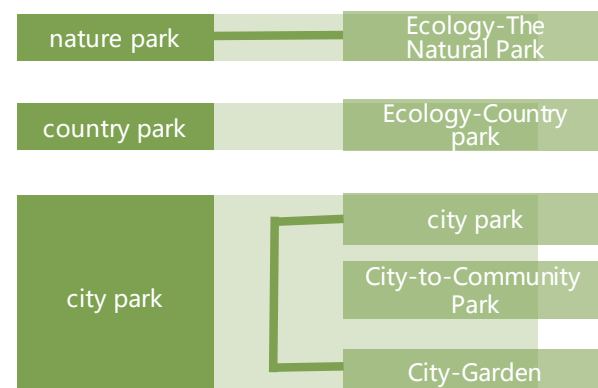


# Blue - Green Network









Measure group: People  
System of Public Parks

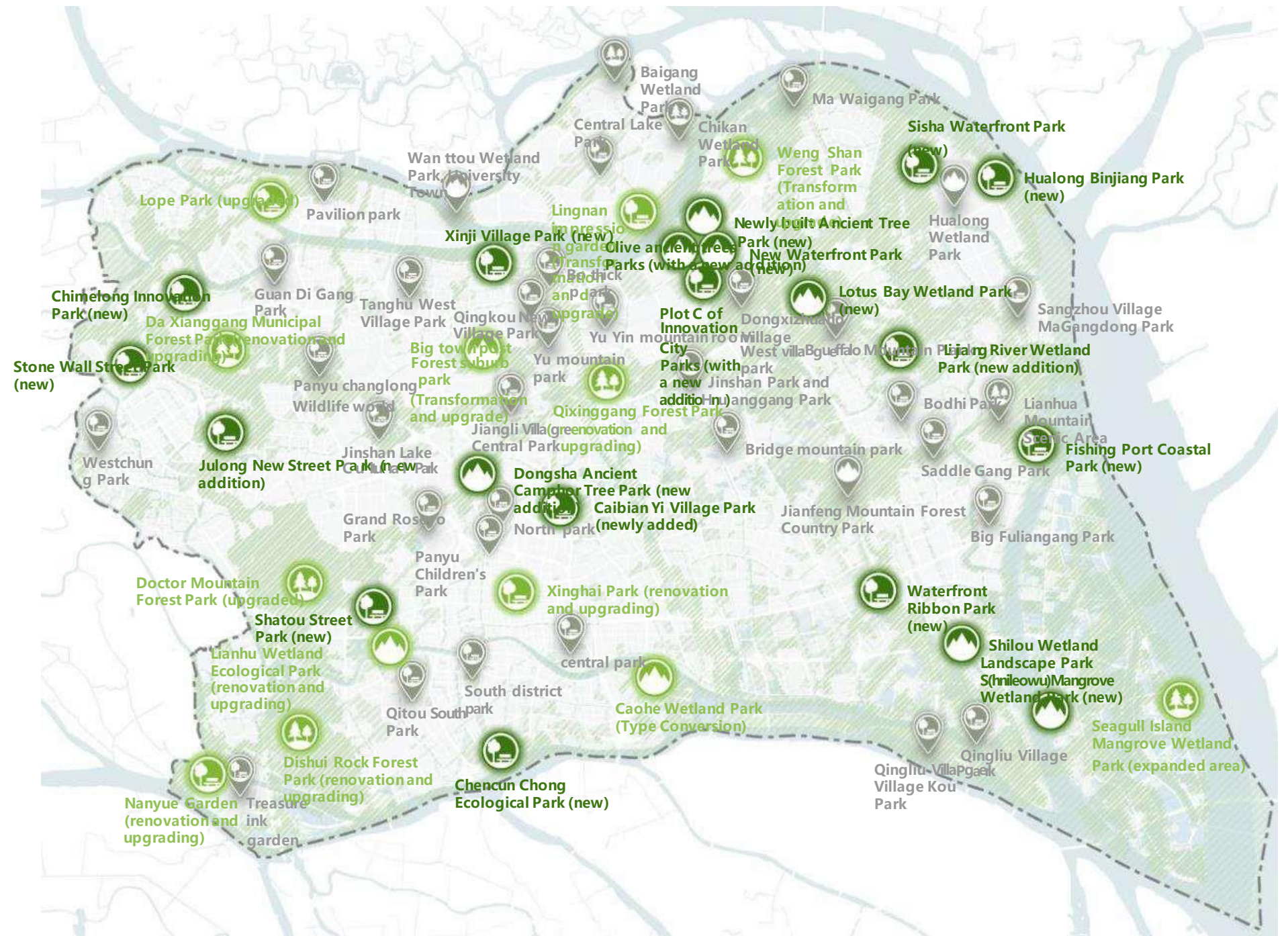
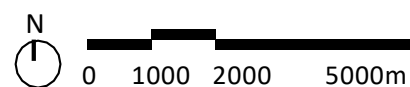
22 new parks planned

13 the public parks will be renovated/improved



**key**

-  Planning to add a new, country park
-  Planning for a new, city park
-  Transformation and upgrading, the natural park
-  Renovation and upgrading, country parks
-  Transformation and upgrading, city parks
-  Status quo is incorporated, and the natural park
-  Status quo for inclusion, and country parks
-  Status quo is incorporated, the city park





# Blue - Green Network

Measure group: Cultural Landscape

Integrated rural, agricultural and tourism development planning

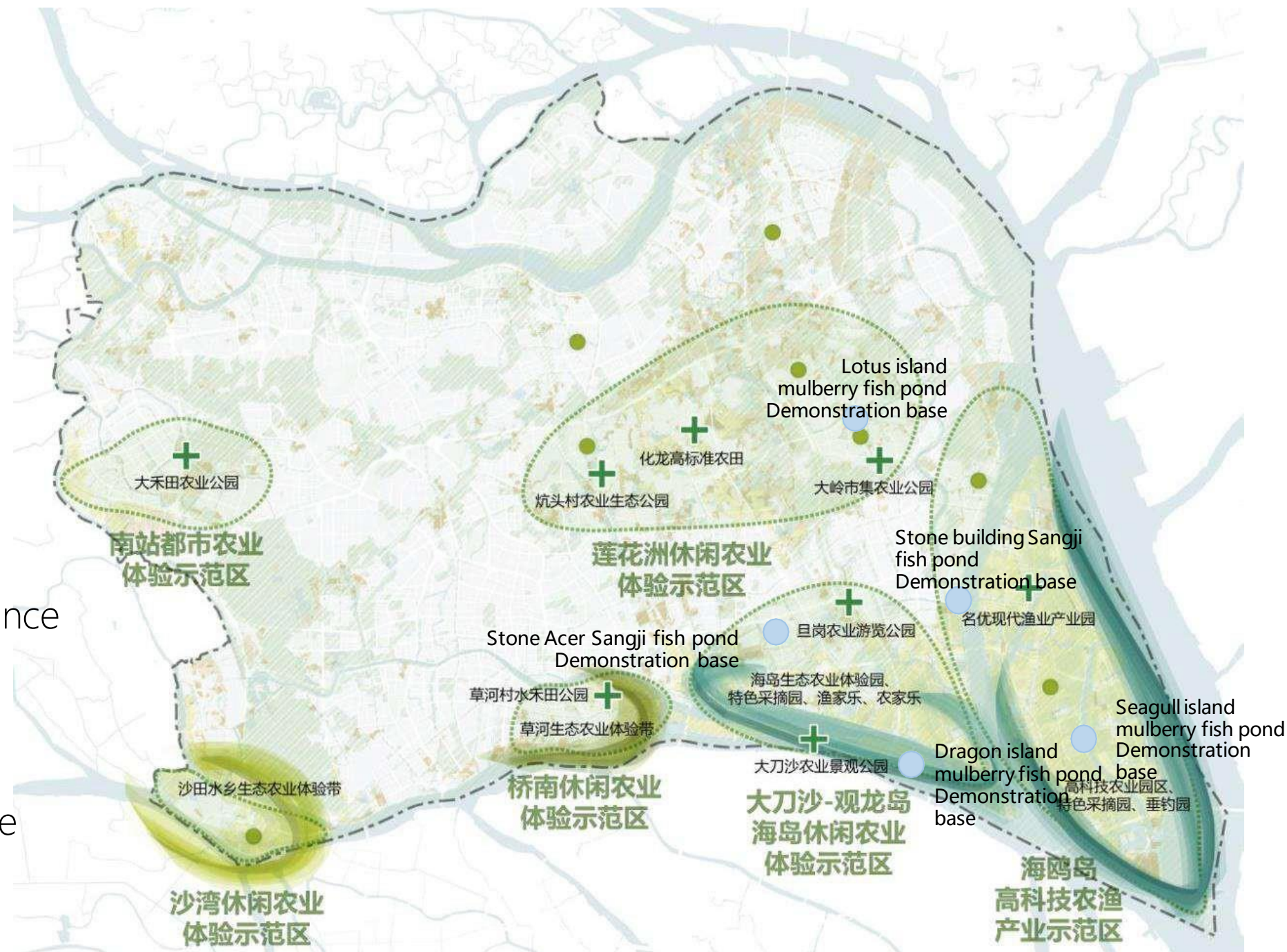
Rural revitalisation

Area consolidation

Sustainable production

Education

- Agricultural experience demonstration area
- Ecological agriculture experience belt
- Agricultural and fishing characteristic experience belt
- Agricultural park and agricultural display
- Mulberry base fish pond demonstration base

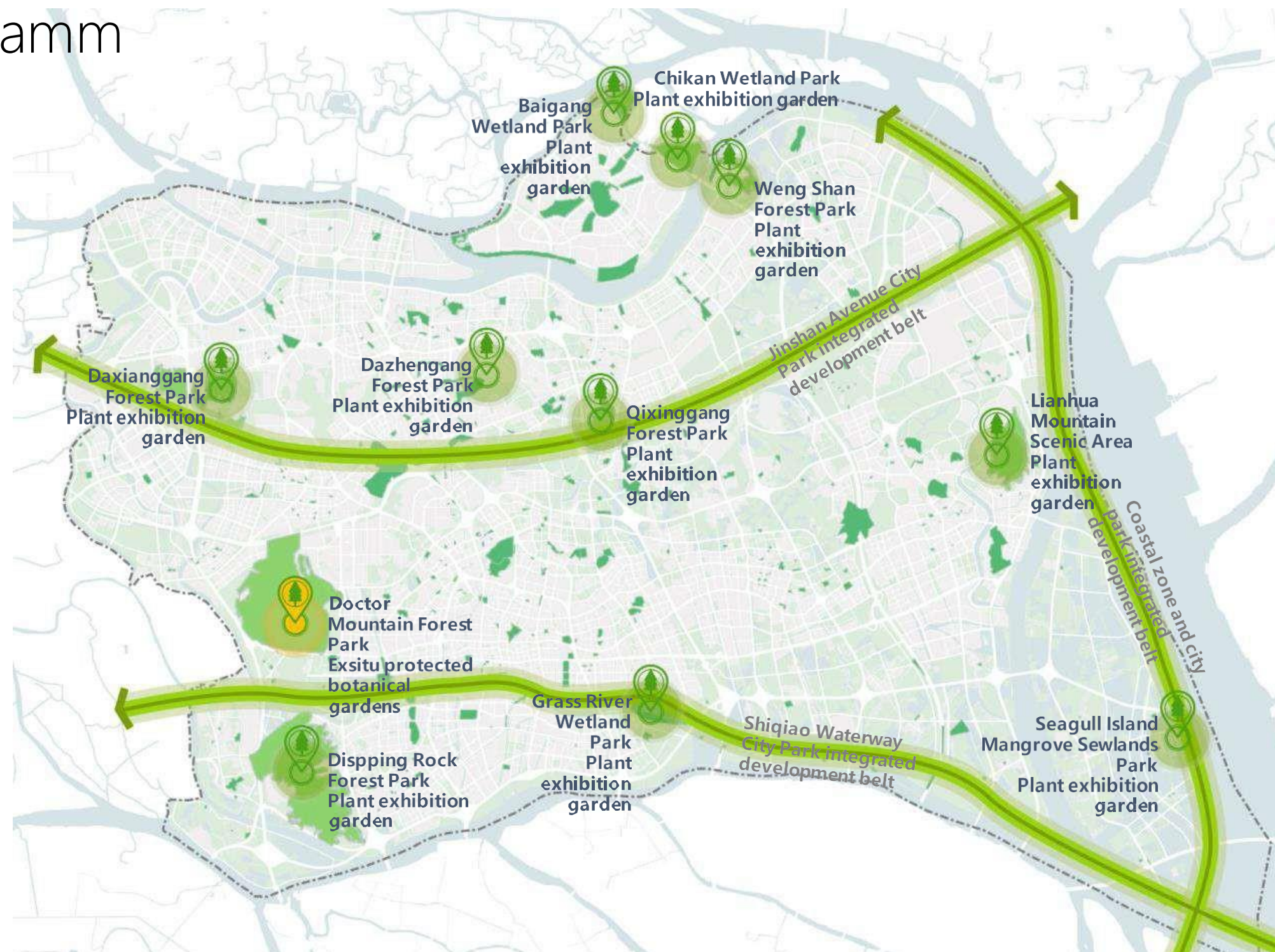




# Blue - Green Network

## Measure group: Botanical Gardens Botanical Gardens Programm

- 10 special Plant Exhibition Gardens
- Range of „ecological science popularization and recreation points“ combined with urban parks
- Yellow: Southern ex-situ protection demonstration area
- City-park integrated development belt



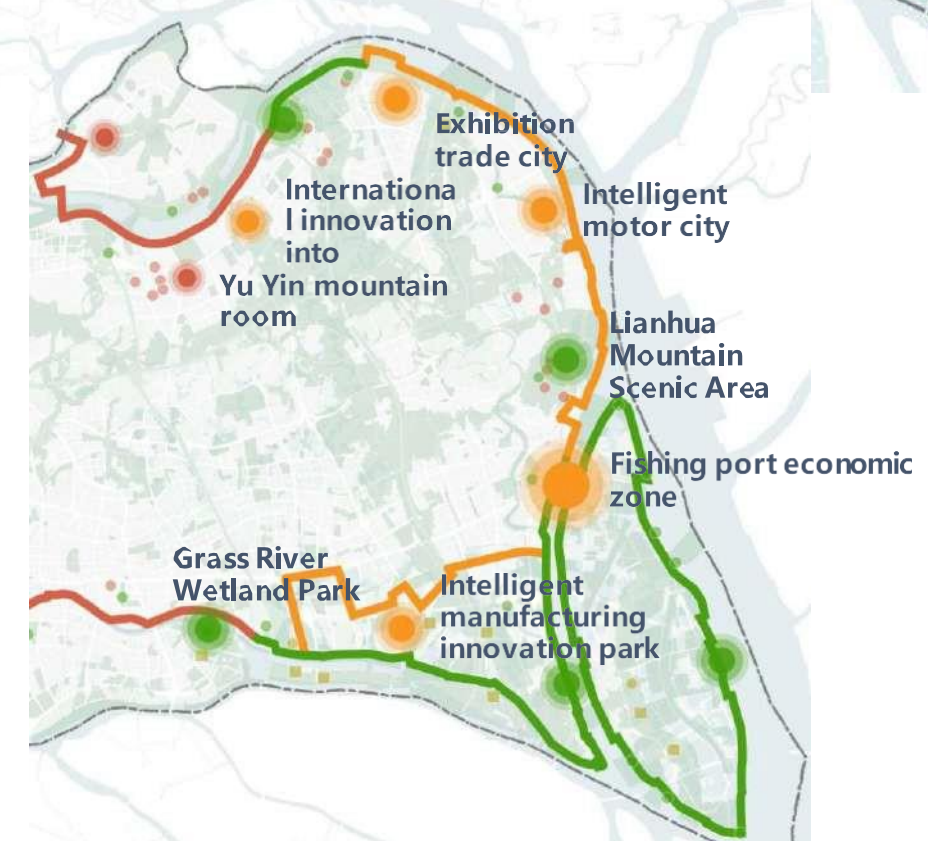
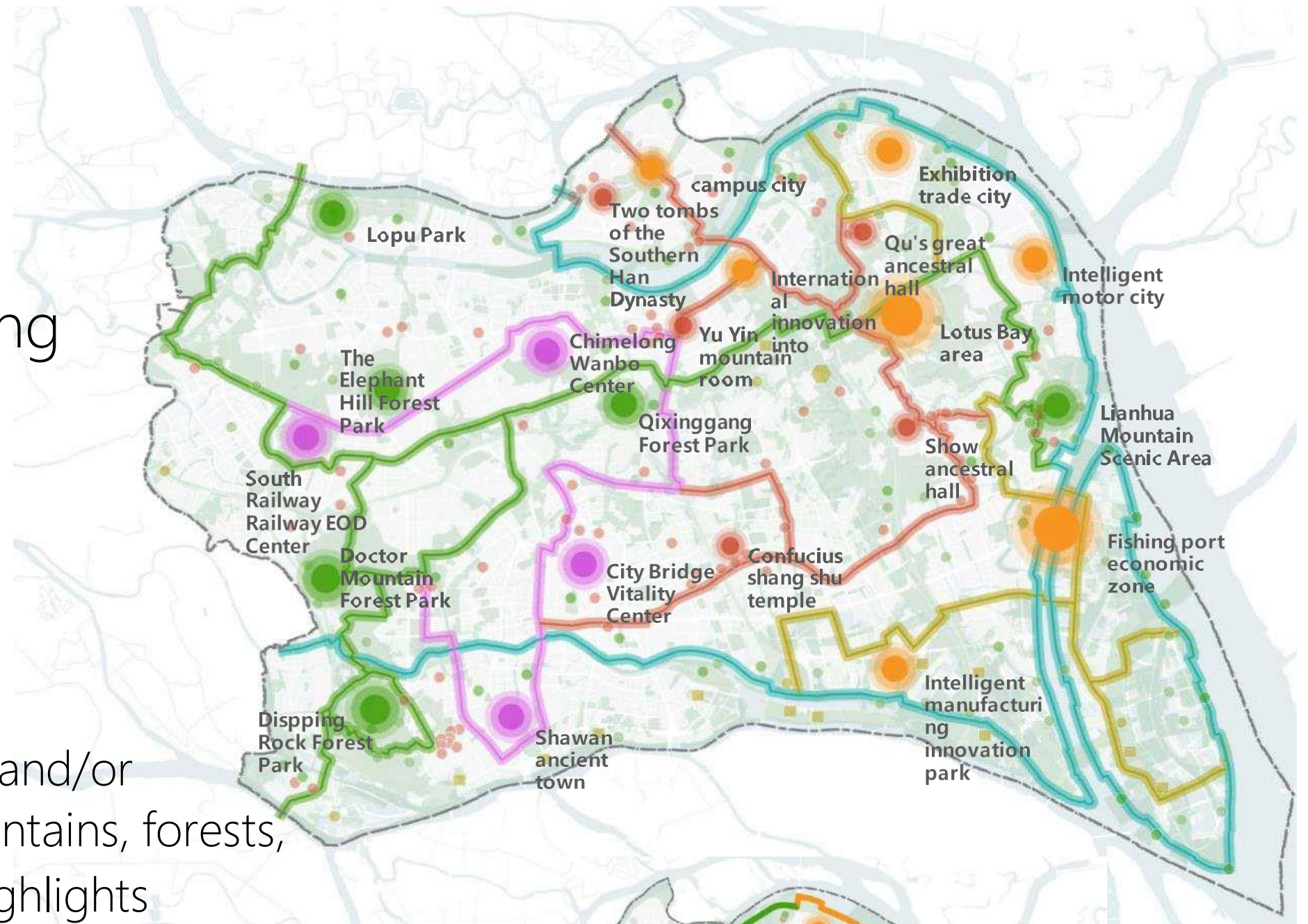


# Blue - Green Network

## Measure group: People Slow-Way-System Planning

Slow-Way-System for pedestrians and/or cyclists connecting important mountains, forests, waterfront and other landscape highlights

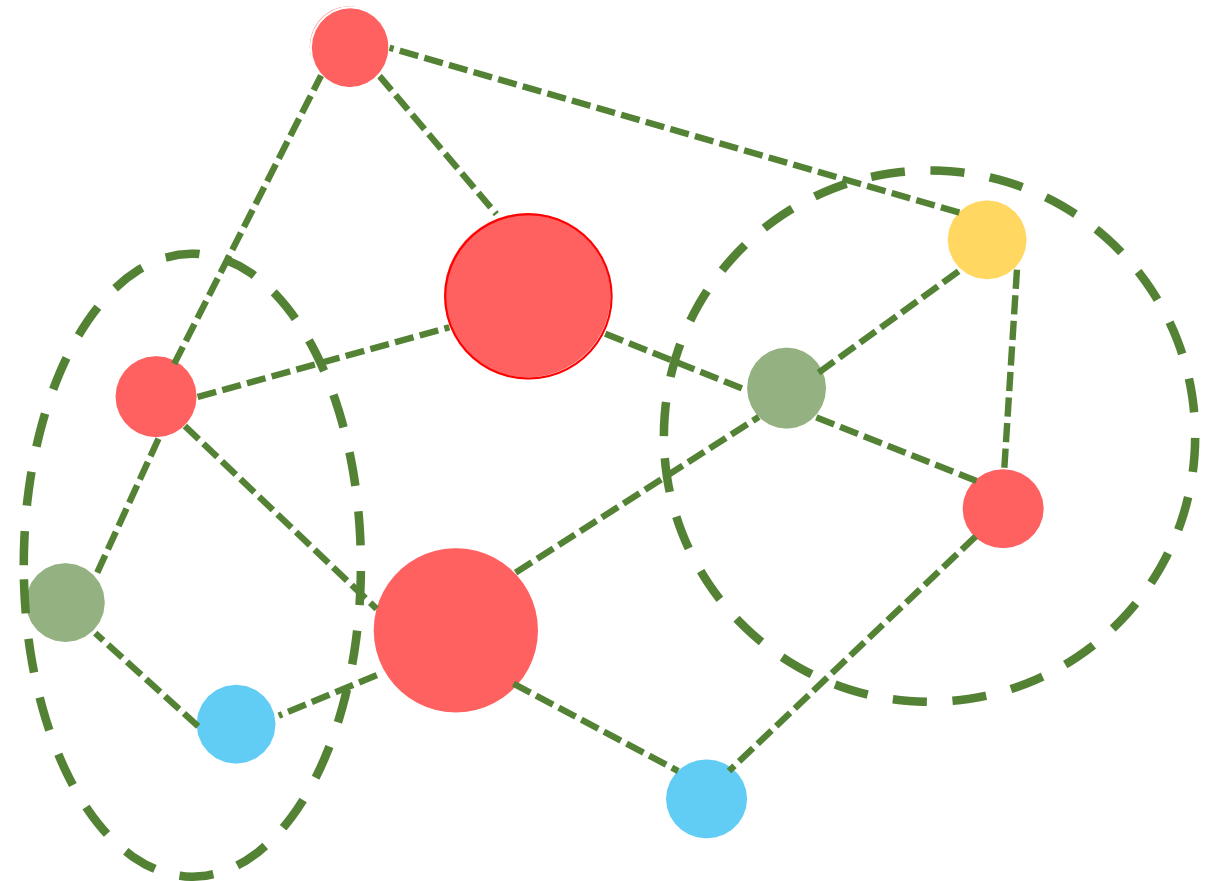
- 84km countryside ecological experience belt
- 40km urban vitality belt
- 57km farmland landscape belt in the east of Panyu
- 47km historical and cultural sightseeing belt
- 115 km riverside experience route





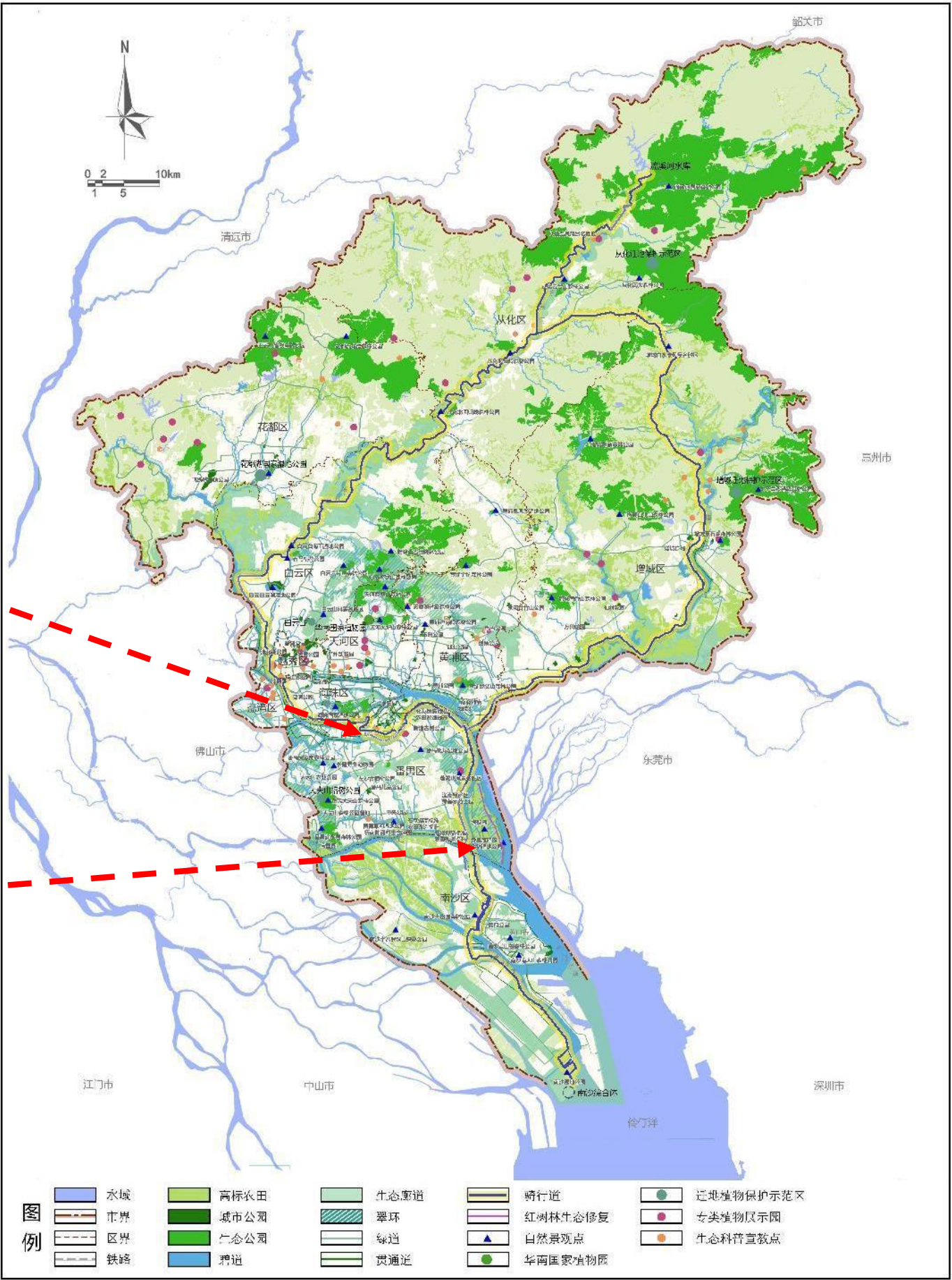
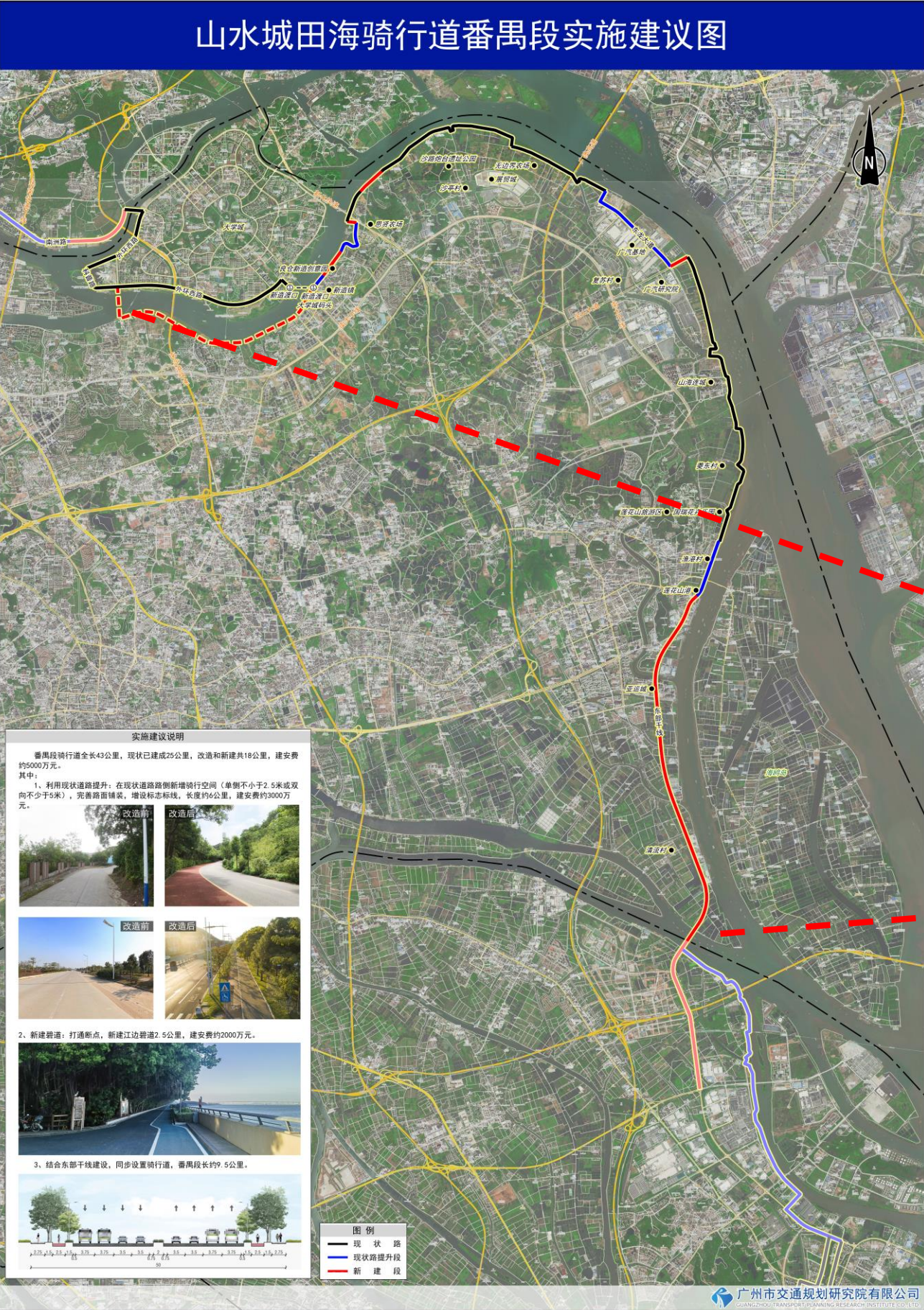
## Next planning implementation steps:

- 2 large landmark projects
- 5 Key actions
- 3 Demonstration nodes





# 2 large landmark projects

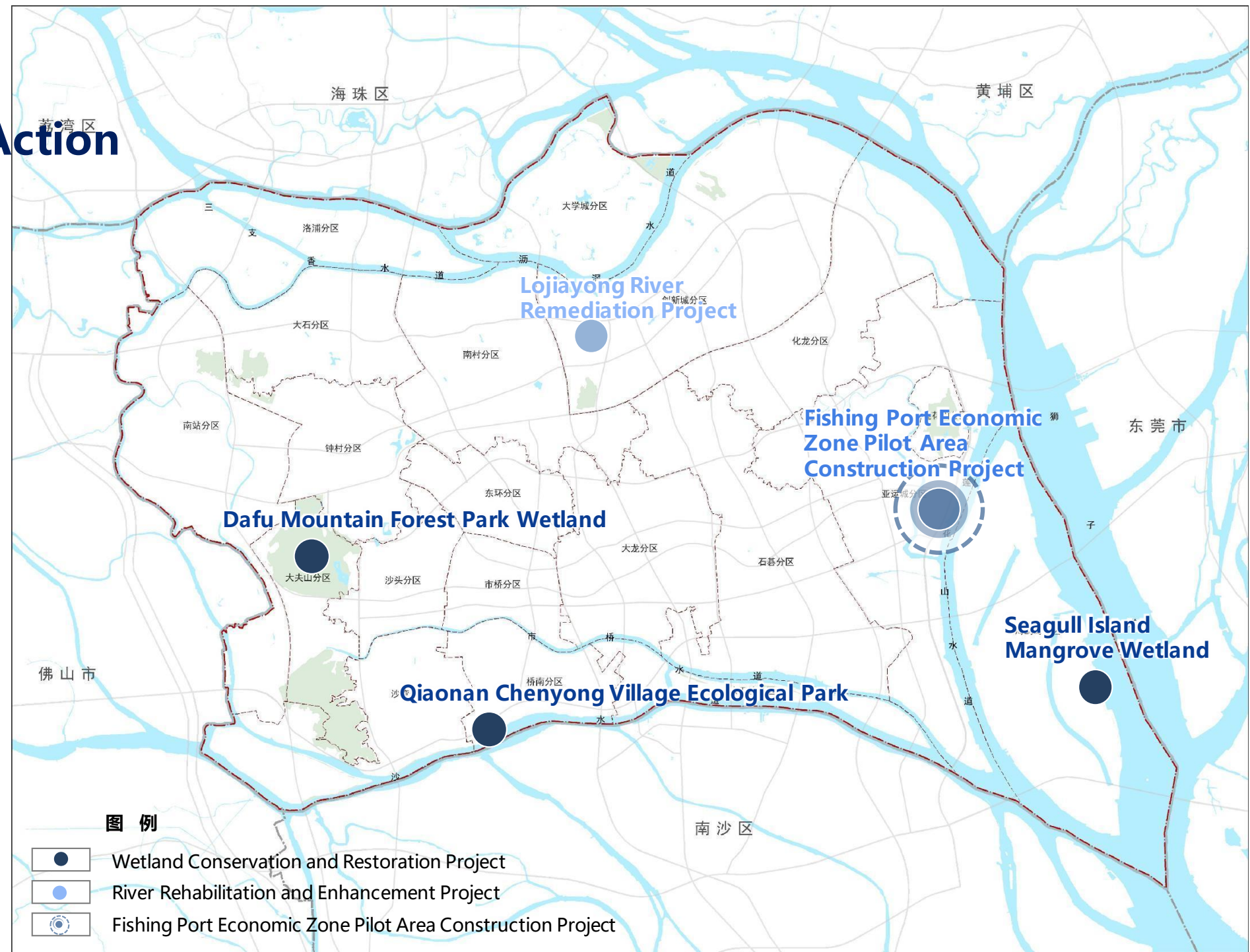




# Action

## Water Ecological Improvement Action

1. Wetland Protection and Restoration Project (3 projects)
2. River Remediation and Transformation Project (1.3 kilometers)
3. Fishery Economic Zone Start-up Zone Construction Project (Transformation and upgrading of Li River, Upper and Lower Yong River, and Lianhua Mountain Fishery Harbor, etc.)





# 绿色开放空间建设行动 Action Plan for the Construction of Green Open Spaces

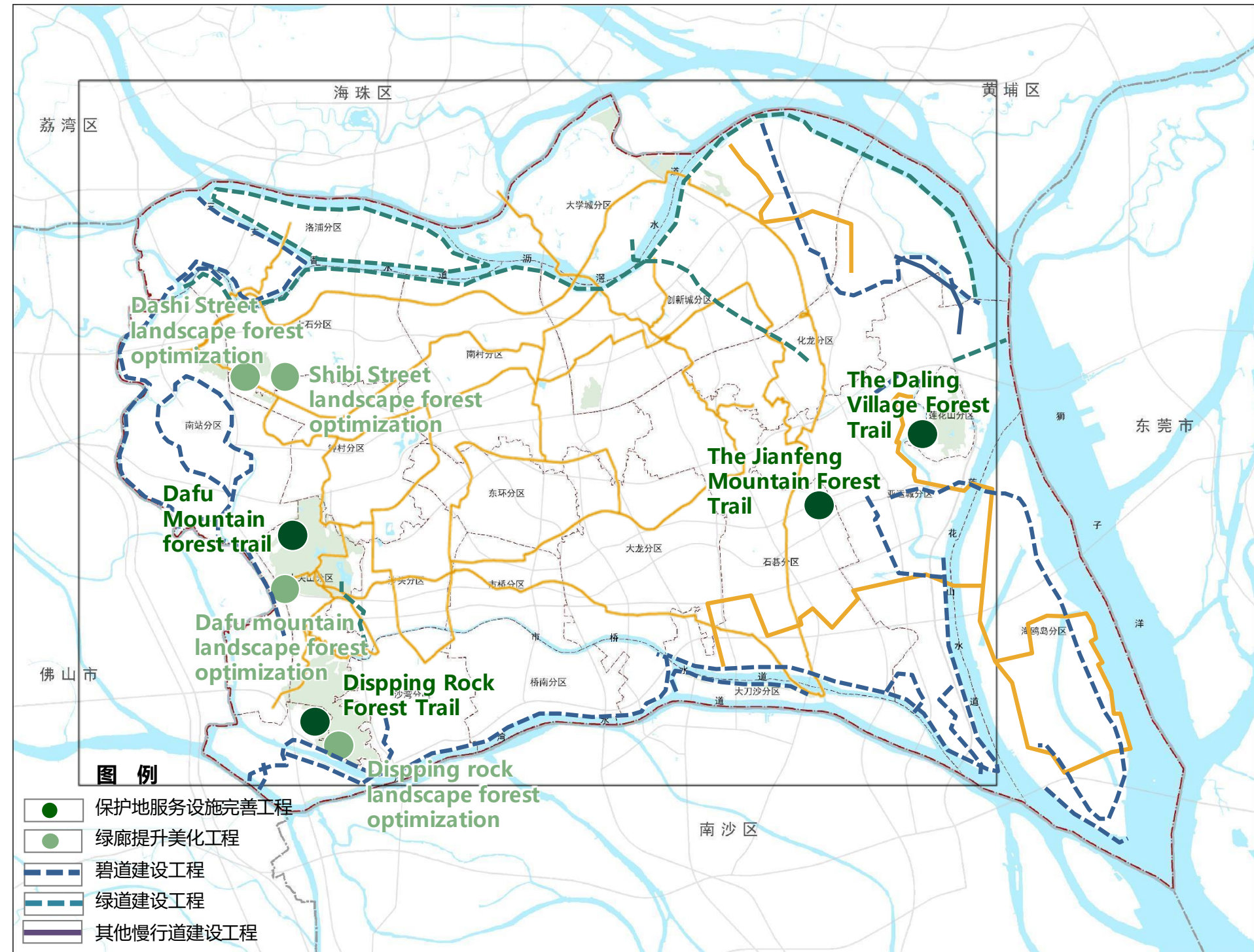
- 
- The map displays the Panyu District of Guangzhou, China, with its green space planning and construction projects. The district is bordered by Haizhu District to the north, Huangpu District to the northeast, Dongfeng City to the east, and Nansha District to the south. The map shows various parks and green spaces, including Lopu Park, Central Lake Park, Jinshan Lake Cultural Park, and others. A key indicates different types of projects: Urban Park Green Space Planning and Construction Project (Renovation and Upgrading Park), Urban Park Green Space planning and construction project (green planting), Urban Park Green Space Planning and Construction project (new urban park), Rural greening and beautification project, and Protection and restoration project of ancient and famous trees.
- key**
- Urban Park Green Space Planning and Construction Project (Renovation and Upgrading Park)
  - Urban Park Green Space planning and construction project (green planting)
  - Urban Park Green Space Planning and Construction project (new urban park)
  - Rural greening and beautification project
  - Protection and restoration project of ancient and famous trees



## Action

# 慢行系统建设行动 Construction Project of Slow Traffic System

1. Improvement of Protection Area Service Facilities (50 kilometers)
2. Upgrading and Beautification Project of Green Corridors (63 kilometers)
3. Construction Project of Blue-Green Roads (206 kilometers)
4. Green Path Construction Project (20 kilometers)
5. Other Slow Walk Path Construction Projects (305 kilometers)





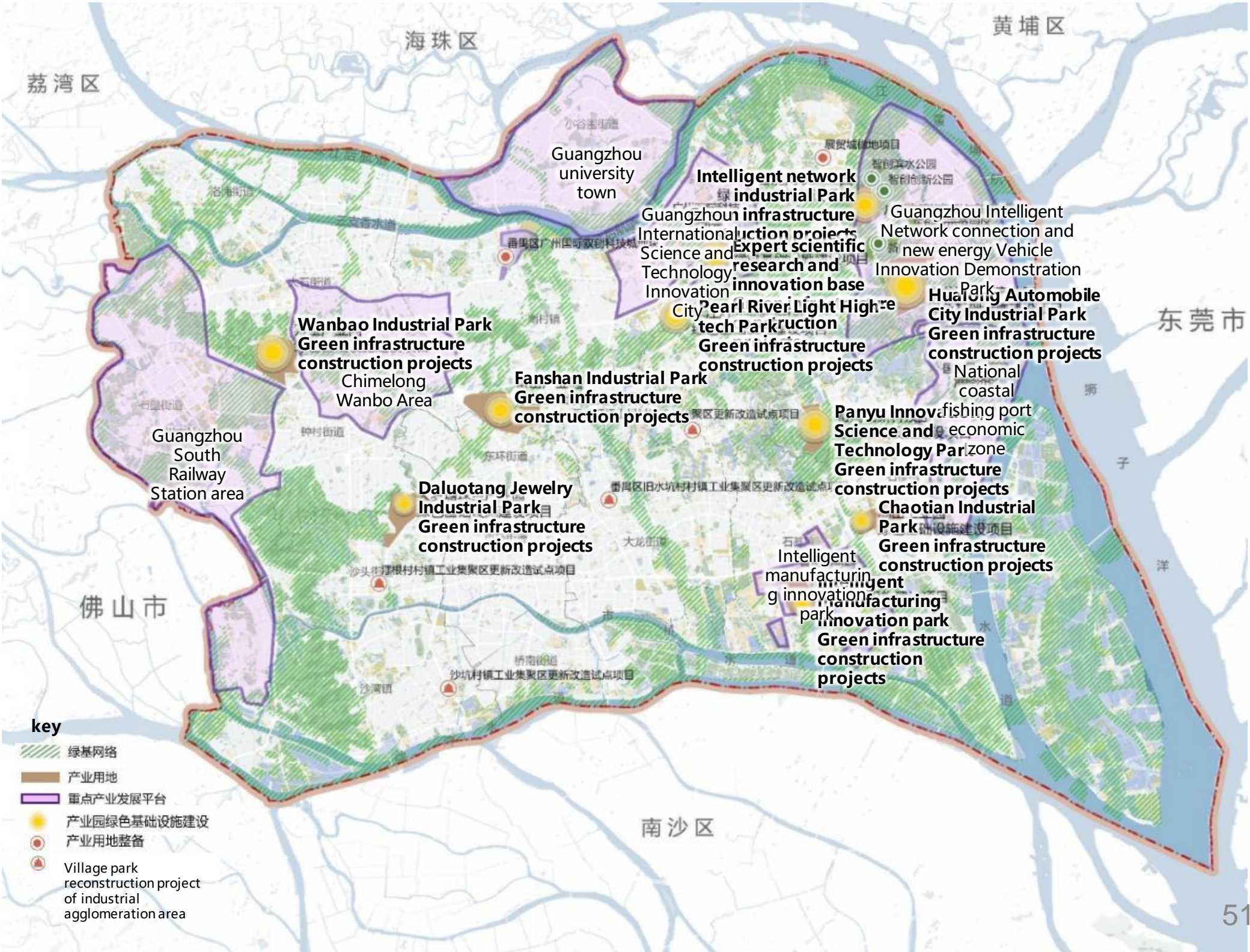
Action

# Green-industrial park concept

Leverage the green infrastructure park system to create green infrastructure development projects in various industrial parks.

Construction of 10 new green infrastructure projects for industrial parks

Ecological enhancement of 6 existing industrial zones



Reference source: Panyu District 2049 Overall Development Strategy (Stage Results), The Comprehensive Land Improvement Plan of Panyu District



# Action

## Green-industrial park concept

### (1) Green infrastructure construction of the industrial Park:

- Green roof: Set a green roof on top of the building, which helps provide insulation, sound insulation, and additional green space. Greening the roof can also reduce rainwater runoff and improve rainwater treatment.
- Vertical greening: Add vertical greening to the facade of the building, and increase the green coverage area by planting climbing vines or installing a vertical garden.
- Landscape design: Careful landscape design, including promenades, seating areas and other social spaces, to promote staff interaction and rest. Consider people's needs for activities to make the green space more pleasant. At the same time, emphasis should be placed on the avenue in the landscape design, and local trees should be planted as street trees.
- Environmental friendly building design: Adopt environmentally friendly design concepts in new buildings or renovation projects, including maximizing lighting, using renewable energy and using environmentally friendly building materials.

### (2) High-quality upgrading and transformation of rural industrial agglomeration areas:

- In order to improve the quality and efficiency of the stock and inefficient industrial land, the relatively orderly park or the park near the green corridor in the industrial zone will be upgraded into village-level industrial parks. At the same time, as the supporting space for the future park industry, it will gradually improve its green content, and become a model of symbiosis of industrial and ecological garden cities.

### (3) Green Base Innovation Park:

- Combined with the construction of the waterfront space around the industrial park, the innovation park forms the catchment space around the industrial park, reduces the rainwater discharge pressure, uses the rainwater for irrigation green space, and promotes recycling.

### (4) Green space construction in the park connects with the green base corridor:

- The green base construction of the industrial park will fill the green shortage of Panyu Industrial Zone, connect with the green base corridor, and expand the coverage of green space.



Source: Network / Vanke Cloud Design Community Ecological Office Park

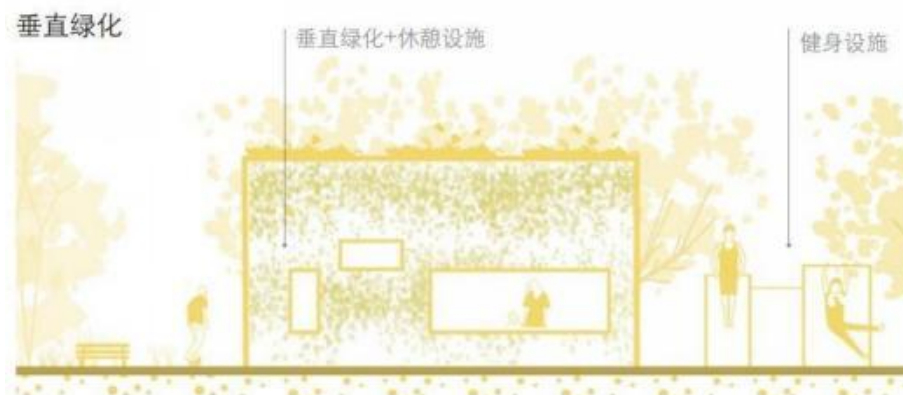


Photo source: this planning guidelines



Photo source: Comprehensive Land Improvement Plan of Panyu District - Pilot project of renewal and reconstruction of industrial agglomeration area in Jiushuikeng Village, Panyu District



Photo source: network / Shenzhen China Resources Vientiane House roof garden



Photo source: network / Germany Adleshof high-tech Industrial Park building vertical greening





# 农业景观建设行动

## Agricultural Landscape Construction Action

- 
- 图例**
- New Countryside Demonstration Belt Construction Project
  - Beautiful Countryside Highway No.1
  - High Standard Farmland Construction Project
  - Agricultural Park Construction Project
  - Organic Agricultural Product Demonstration Base
- Map Labels:**
- Beautiful Countryside Highway No.1
  - Hualong Organic Agricultural Product Demonstration Base
  - Shiqi Town High Standard Farmland Transformation and Improvement
  - Shilou Organic Agricultural Product Demonstration Base
  - Shilou Town High Standard Farmland Transformation and Improvement
  - Seagull Island Organic Agricultural Product Demonstration Base
  - New Countryside Demonstration Belt
  - Dahetian Agricultural Park
  - Nanpudao Organic Agricultural Product Demonstration Base
  - Huadong Town High Standard Farmland Transformation and Improvement
- Geographical Context:**
- 海 珠 区
  - 荔 湾 区
  - 黄 埔 区
  - 东 莞 市
  - 佛 山 市
  - 南 沙 区



## Action

### 3 Demonstration areas



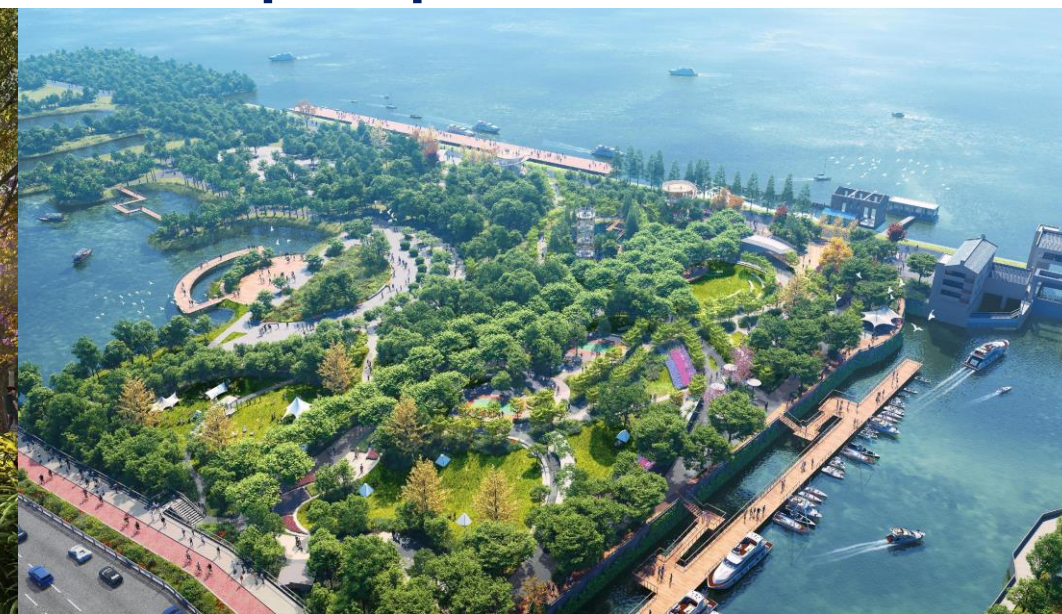
**Dahetian Agricultural Park**



**Chenyong Village Wetland Park**



**National Fishing Port Economic Zone Coastal Open Space**





## Action

### „Dahetian Agricultural Park“ (= Demonstration node)



*Discover ...*



## Action

### „Dahetian Agricultural Park“

(= Demonstration node)







# Conclusions

Green and blue spaces require prioritized development

Green infrastructure is a strategy for sustainable open space-oriented urban development

Green infrastructure planning is a comprehensive planning instrument for the sustainable development of open spaces





Thanks for your Interest!