Taihu Lake New Town: an comprehensive ecological plan towards implementation

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New City, the strategic platform of local economic growth and urban extension

- **12** provincial capital cities
- **4.6** new cities and towns on average for each
- **144** cities at the prefectural level
- **1.5** new cities and towns on average for each

*Source: data from the survey on 12 provinces conducted by China Center for Urban Development under National Development and Reform Commission*
Eco-city, a new hot topic in new city development

- Constructing eco-cities has become a trend in new town construction too. However, most of the eco-city planning is deficient and lacking a holistic perspective. The plans lack of a method to combine goals and content into the existing planning system to achieve efficiency, economic growth, and reduced pollution.

Source: data published by cities in 2013 and collected and mapped by the author
Taihu Lake New Town, an exploration of “overall ecological plan”

Nowadays, most cities’ traditional new town construction has provided a relatively complete planning system. How to implement an ecological civilization at all levels of construction is a meaningful issue for urbanization in our country. What follows are some aspects we can learn from Taihu New Town.
01 Overview
Wuxi: the “Pearl of Taihu Lake” with Long Culture History and Proposals Economy

- One of the central cities of the Yangtze River Delta, its environs have the best natural environment, the most abundant human resources, and the most developed and active economic environment.

In 2012 within the Yangtze River Delta, the city’s GDP, GDP per capita, gross industrial output value, and municipal revenue ranked fourth, first, third, and sixth respectively.
Taihu New Town: A mission to build a new town for a “National Low-carbon Ecological Demonstration Area”

- one the most important part of the master plan to convert Wuxi urban area from the “canal era” to the “Taihu era”.
- 2012: the “Build a National Low-carbon Eco-city Demonstration Area - Wuxi Taihu New City Cooperation Framework Agreement”

Area: **150km²**

**1km** east to airport

**6km** north to old city area

Populations of **400,000**

*Source: Master Plan of Taihu Lake New Town*
Since its inception Taihu New Town’s development, has undergone a change in concepts, from traditional new town construction to a transformative eco-city. This low carbon, ecological approach has laid a foundation for new town as transformation upgrade.
02 Spatial Planning
Goal: the New City Center

- New positioning: administrative and commercial center, scientific and creative center, leisure and livable center

- By 2020

In 2020, there will be one million people living in the new town and 500,000 will be employed there. Urban construction land will be 9,980 ha, and 5,020 ha will be non-construction land.
Clustering: Clarify the Three Major Functional Cluster

- **Western Zone**
  - 72km²
  - Creative industries and ecological tourism by constructing the nation’s leading university city and technology park, a tourism and leisure base, and a movie and television studio base.

- **Eastern Zone**
  - 23km²
  - National sensing and information center, high-tech research parks, university science and technology park.

- **Central Zone**
  - 55km²
  - Home to the financial, commercial, cultural and administrative centers and the livable communities of Taihu New Town.

*Source: Master Plan of Taihu Lake New Town*
Spatial Structure: One Core, One Belt, Two Parks and Two Zones

Source: Master Plan of Taihu Lake New Town
Public Facilities: **Three Levels of Allocation “Sub-district - Neighbourhood Centre – Grass-roots Community”**

- The three levels planned to serve 50,000-100,000 people, 30,000-50,000 people and 10,000-15,000 people respectively.

Source: Plan for community supporting system of Taihu New Town
Transportation: A Backbone of Rail, BRT and Conventional Bus Transit

- **1** highway (Taihu Lake Ring Road)
- **3** expressways (Gaolang Road, Lihu Avenue, and Huaqing Road),
- **2** Metro lines (Line 1 and Line 4),
- **6** BRT lines

- "five vertical and eight horizontal"
Ecological Infrastructure: forming the Ecological Context with the Green Corridors and the Water System

- regulating and retaining more than 300 original rivers
- opens up the symbiotic links between the lake and the city
- constructs a green space system of “three verticals and three horizontals"

Source: Master Plan of Taihu Lake New Town
Ecological Construction Strategy
3.1 Energy Saving Oriented Spatial Allocation of Urban Functions

1 Encourage Composite Urban Functions

- at the urban cluster level: rely on the practical strategies of the existing industries
  - Encourage low-carbon and service industries
  - Improve the live/work balance
- at the neighborhood level: Adopt mixed-use land development
- encourage mixed-use development
  - live-work, live-commercial, and commercial-work mixed-use
- suggests that more than 50% of the newly developed neighborhood be mixed-use.

Source: the author mapped according to Master Plan of Taihu Lake New Town
3.1 Energy Saving Oriented Spatial Allocation of Urban Functions

2 Improve Land Use Intensity

- Enhance development of areas surrounding public transportation hubs and along rail lines. Plot ratios for office uses should be between 2.5-6.0 and between 3.5-6.5 for commercial uses.
- Improve connections between underground spaces and public activity centers.

Encourage building urban complexes and public activity centers—with a greater than 80% overlap between the public activity center and public transport hubs.

Source: the author mapped according to Master Plan of Taihu Lake New Town
3.1 Energy Saving Oriented Spatial Allocation of Urban Functions

3 Enhance Distribution of Public Facilities

- enhance accessibility

Source: data from Taihu New Town Construction Headquarters
3.2 Multi-layer Green Transportation: green public transportation + slow mode system

a “public transit city” by constructing a coordinated multi-modal transport system with a complete rail, BRT and conventional bus system

- Slow Mode Transport System with a density of 3.7km/km²

source: Plan for Slow Mode Transport System of Taihu Lake New Town
3.2 Multi-layer Green Transportation: green public transportation + slow mode system

ensuring that each development unit has a 2 km service radius and 1-2 transit nodes

- integrate it into local neighborhoods, transit nodes and major public buildings. A complete bike share system will also help increase the use of green transport modes.

source: Plan for Slow Mode Transport System of Taihu Lake New Town
3.3 Promote Energy Saving and Low Emission Model for Energy and Resources Uses

1 Encourage the construction of common pipe trenches

- Encourage the construction of common pipe trenches (holding electric cables, telecommunications, and water mains). Total length of common pipe trenches is about 16.4 kilometers.

Source: data from Taihu New Town Construction Headquarters
2 Water Resources/ Water Circulation and Regeneration

improve the utilization of unconventional water resources

• the water loss rate in the new pipe system should be no more than 5%.
• Use of unconventional water resource should be above 40% for new projects.
• Achieve 100% use of water saving appliances.

Improve sewage treatment

• adopts a grey water reuse system
• aims top expand grey water use to 30%

Achieve ground permeability and zero impact.

New roads and buildings of the New Town will comprehensively utilize a rainwater reuse system and increase rainwater infiltration through permeable surfaces to guarantee that rain infiltration remains the same as before development—achieving zero impact in regards to stormwater runoff.

• adopts a grey water reuse system
• aims top expand grey water use to 30%

Achieve 100% use of water saving appliances.

Source: data from Taihu New Town Construction Headquarters
3.3 Promote Energy Saving and Low Emission Model for Energy and Resources Uses

3 Waste Disposal Technology

Reduction of solid waste

- Per capita garbage disposal should be no more than 0.8 kg/person/day.
- Reduced construction waste will come about through efficient construction techniques and utilizing construction debris for land reclamation.

Utilization of solid waste as a resource

- The plan states that the New Town’s garbage recycling rate should be no less than 95%.
- The recycling rate of construction waste should be no lower than 75%.

Zero impact on solid waste disposal

- The plan targets Taihu New Town to have hazard-free treatment rate and waste collection up to 100%.
- Implement an ecological vacuum waste collection system.

Source: data from Taihu New Town Construction Headquarters
3.3 Promote Energy Saving and Low Emission Model for Energy and Resources Uses

4 Energy Saving and Regeneration Technology

**Strategy for new building energy savings**

- The proper use of shading devices, thermal insulation, sound insulation, and environmental friendly technology will reduce each building's energy consumption. The plan targets the energy efficiency rate of new residential and public building's to be greater than 65%.

**Strategy for utilization of renewable energy**

- The utilization rate of renewable energy should be above 8%, new buildings renewable energy utilization rate of 15% or more, in the low carbon eco-city will be more than 20%.
- The technology of distributed energy form

*Source: Special Plan for Energy of Taihu Lake New Town*
## 3.4 Protect and Improve the Ecological Environment

### Development goals

Air: Monitored air quality levels should be better than or equal to national Standard 2 at least 350 days per year.

Water: Strengthen control of Taihu Lake’s water environment so that the lake’s surface water environment quality is not lower than Class III.

Noise: Environmental impact assessments should be done before each construction project.

### Greening projects

- Improve the landscape’s photosynthesis rate to at least 45%.
- Plant tall trees and create protective green space 80%, road green space 70%, and park green space 60%.

### Livable city

- Actively promote the building of the vertical greening and increase the number of green roofs to increase the carbon sink capability of the eco-city.
3.5 Promote Green Architecture

Eco-city new buildings are constructed in accordance with the "Green Building Evaluation Standards" and "Green Building Evaluation Standards of Jiangsu Province". 100% of the buildings will pass the one-star certification, with 20% qualifying for two-star certification and 10% for three-star certification.

Source: data from Taihu New Town Construction Headquarters
04 Character Analysis
Characters of Ecological Construction

Comprehensive, operational, local, detailed
Intermediate-level Technical Exploration of Comprehensive Ecological Planning

Ecological planning oriented by goals

**Development Goal:**
Innovation town leading the development of environmental industry

Ecological promotion based on traditional planning system

**Development Goal:**
new administrative, scientific and educational creative, living and recreational centers

Ecological planning oriented by goals

**Development Goal:**
showcase of livable low-carbon district and new towns in the future

Source: drawn by the author
Intermediate-level Technical Exploration of Comprehensive Ecological Planning

**Traditional Planning**

- 150km²
  - Overall planning level
    - Taihu New Town Comprehensive Planning
    - Municipal, road, water system, and public facilities special planning

  *Taihu New Town Comprehensive Planning*

- 2.4km²
  - Land planning level
    - Existing control detailed planning

  *Sino-Swedish Eco-city Planning*

**Ecological Consultation**

- 2

**Indicators System**

- 2

**Construction Indicator System**

- Taihu Eco-city Planning
- Circulated information strategy
- Ecological development strategy
- Low-carbon economy strategy
- Green transformation strategy


**Update Plan**

- Update the regulatory unit
- Ecological indicators update of the Taihu New Town Detailed Plan

**Deepen the Subject Planning**

- Ecological examination of energy, slow transportation, and municipal pipelines

**Promote the Plan Revision**

- Sino-Swedish Eco-city Detailed Plan Revision
- Wuxi Sino-Swedish Low-carbon Eco-city Indicator System and Implementation Guidelines for Construction

Data source: Drawn by the author
Intermediate-level Technical Exploration of Comprehensive Ecological Planning

Traditional Planning system

Ecological Planning system

Both macro-level planning of space and micro-level guidance on land development

Source: drawn by the author
Operational Indicators System Establishes Both Technical and Management Measures

- Not a “One Size Fits All” – the Guidelines Provide Sufficient Flexibility

- it combines the practicability of implementation in the guidelines with targeted decomposition

- Local character

Source: Operational Indicators System
Support of Local Industry and Ecological Environment

**Other Eco-cities**

- focused mainly on residential and living facilities—mono-functional projects
- lacked cohesion and planning with the surrounding city economically and socially.

**Taihu New City**

- Taihu New Town has functionally diverse planning to create integrated development that is ecological and livable and has high-technology industries, tourism, and modern services.
- The strong foundation of new energy technologies and industry has contributed to the development of a low-carbon eco-city, and formed networked foundation for business, research, government, and market.
In 2005, urban design for the Taihu New Town started in the core area to optimize the functional layout of the Central Zone and explore possible city skylines, focus points, and interfaces. In stages, designs were completed for focal functional areas, spaces along main roads, and the waterfront. All main urban design was completed in 2007.

- **focal functional areas**
  - CBD, sensing center, golden bay park...

- **spaces along main roads**
  - Gaolang Road, Guanshan Road, Lixin Avenue...

- **the waterfront**
  - Shangxian River, Gonghu Bay, Liangtang River...

- **to coordinate the generation of a district skyline**

- **to design the urban space along the main roads, to focus on the building scale and setbacks,**

- **focus points, facilities**
Directly Guiding Detailed Urban Design for the New Town’s Place-making

Source: Urban Design for No.2 and 3 Blocks in CBD of Taihu Lake New Town
Thirty-year urbanization of China has witnessed an unprecedented construction wave of new cities in world`s history. There are both success and lessons. With emphasis on ecological construction and based on traditional concepts of planning, the construction of Taihu Lake New Town is a practical and sustainable example in this area.
We Welcome Your Comments and Suggestions!