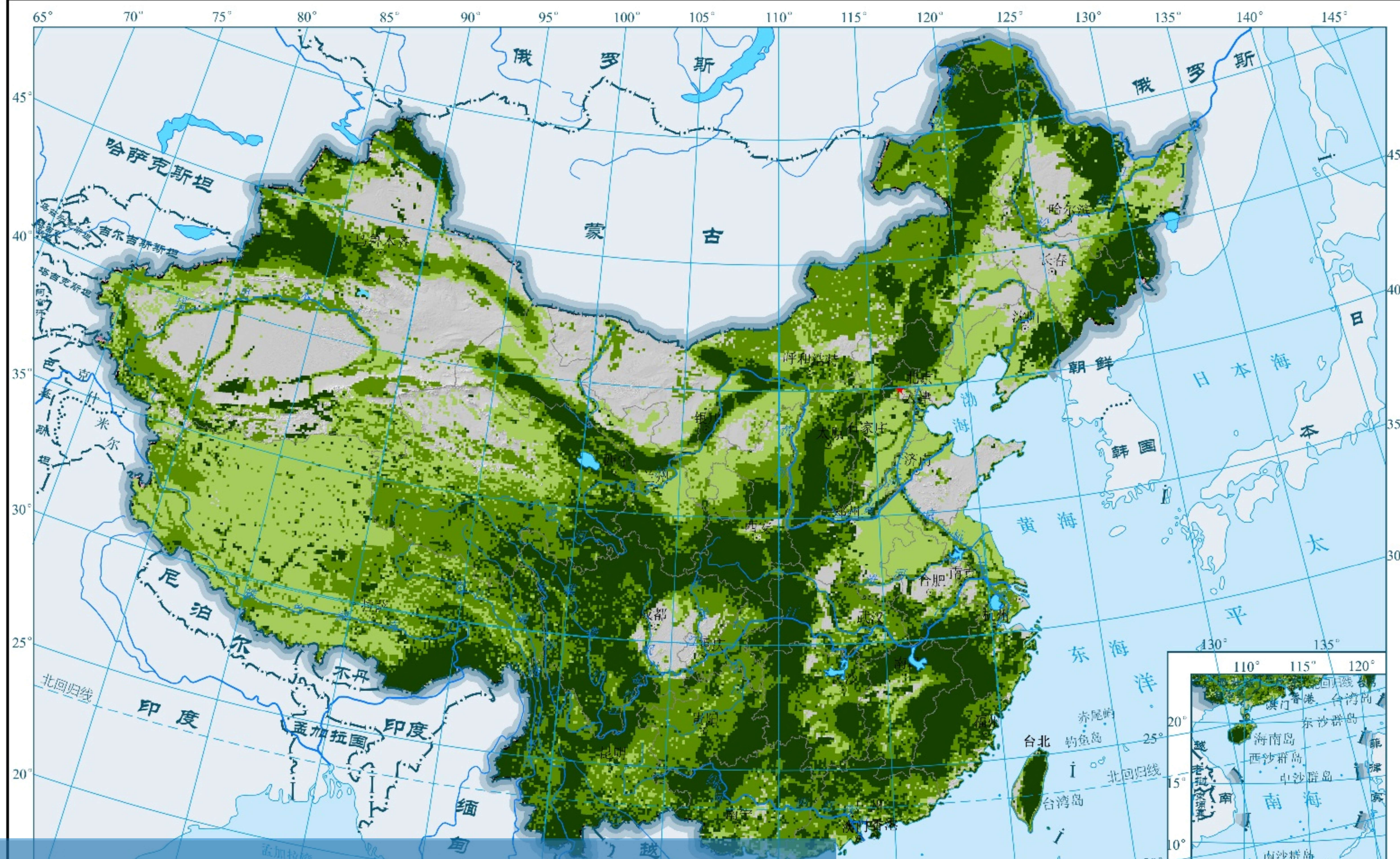




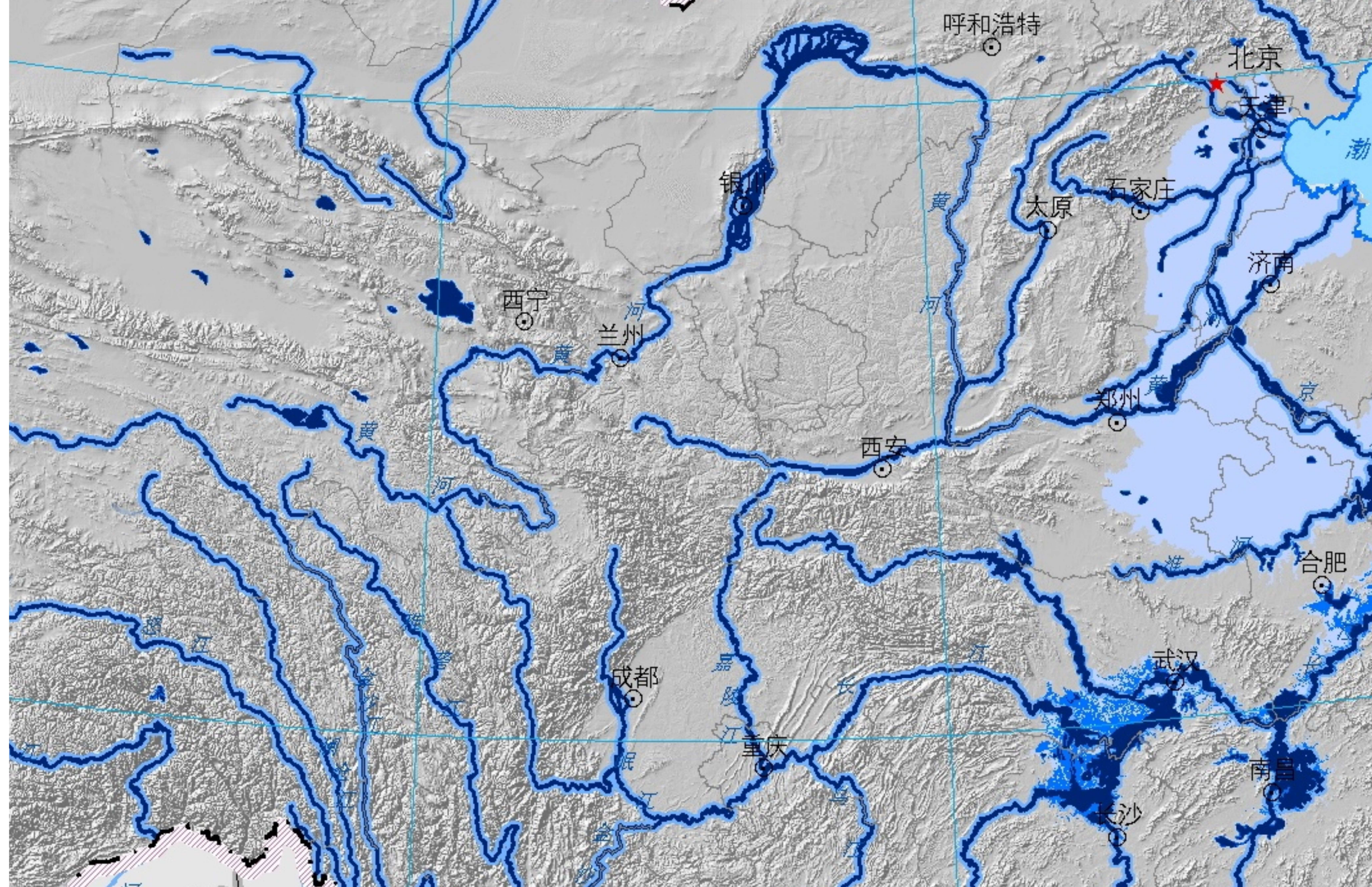
王冬
WANG DONG
土人设计
TURENSCAPE

Nature-based Solutions

Sponge City and Holistic Solutions
Inspired by Ancient Wisdom



China National Ecological Security Patterns
TUBENGSCAPE / P. Li, H. Li



中国近 70% 的 GDP 和人口都集中在占国土面积 6.2% 的淹没风险区内。

农业时代生产方式对自然的适应，创造了许多富有智慧的可持续农业模式，形塑了我国大江南北的景观面貌



元阳梯田



大理，历史上，苍山上的雨水经过森林植被过滤和滞蓄调节，缓缓流向平原，灌溉良田；田里溢流出的养分被长满植被的河渠湿地净化过滤，汇入洱海，湖水清澈见底



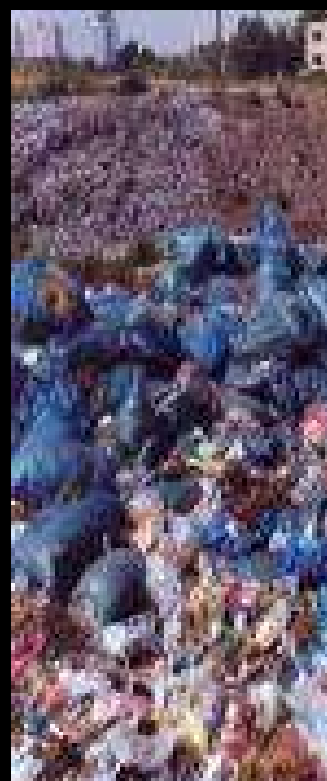
工业化的农业生产、过度的化肥和农药，加上渠系统，彻底毒化了山水林田湖草生命共同体，水质面临严峻考验

Challenges:

Climate Change +



air pollution



Flood: annual flood damage cost 100 billion US \$

Draught: 400 of 662 cities in shortage of water

Pollution: 75% of the nation's surface,
64 % of underground water

Habitat loss: 50%
years

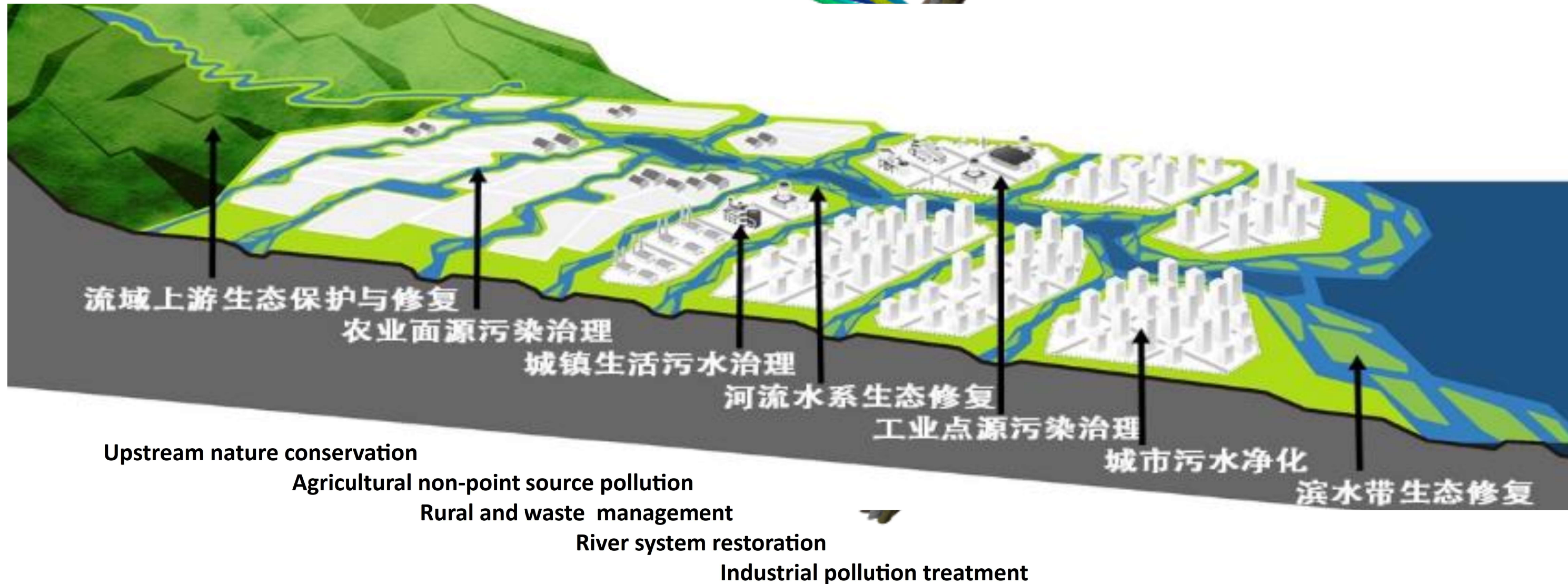
Conventional solutions of single-minded engineering are not sustainable



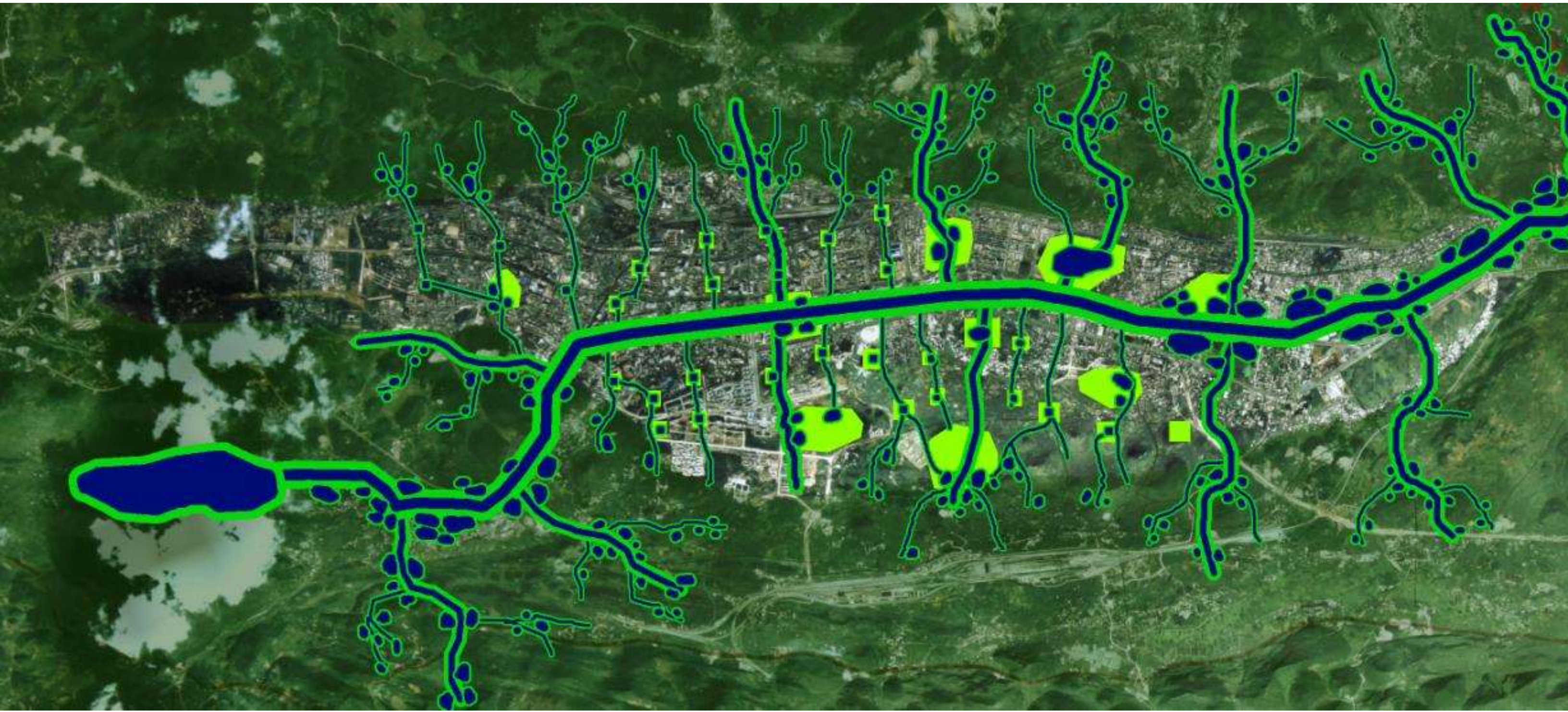
The alternative solutions:

After so much suffering, it is time now to revive the ancient wisdom to develop the nature-based and holistic solutions ecological infrastructure (green infrastructure) that are critical for securing ecosystems services

Provision
Regulation
Life supporting
Spiritual and cultural services

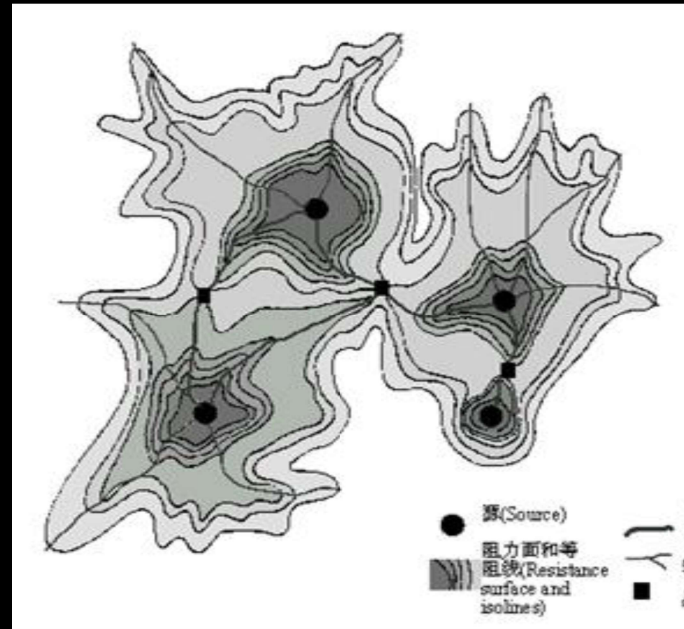


Action level-1 Planning green infrastructure across scale

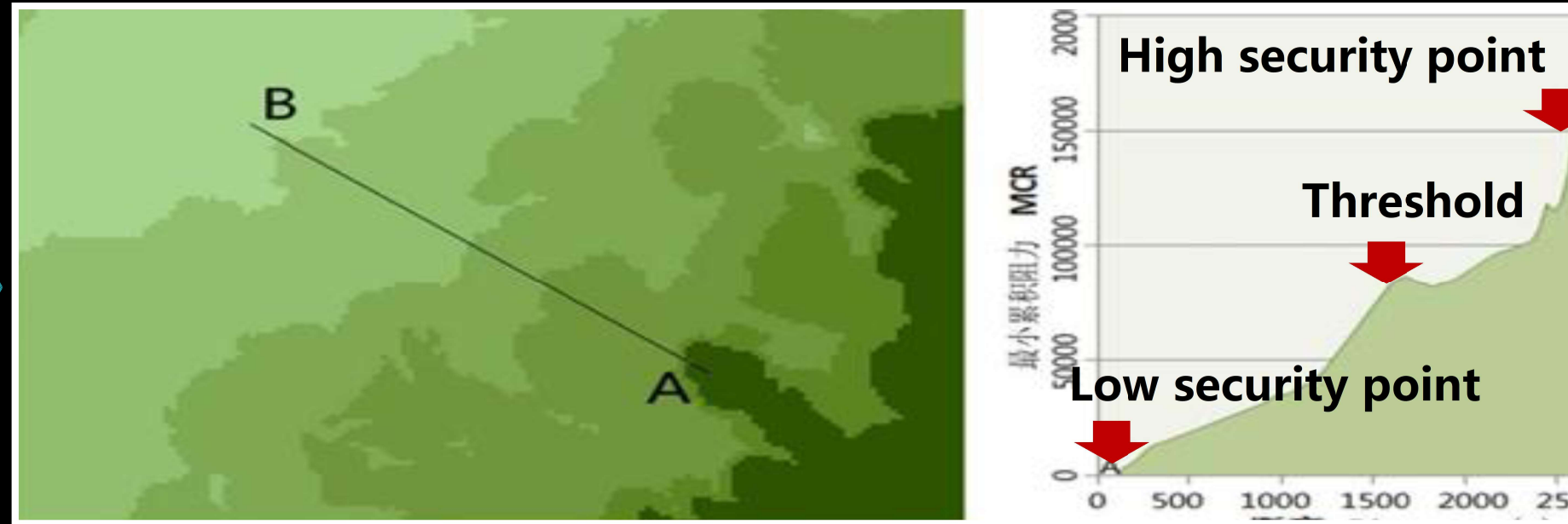
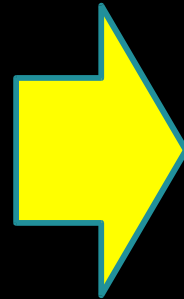


Methodology

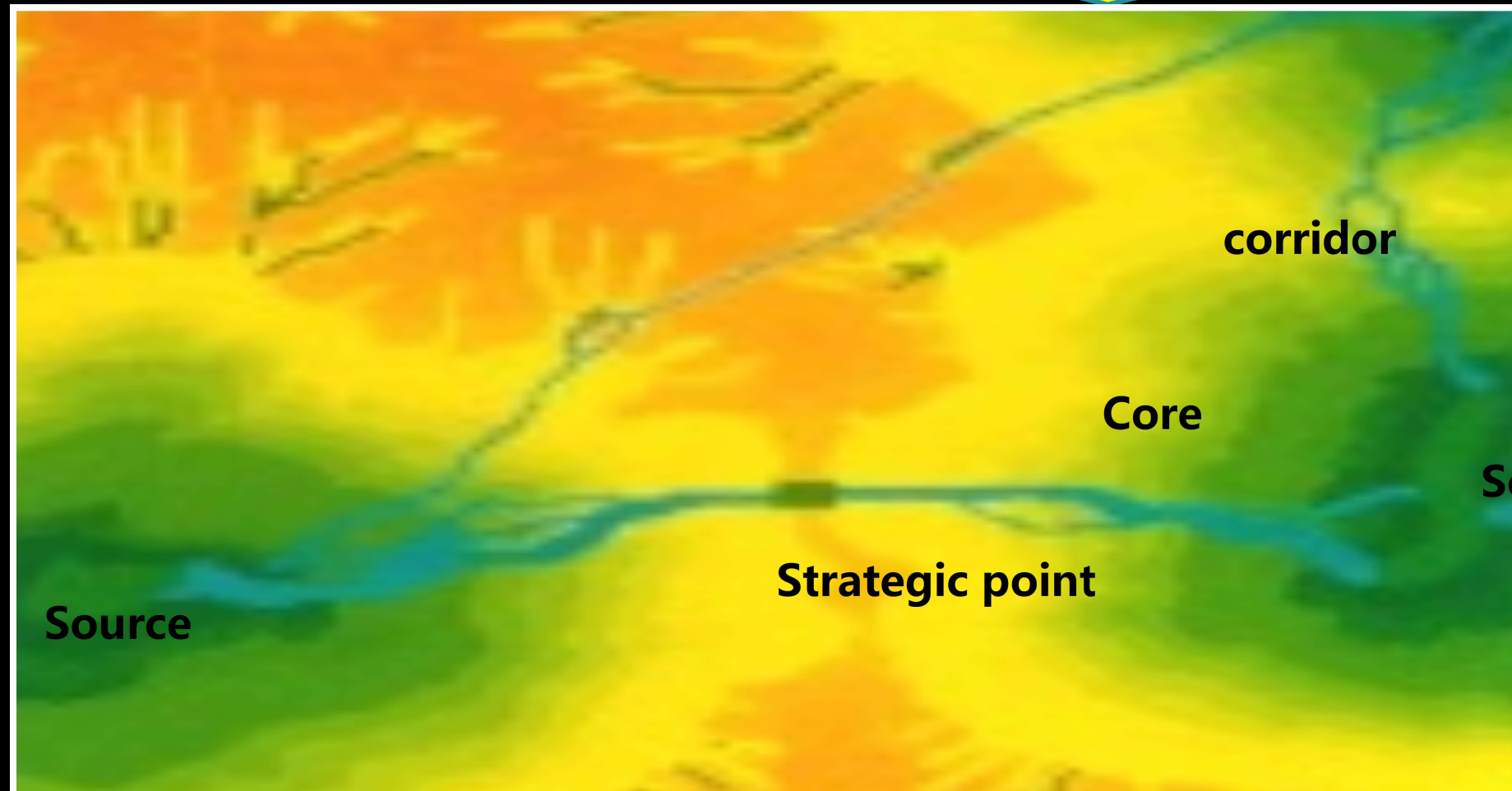
Identifying the ecological security patterns based on the and modeling of the ecological processes



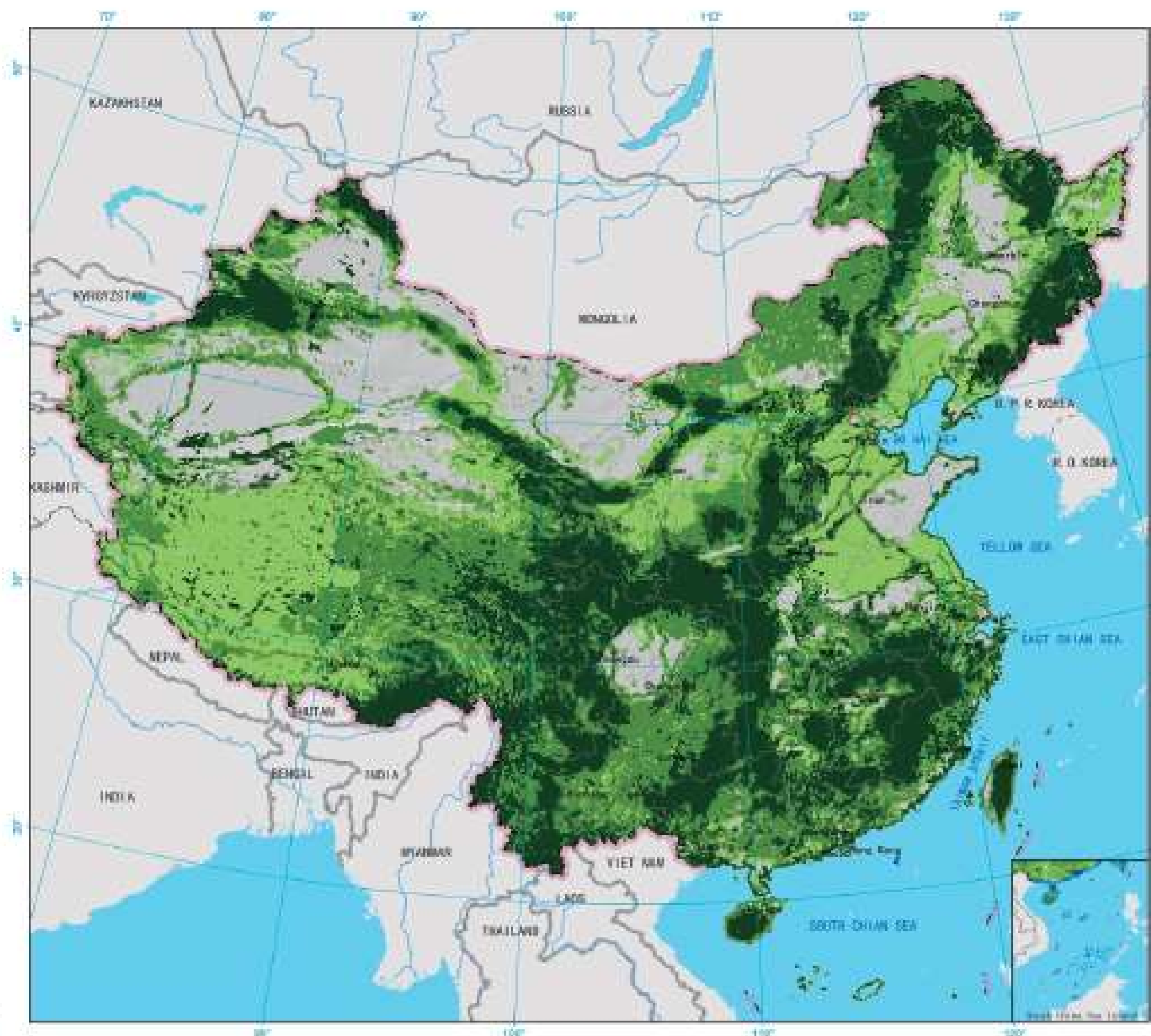
Potential surface



Security point

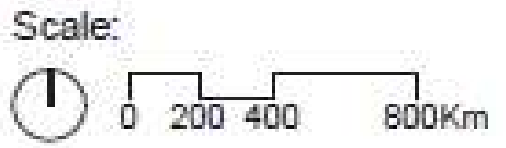


Security pattern

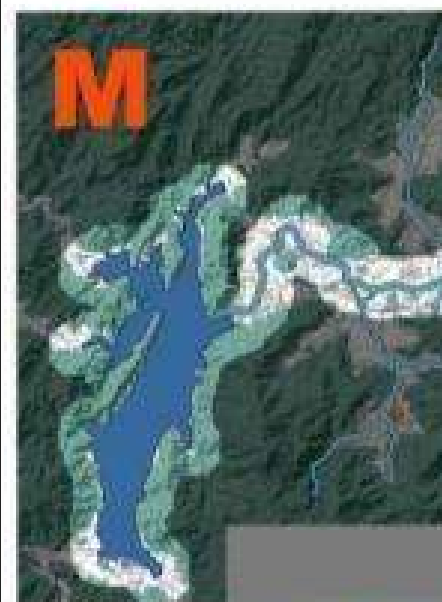
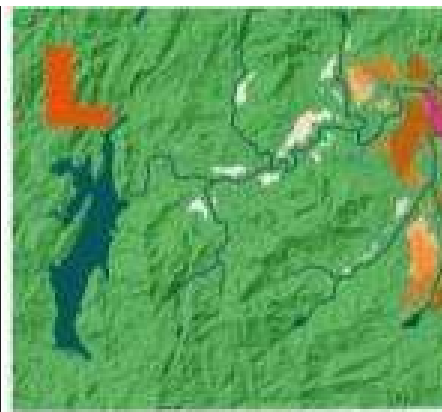


National Integrated Ecological Security Pattern

- ★ National Capital
- ⊙ Provincial Capital
- Provincial Boundary
- Light Green Ideal SP
- Medium Green Satisfied SP
- Dark Green Minimum



Projection System:
Krasovsky_1940_Albers



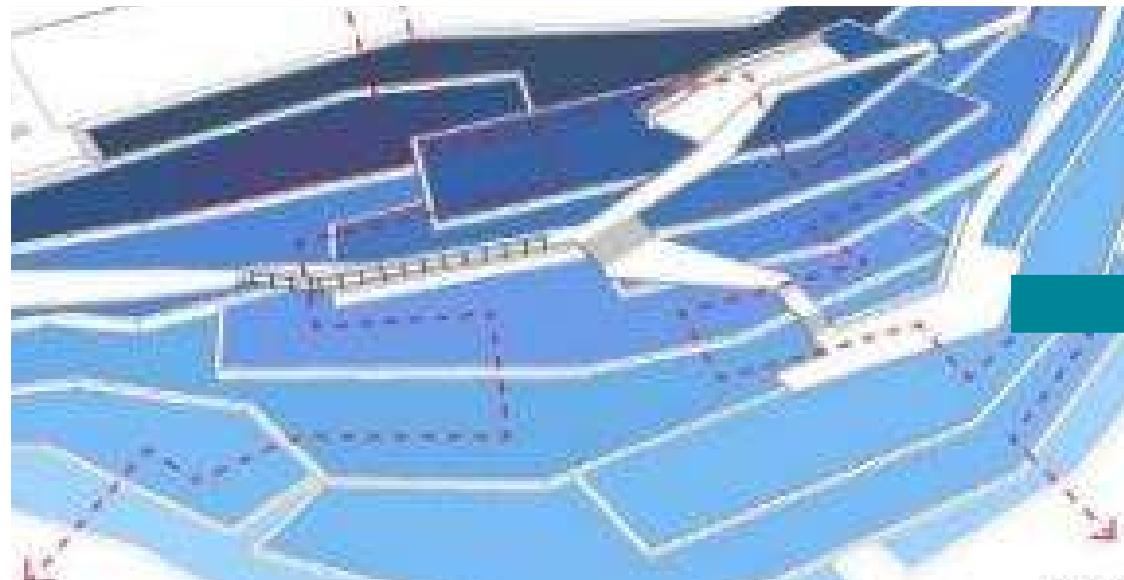
Action Level 2- “Creating working Big Feet”

means creating nature-based engineering models inspired by ancient wisdom, particularly agriculture. We have developed replicable modules based on traditional farming techniques

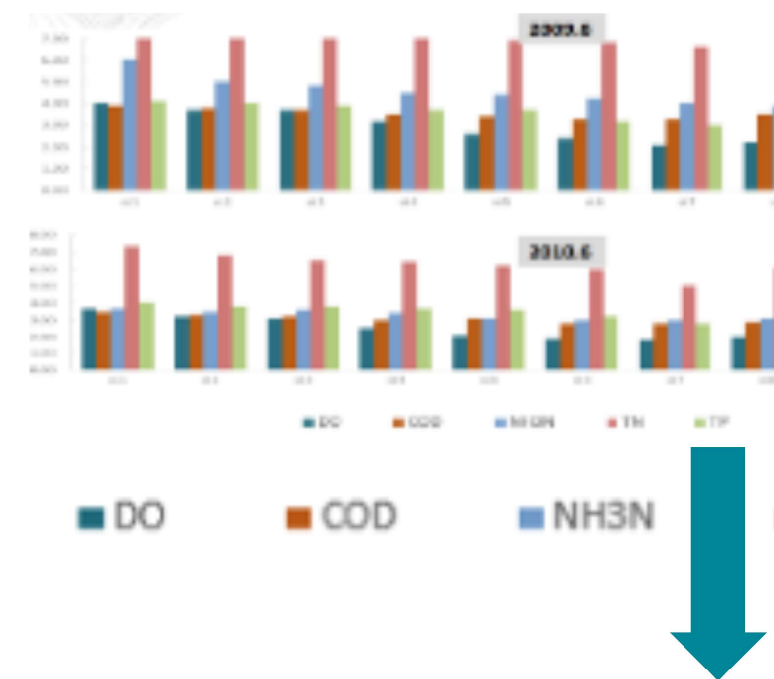
Traditional wisdom



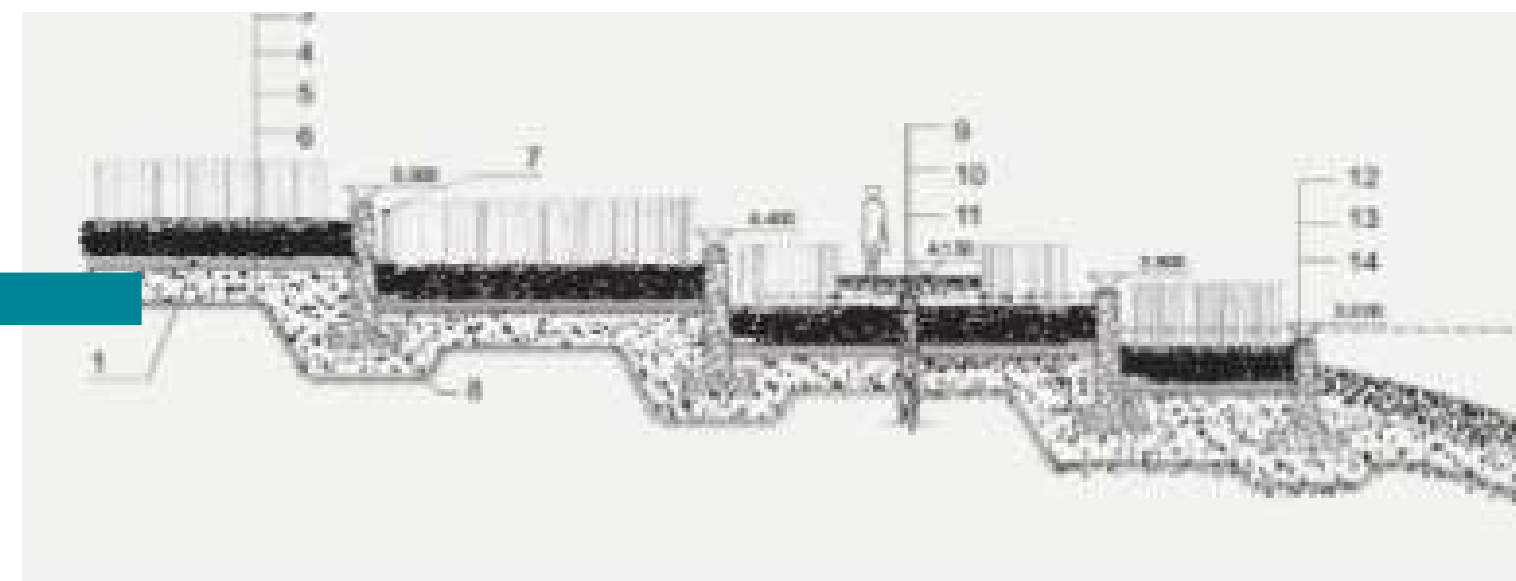
Design engineering module



Post operational test



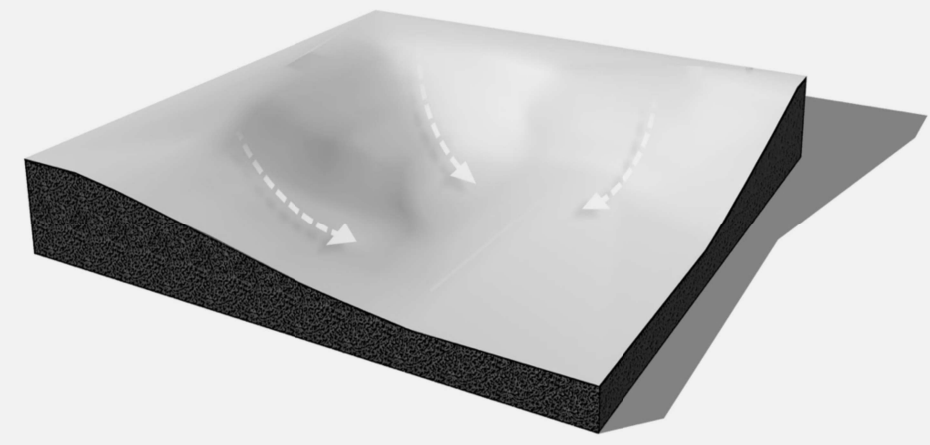
Modern ecological engineering



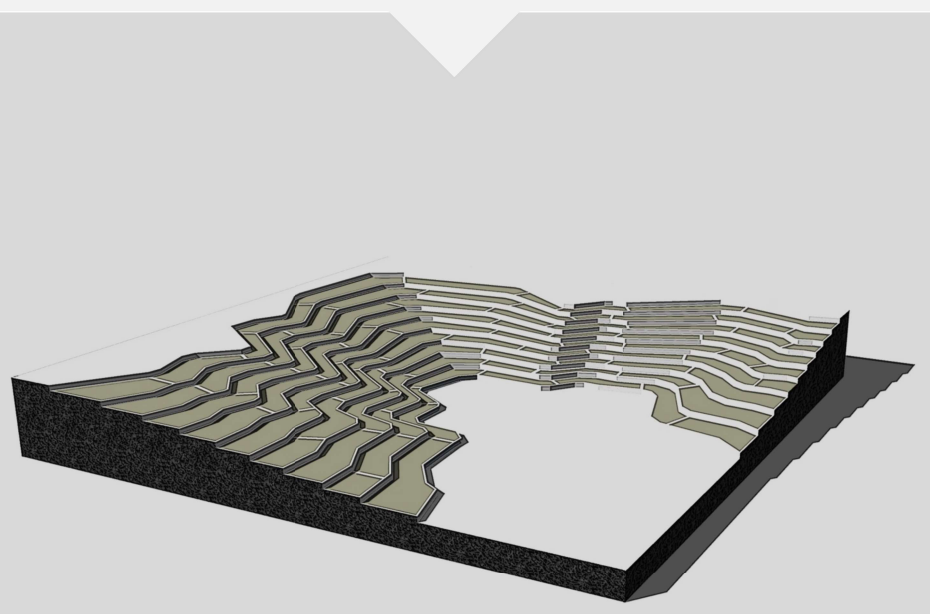
Replicable modules



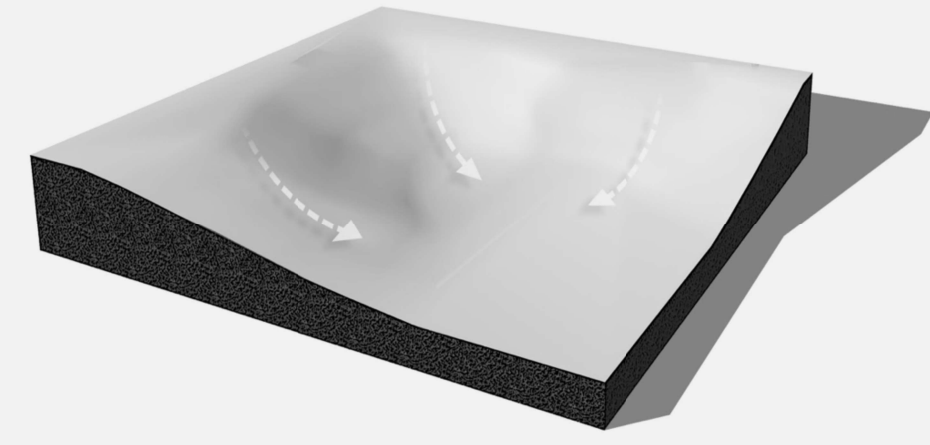
Terracing



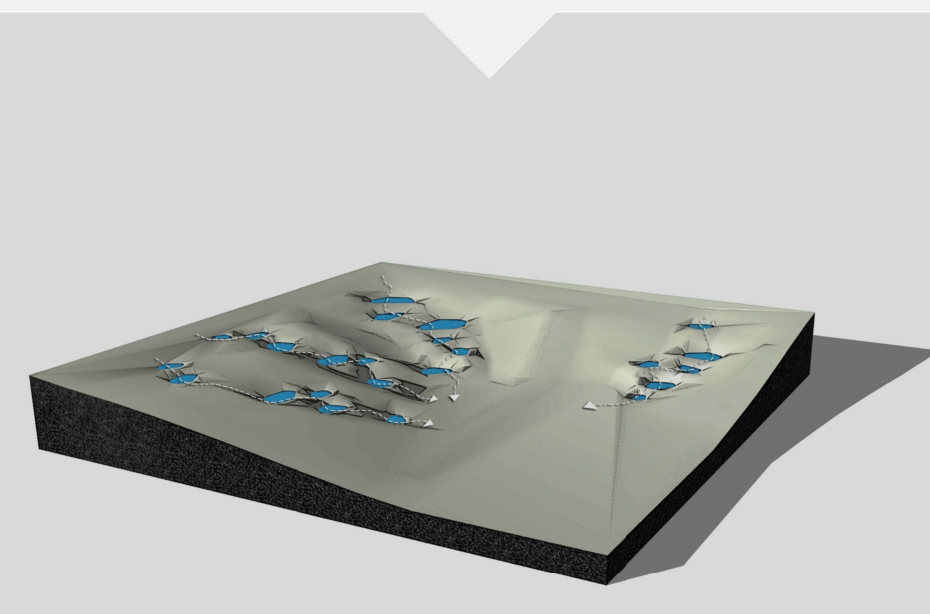
Source



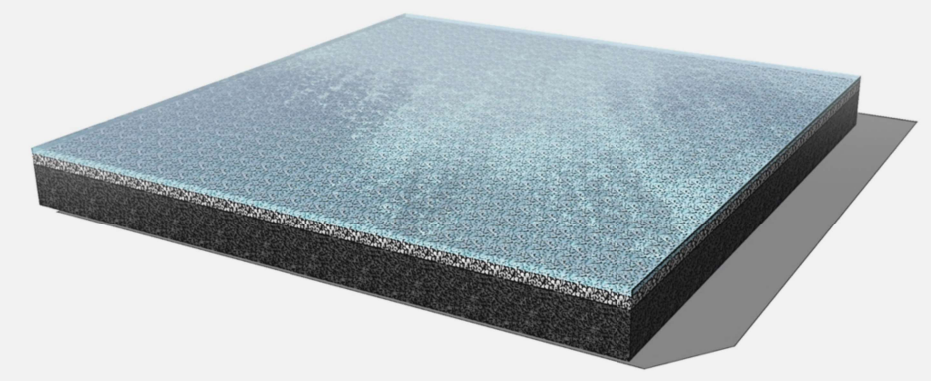
Ponding



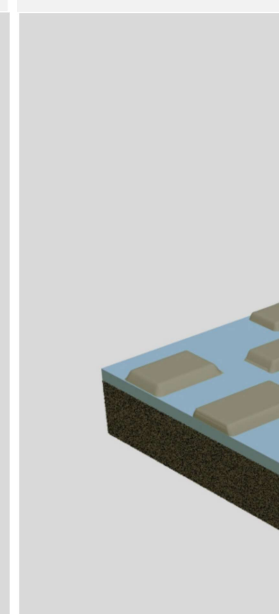
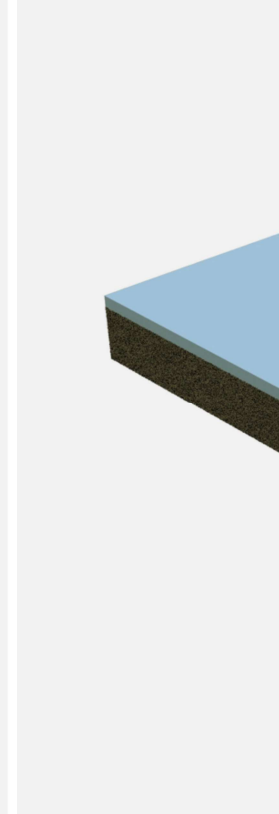
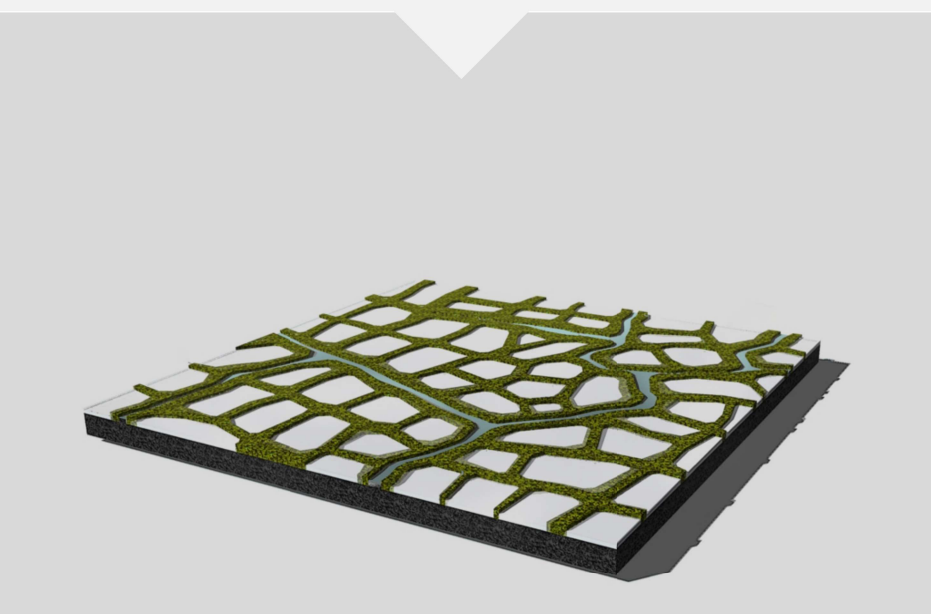
Flow



Diking & ponding



Sink



Design modules that are replicable at massive scale



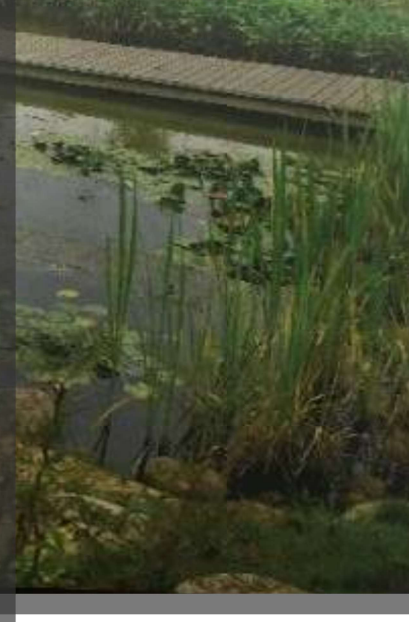
海绵城市景观工程图集

Sponge City Landscape Construction Drawings

土人设计 TURENSCAPE 俞孔坚 张锦 等著

中国建筑工业出版社

CONSTRUCTION
WETLANDS AND
SUSTAINABLE
DEVELOPMENT



For about 20 years, the team of turenscape has been testing such solutions over 200 cities and showcased numerous replicable models for transforming our environment at various scales



While focusing on some **major targets**, such as

1
Flood adaptation

2
Stormwater regulation

3
Water cleansing

4
Climate resiliency

5
Soil remediation

6
...

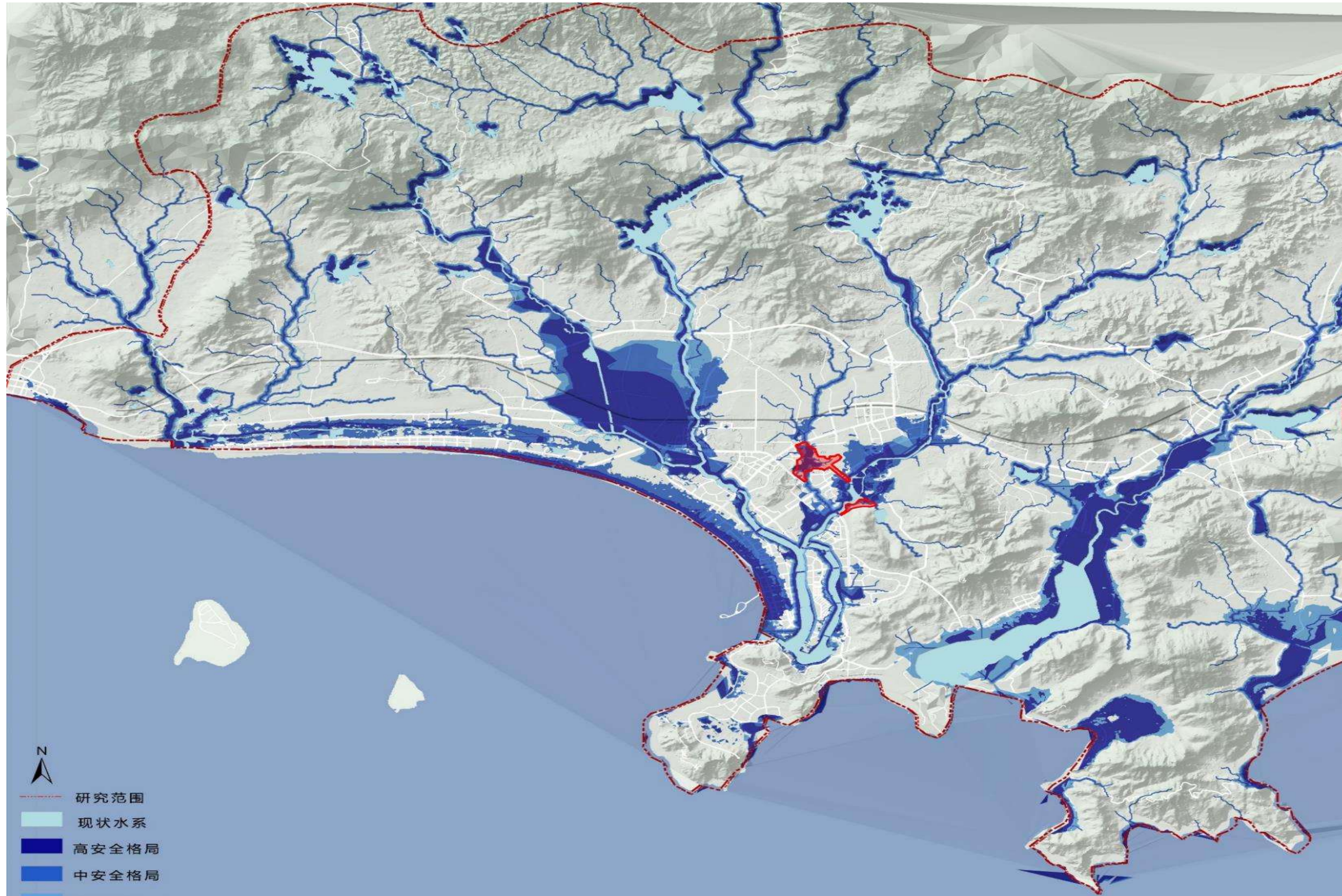
These projects are always holistically and systematically designed to provide all kinds of ecosystem services – for native species, people and the planet as whole

Green Sponge for water resilient City

Sanya, Hainan Island, The First Official Demonstrative project of Sponge City and Ecological Restoration Movement in China



Action level 1 Planning a green sponge system



Action level 2

Creating Green Sponge

Dong'an Wetland Park Sanya, Hainan, 67 ha

In Sanya, Hainan Island, creating a green sponge in the center of the urban environment was an essential adaptation strategy for increasing resilience to climate change, particularly in an area where tropical storms can easily overwhelm conventional drainage systems.



The revival of ancient wisdom: The pond and dyke system



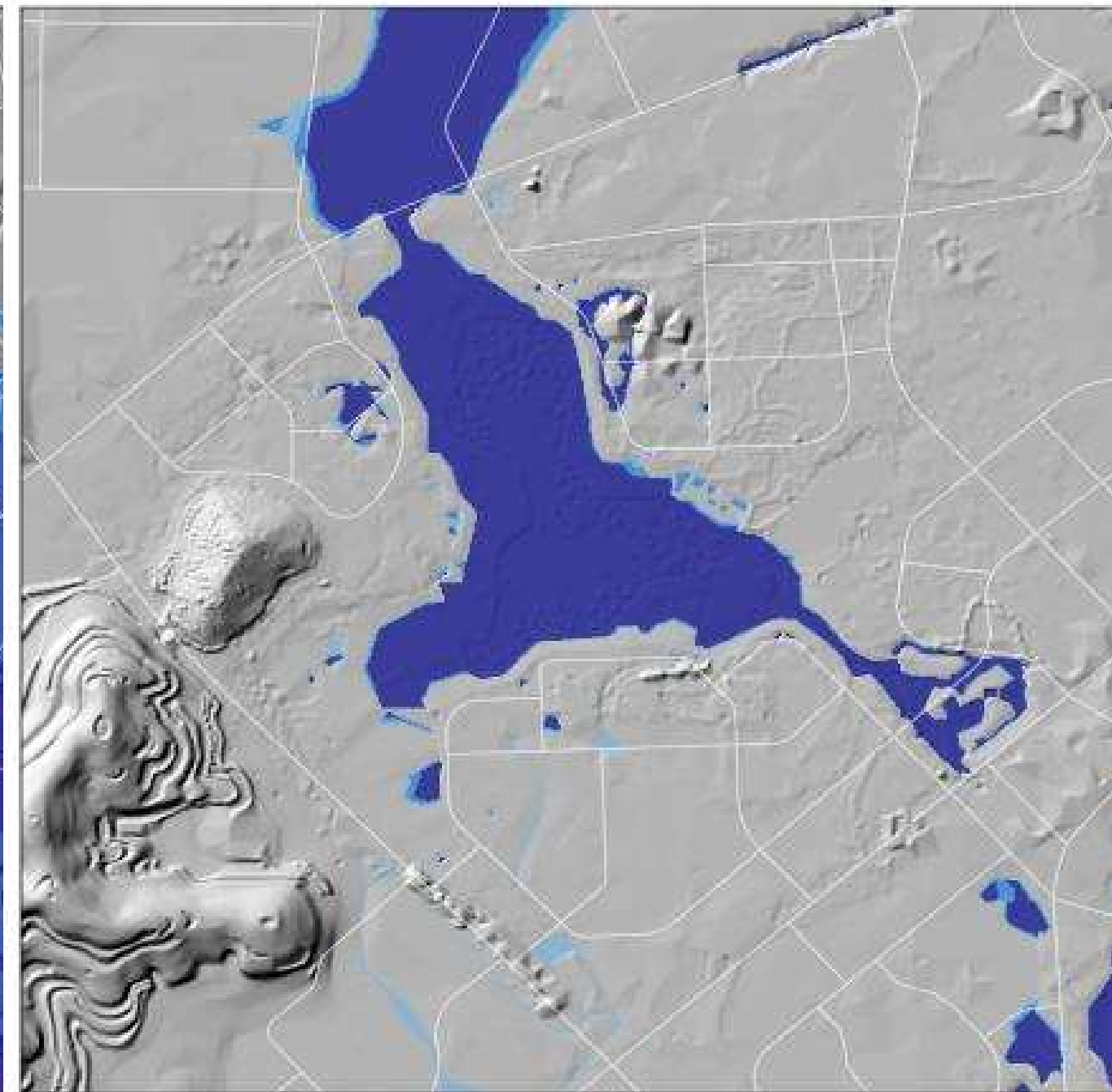
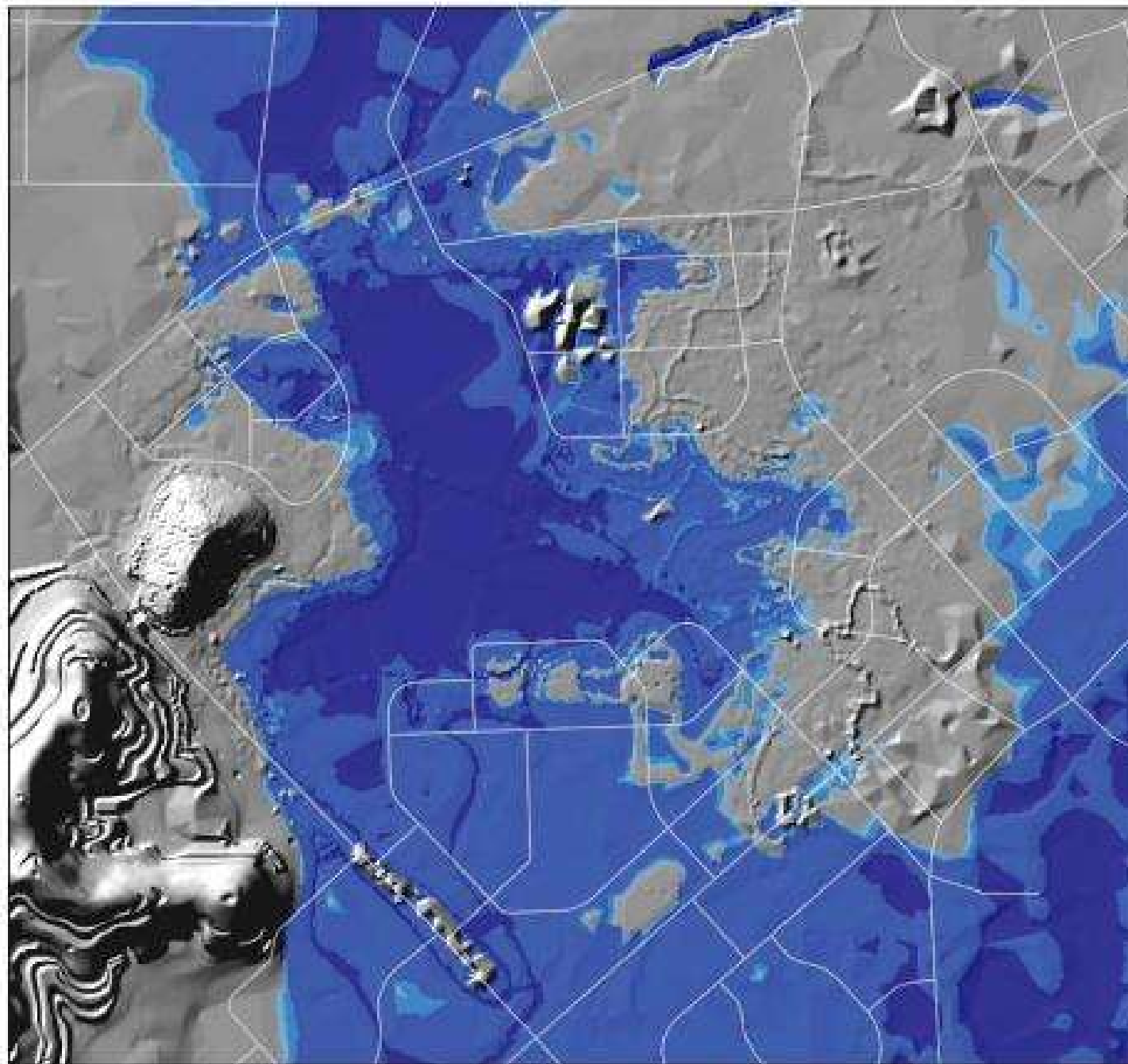
Inspired by the ancient pond-and-dike systems and islanding techniques in the Pearl Delta, and using simple cut-and-fill methods, a necklace of ponds and dikes was created at the periphery of the park that catches and filters urban runoff from the surrounding communities.



In the central part of the park, dirt and fill were used to create islands that are planted with trees to create a forested wetland. Both ponding and islanding will dramatically increase the retention capacity of the park and increase the ecotones between water and land to speed up the removal of nutrients.

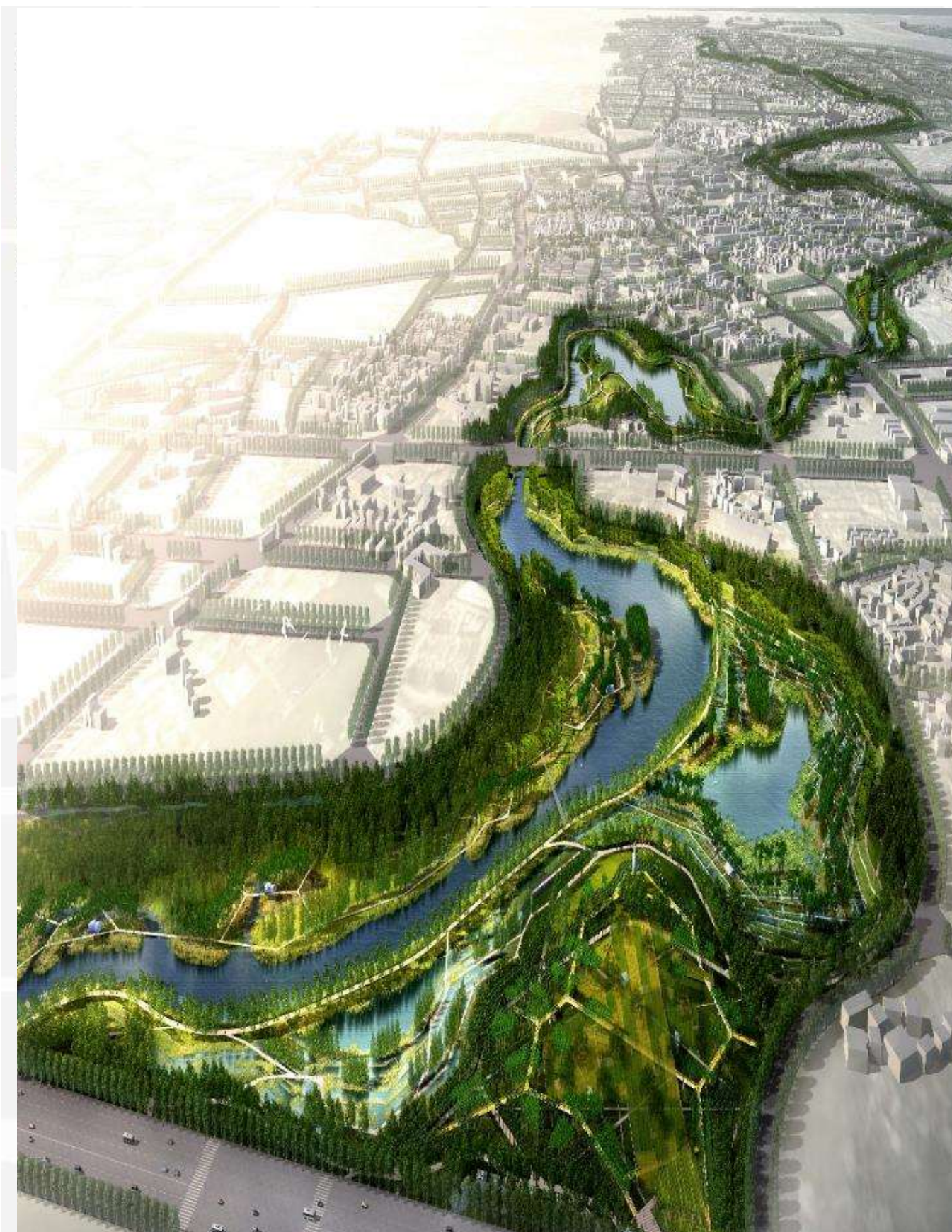


Constructed wetland can accommodate 830,000 cubic meters of storm water, dramatically reducing the risk of urban inundation.

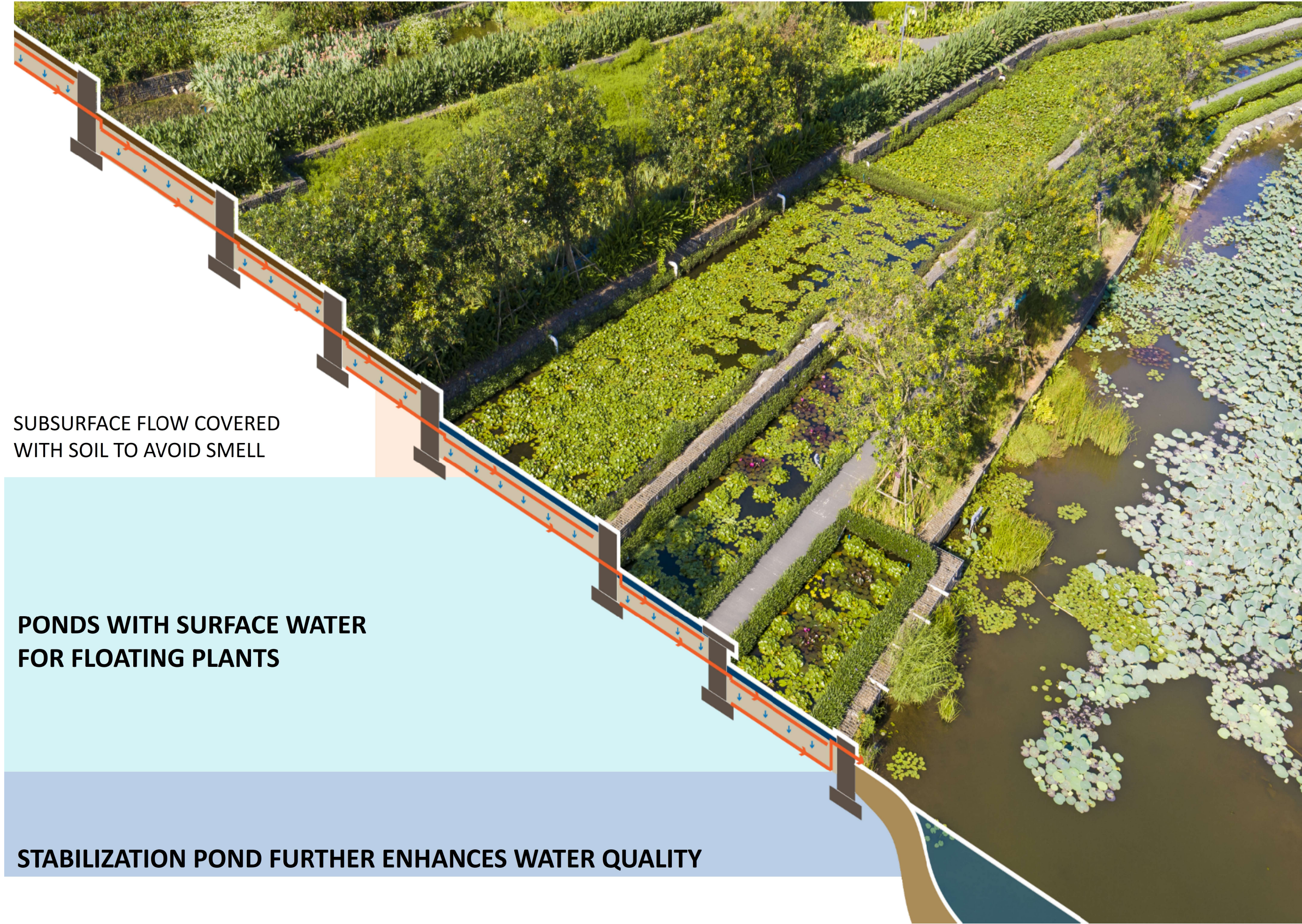


Meshe River, Haikou, 2017

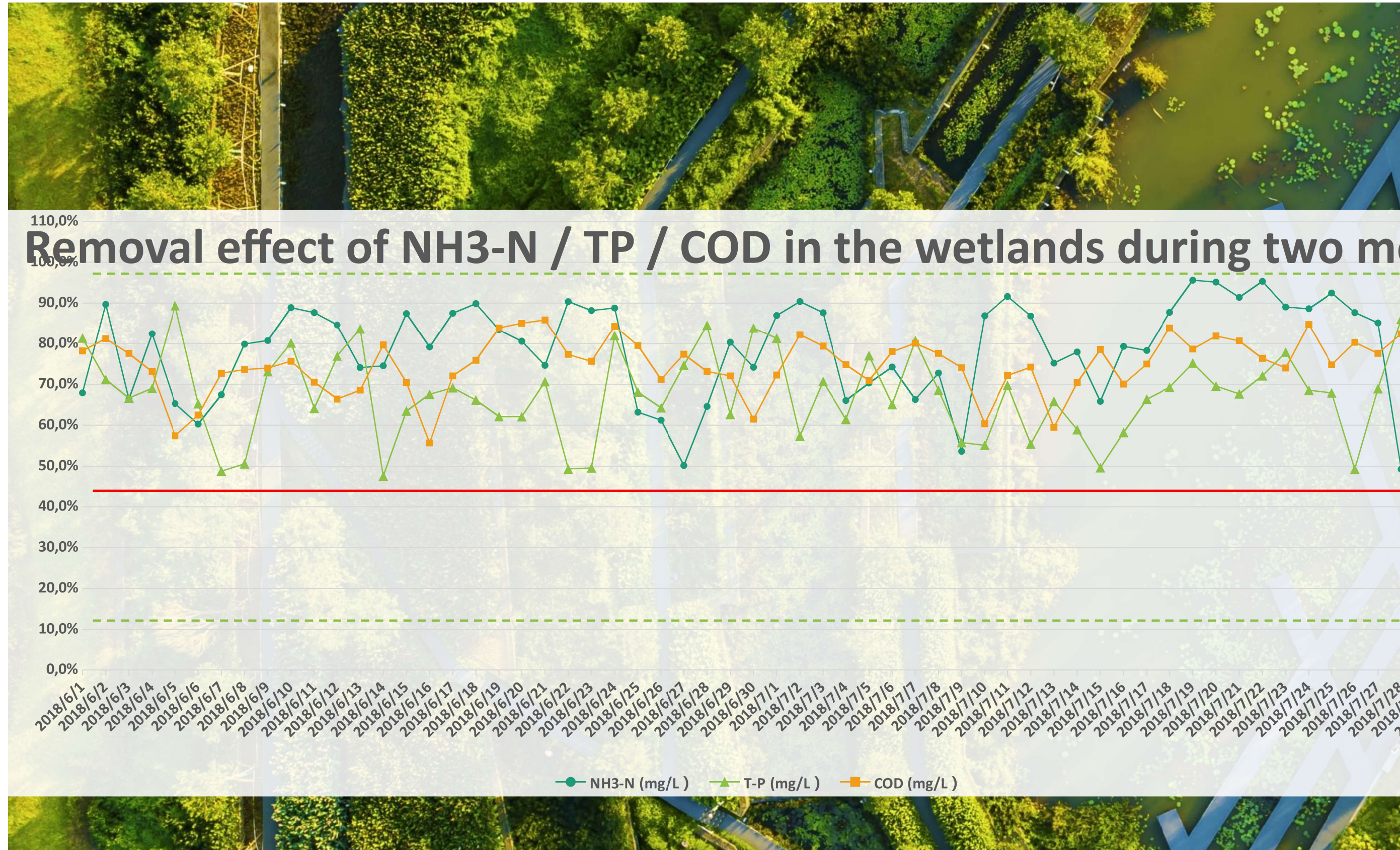




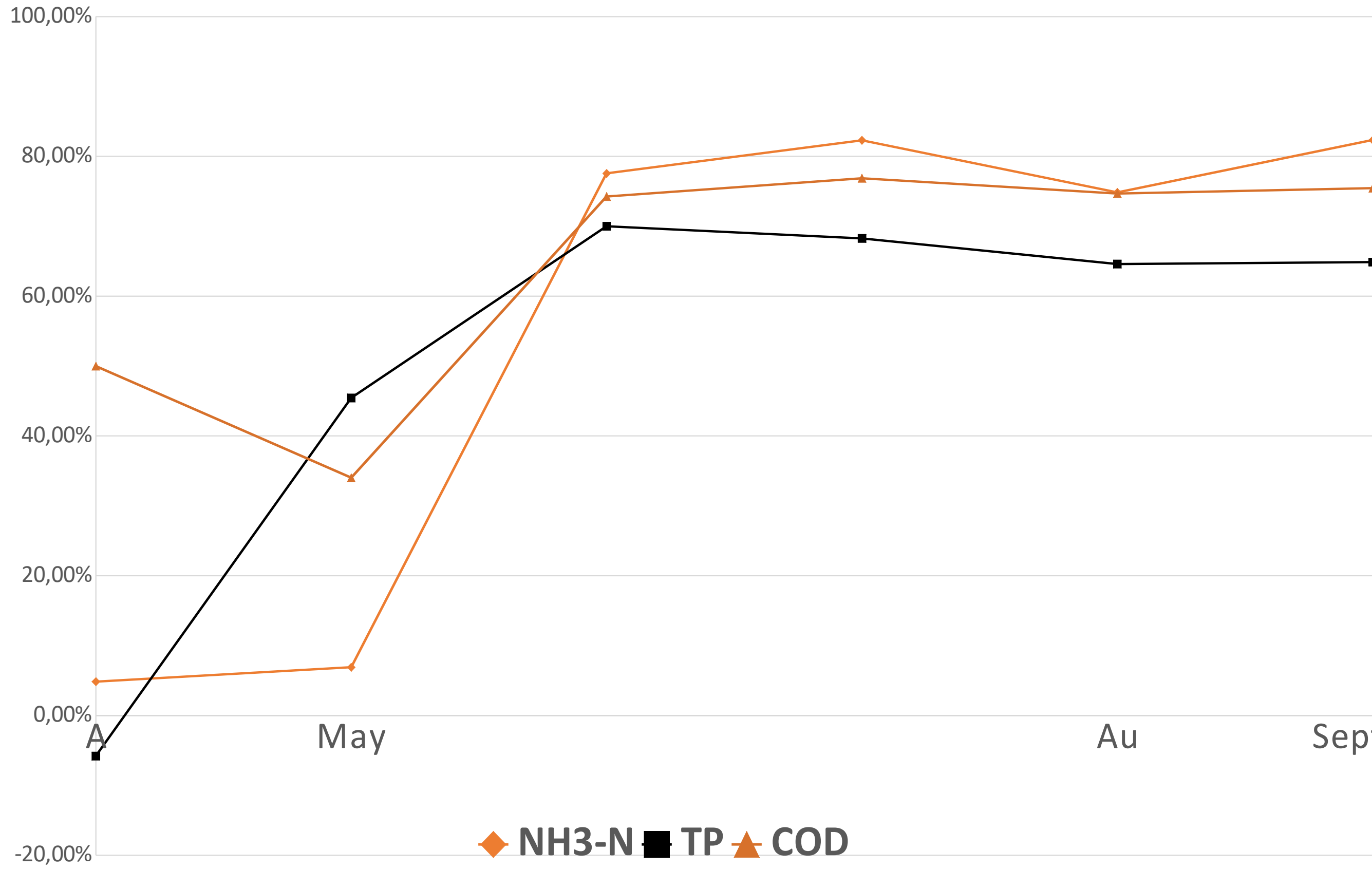




Performance test



Removal effect and cumulative removal rate of nutrients



Looking forward....

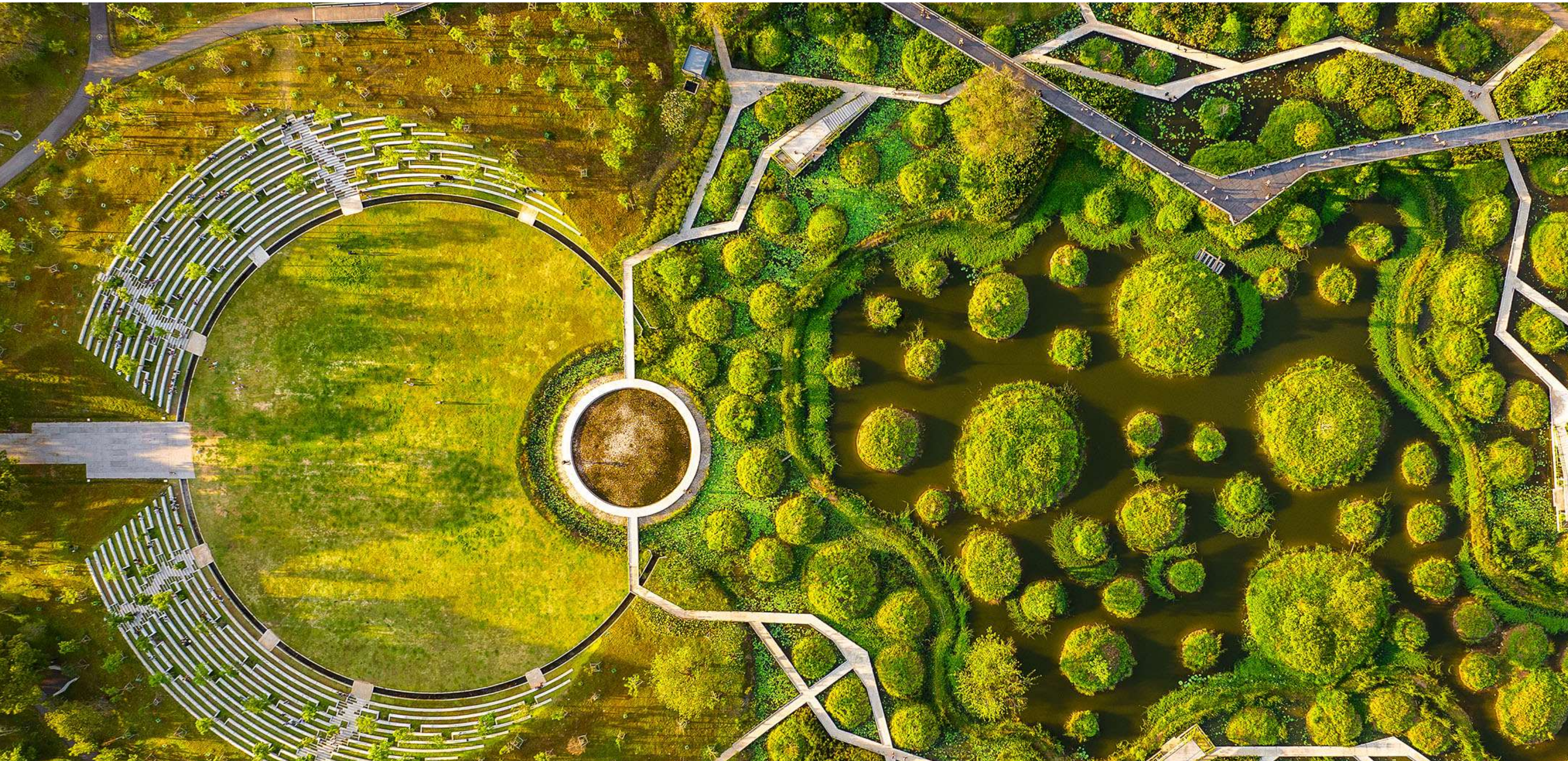
75% surface water contaminated nationwide

85% sewage water untreated global wide

Transforming a Brownfield into an Urban Ecological Sanctuary Benjakitti Forest Park

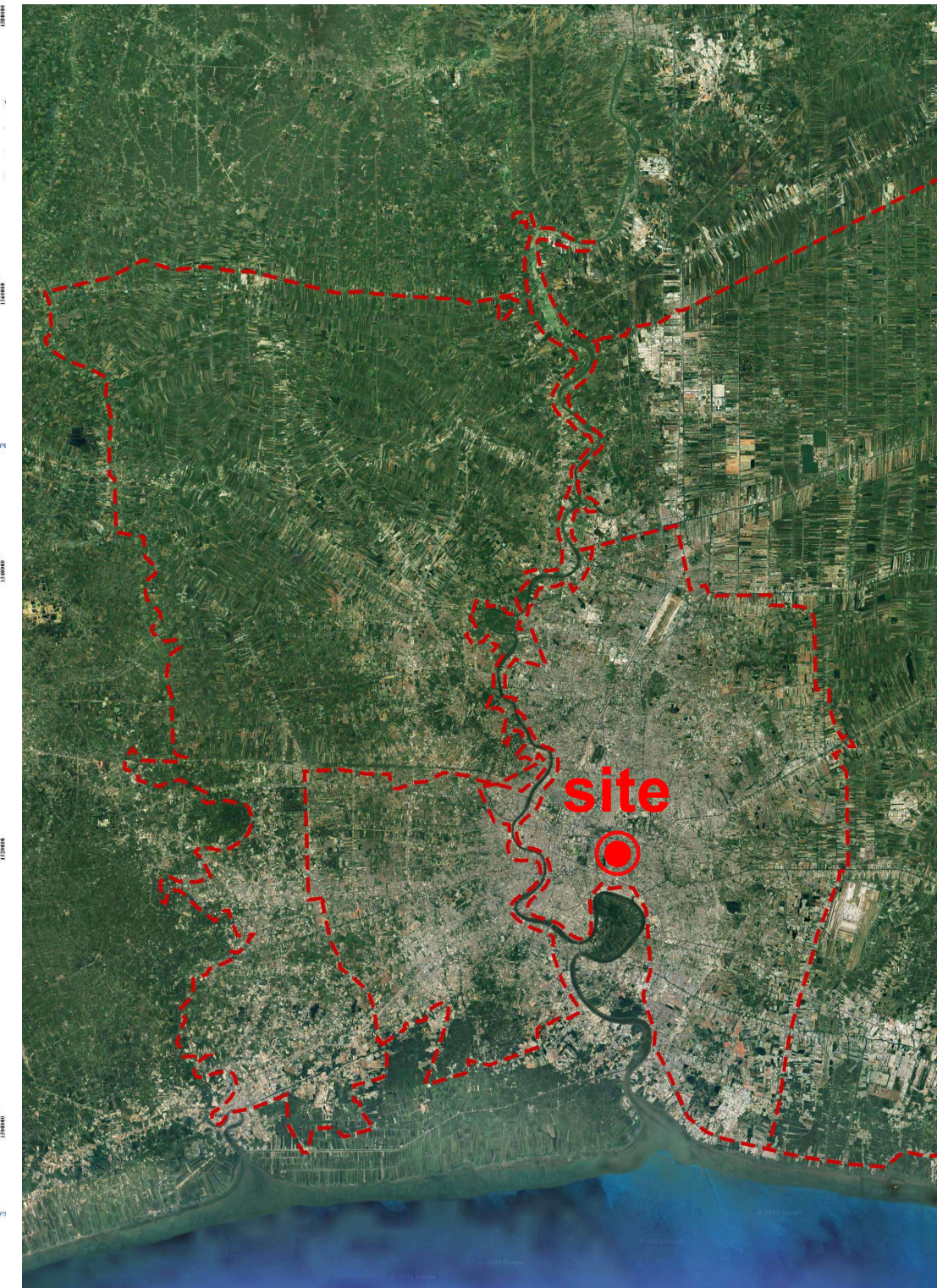
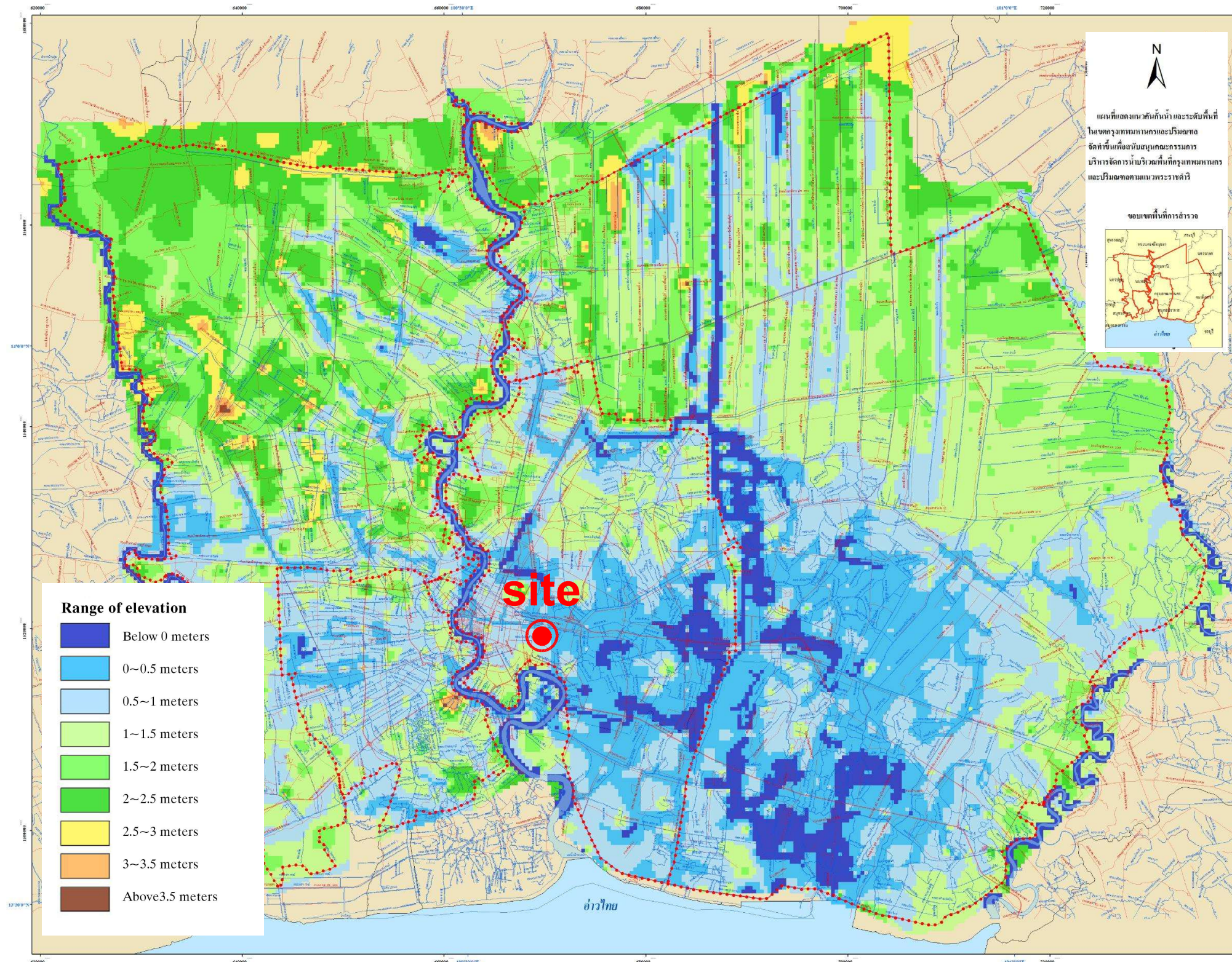
52.7Ha (130.2-acre) ;Built : 2022 Category: Landscape - gardens, parks, ecological/environmental

In the bustling urban heart of Bangkok, our team has transformed the site of a former tobacco factory into a low-maintenance park that intercepts and reduces the destructive force of storm water, filters contaminated water and provides much-needed wildlife habitat.

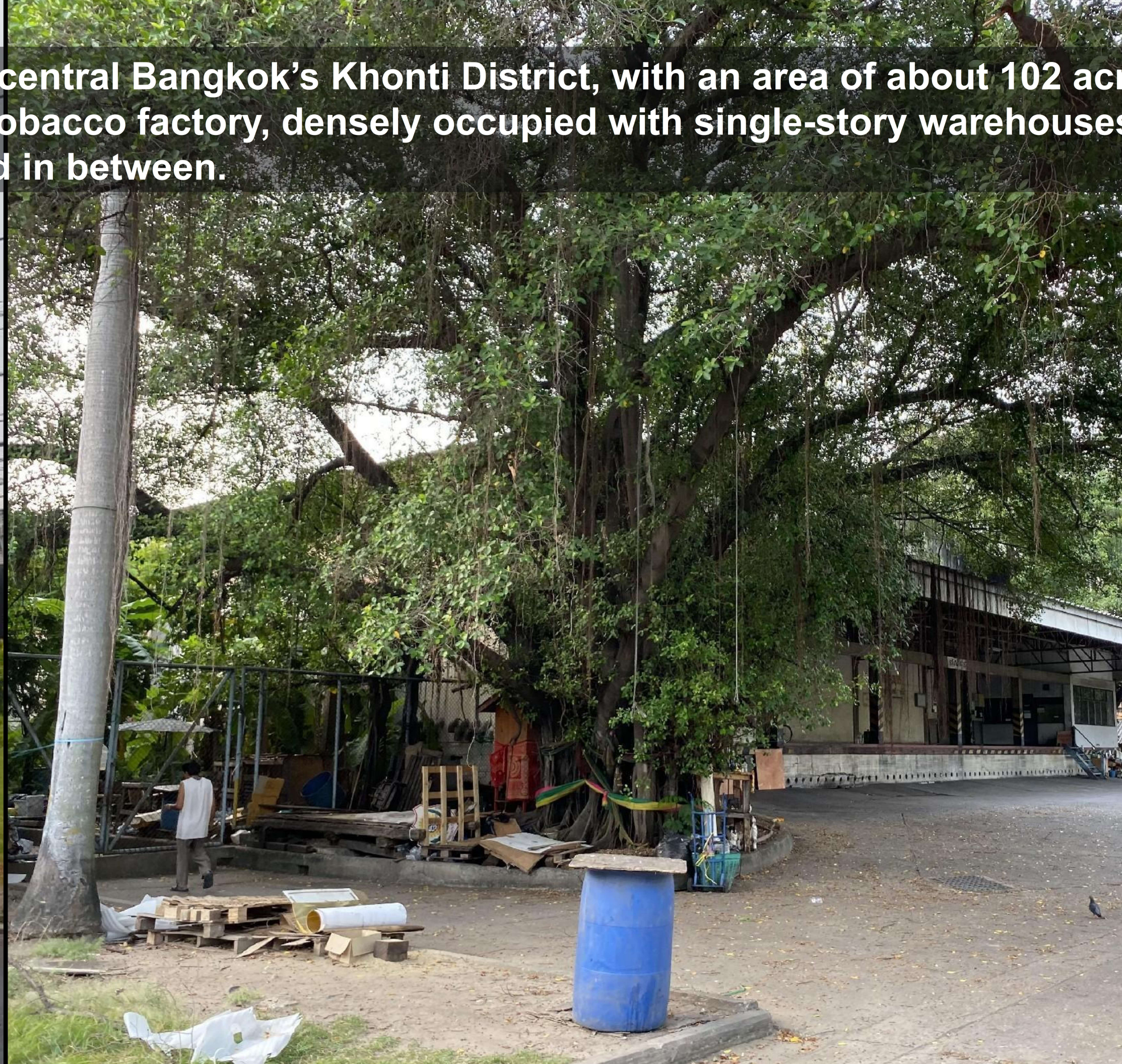


Site and elevation map

Located in the Chao Phraya River Delta, Bangkok is a densely populated city with more than 10.5 million residents. The urban area is mostly low-lying, with an average elevation of just 1.5 meters (4 ft. 11 in.) or less. Most of the area was originally swampland, which was reclaimed with canals and extensive groundwater pumping and irrigated for agriculture.



The project is located in central Bangkok's Khonti District, with an area of about 102 acres. The site was formerly a tobacco factory, densely occupied with single-story warehouses and canopy trees scattered in between.



Five challenges

1. Global climate change and monsoon climate



2. Water quality pollution



3. Low budget



4. Short construction period and operate by army



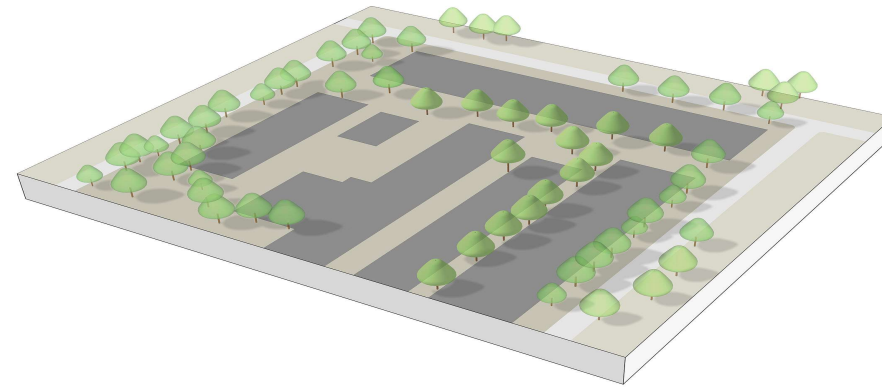
5. Maintenance



Nature-based solutions

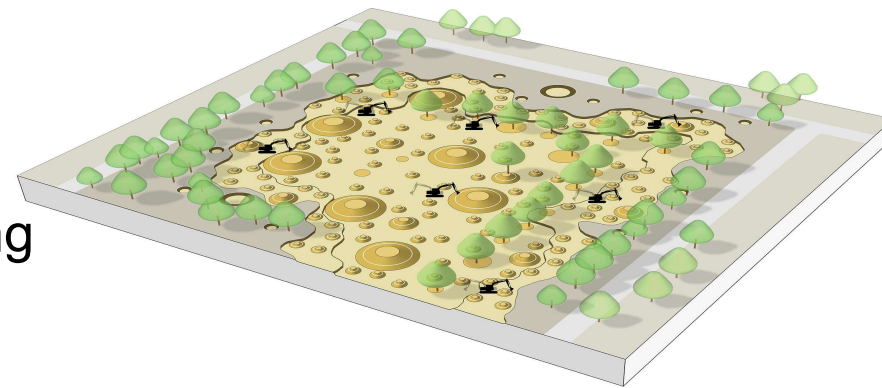
Pre-existing:

Preserve trees and roads, and remove buildings



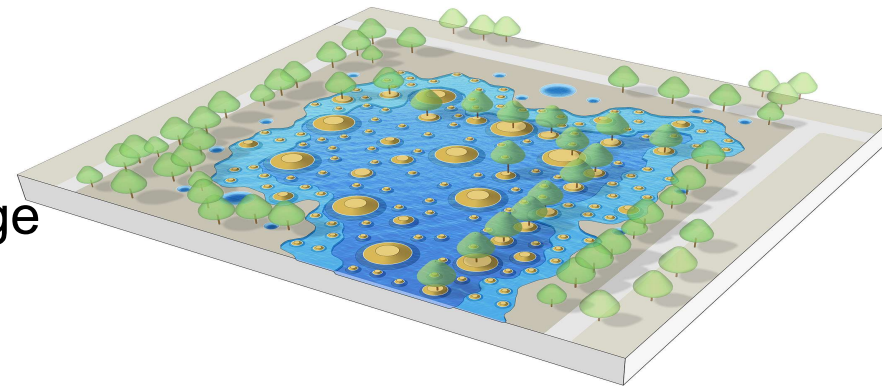
Earthworks:

Construct tree islets through in situ cutting and filling



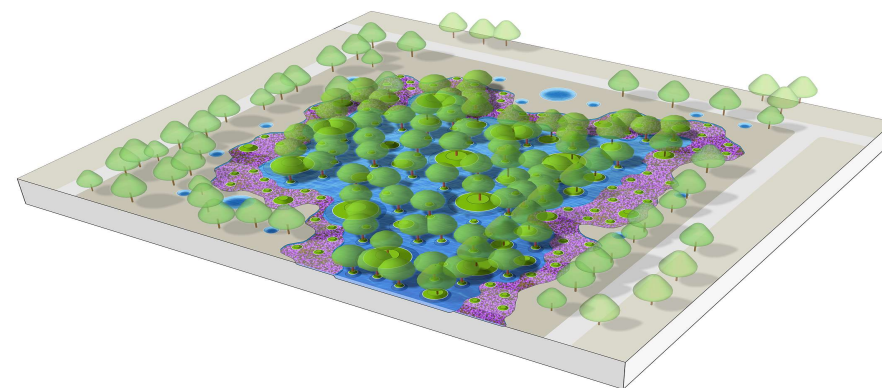
Water:

Convey water into the lake area for rainwater storage



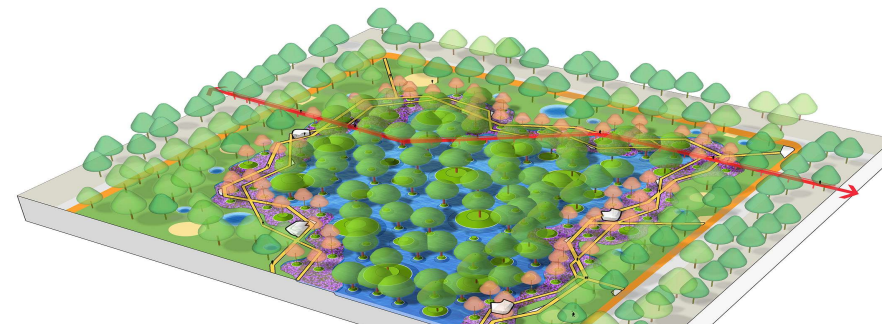
Vegetation:

Create a "water forest" and a wetland buffer



Access:

Service nodes and interpretation/signage system



Design objectives :In addressing the multiple challenges of the site and its dense urban
the project was envisioned as a central park capable of providing holistic ecosystem se



Strategy 2. Modular approach to Create Porous Sponge Wetlands

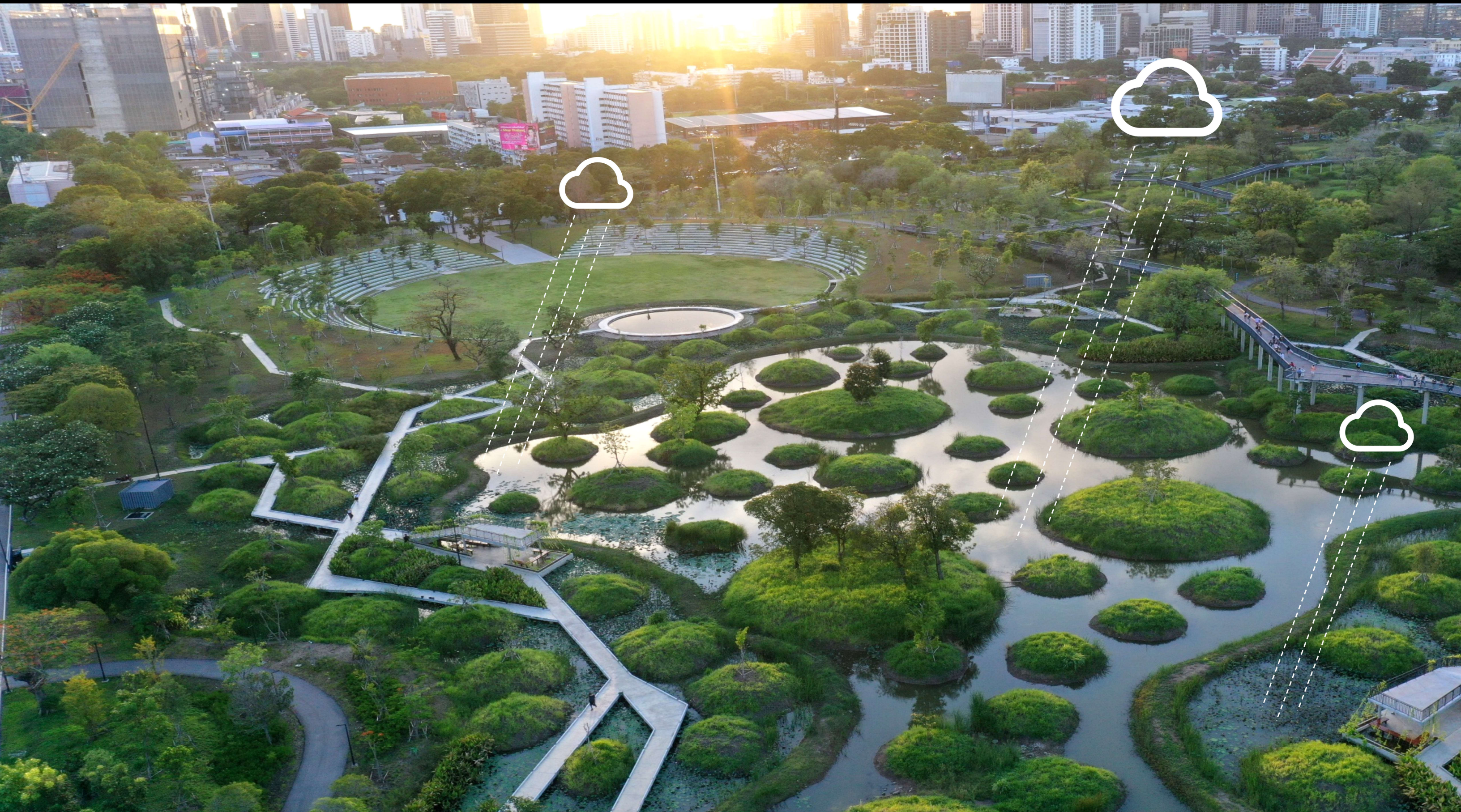
The park adopted a low-tech, easy-to-construct, modular landscape that can be easily single excavator and minimizes dependence on skilled labor.



Without importing or exporting earthen fill, four constructed wetlands scattered with islands were created by simple cut and fill procedures to transform the impermeable.



Concrete-paved ground into a spongy and porous landscape, which is expected to retain **200,000m³ (23 million US gal)** of storm water from the surrounding area during the monsoon.



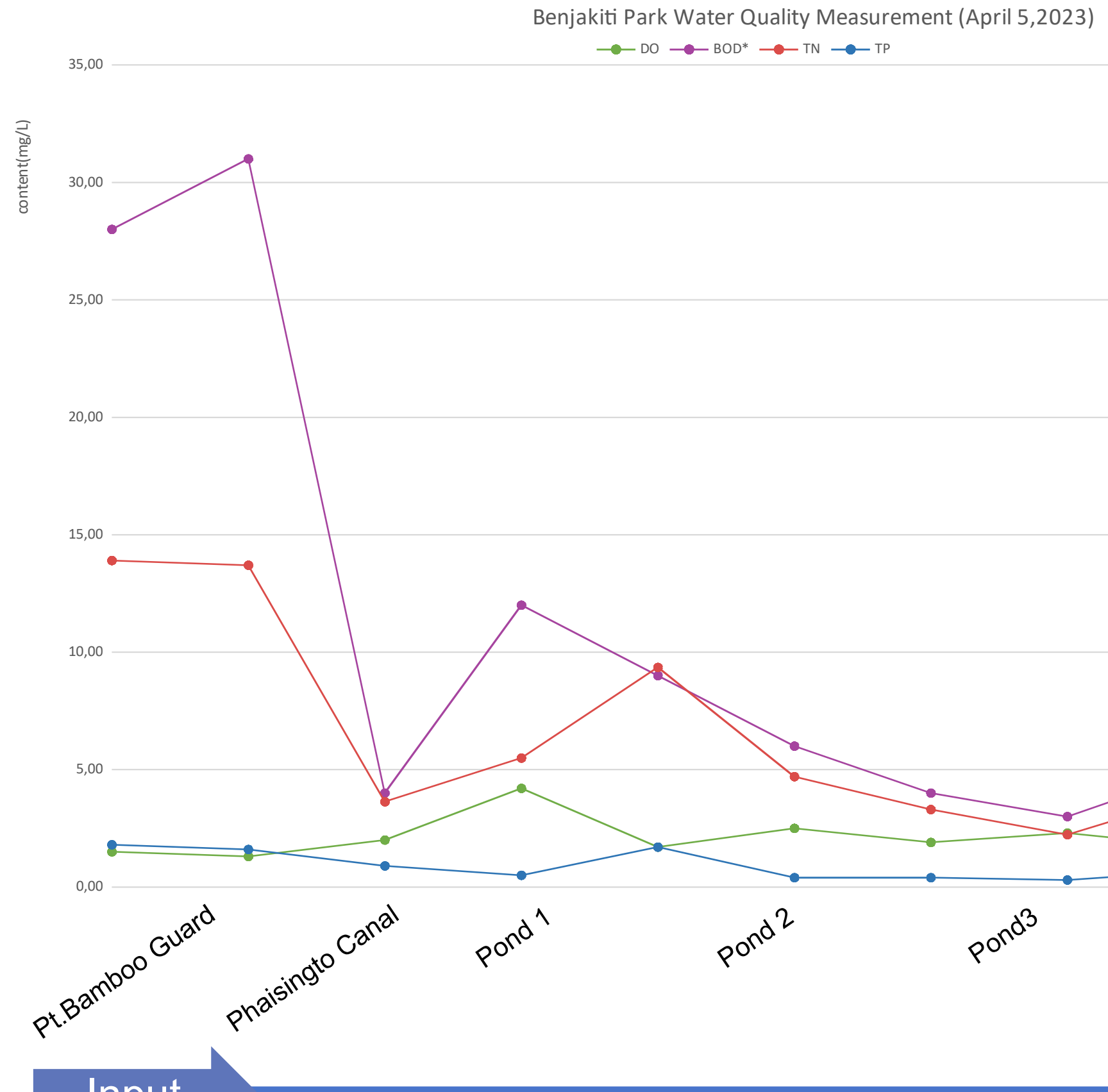
The foundation and foot of each individual islet was consolidated using recycled concrete. While pre-existing trees remain at the center of individual islands, young canopy tree seedlings were planted on each of the newly constructed mounds at minimal cost.



The terraced shoreline is connected to a linear water-quality remediating wetland built at the east and west edge of the park that filters contaminated water from the canal, and can improve **8152m³ (2 Million US gal)** of water from the poorest grade V to grade III per day.



The terraced shoreline is connected to a linear water-quality remediating wetland built at the south and west edge of the park that filters contaminated water from the canal, and can improve **8152m³ (2 Million US gal)** of water from the poorest grade V to grade III perday.



Strategy 3. Fostering a low-maintenance “Messy Nature”

The modulated landform with diverse micro-environments was sown with seeds and p seedlings, creating a foundation for the subsequent evolution of a semi-natural plant c
The result is a low-maintenance mosaic of vegetation that will be continually and spon
enriched with native species.



**A symbiotic ecological interrelationship between fauna and flora is developing, and the
of the constructed wetland is creating a new, highly dynamic and diverse aesthetic that
contrasts with the surrounding urban landscape.**



Strategy 4. Creating immersive places for people

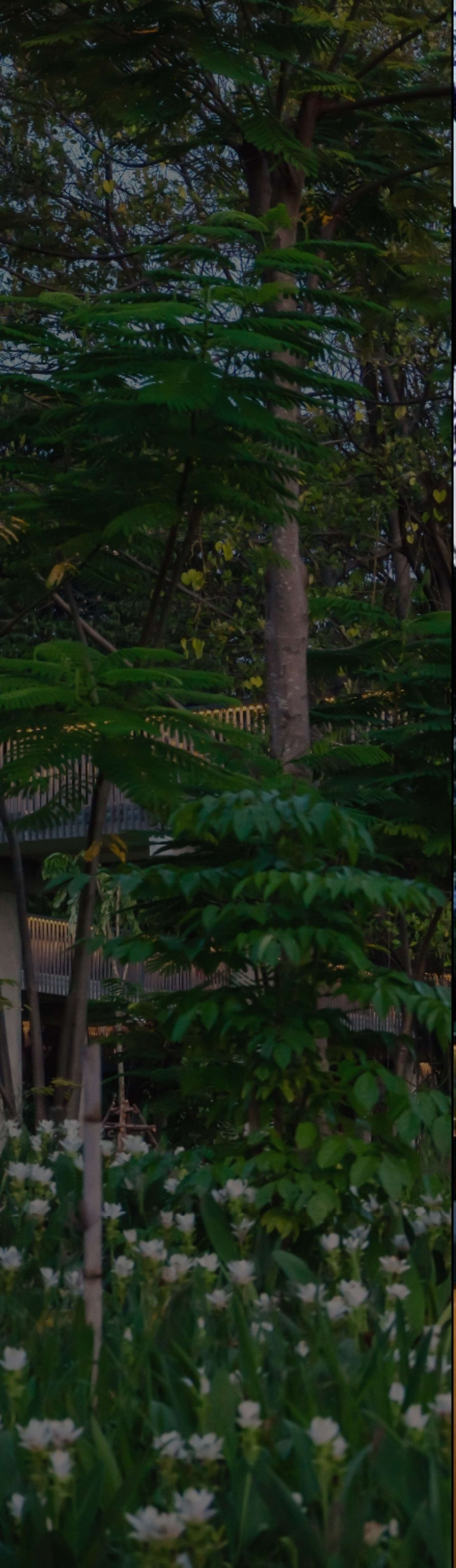


Multiple boardwalks were designed along the edge of the shallow wetlands that allow v
immersive experience of urban nature.



A skywalk runs through the tree canopies. That ties together the entire park, which for sliced through by major roads, and creates a unique immersive experience amidst the





Providing badly needed public space for daily recreational activities and other cultural s



A rich variety of birds and other wildlife has taken up residence in the park.



Asian Openbill



Blue-tailed Bee-eater



Muscicapa dauurica



Polypeptides



Turtle



Indian Roller



Spotted owl;



Orthetrum chrysis



34



29

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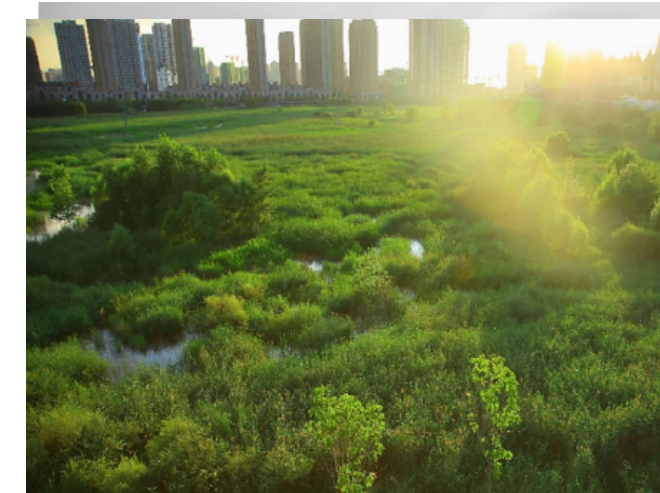
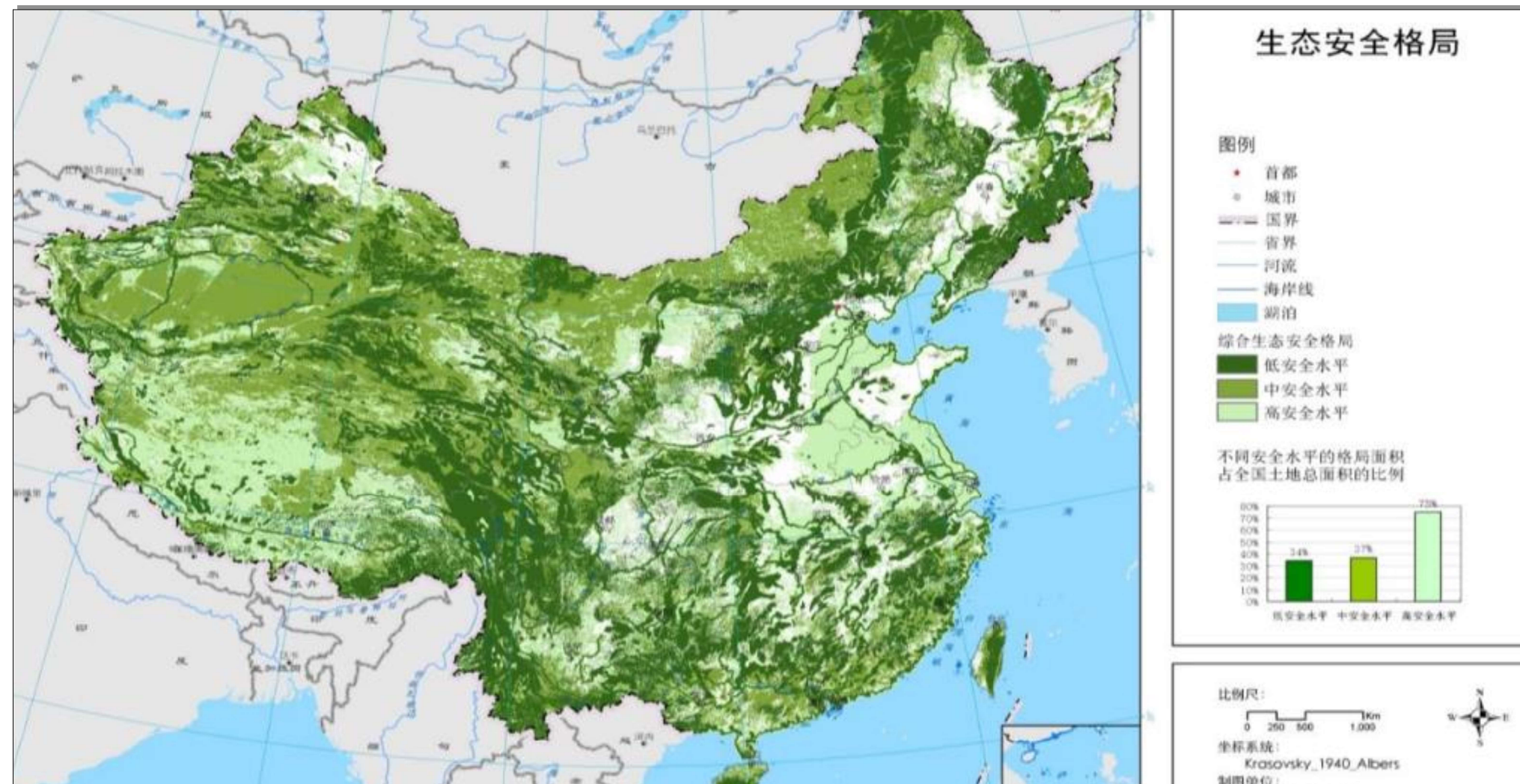


Conclusion: An era of new civilization

More than ever, it is clear that we need a **paradigm shift** in planning and designing our city to adapt the changing climate and solving the **multiple urban ecological issues**.

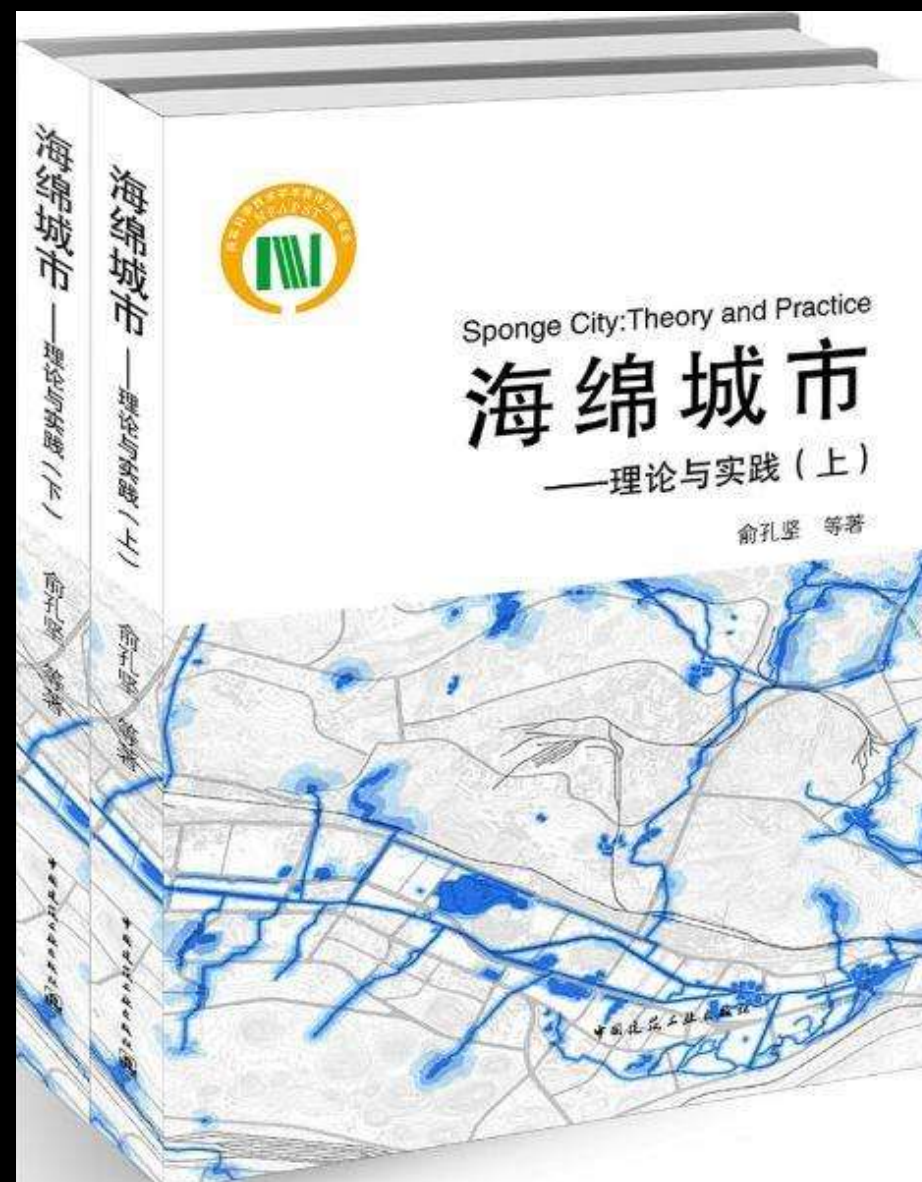
Such a shift calls for a **rethinking of the way we build our cities based on industrial technologies**,

and calls for **the revival of the ancient wisdom of survival: The nature-based solution**.





Negative Planning
2003-2005



Sponge City
2003-2015

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