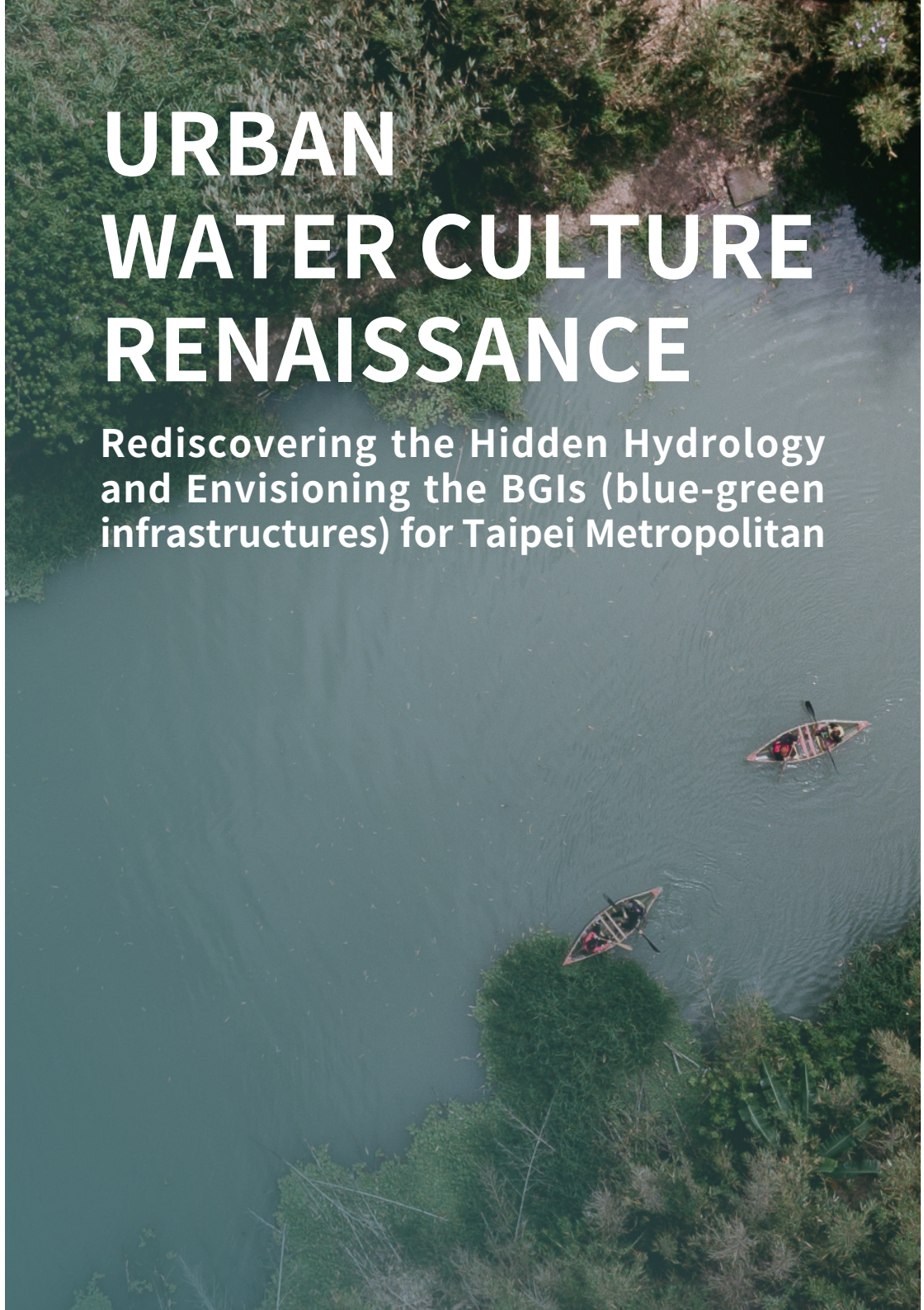


URBAN WATER CULTURE RENAISSANCE

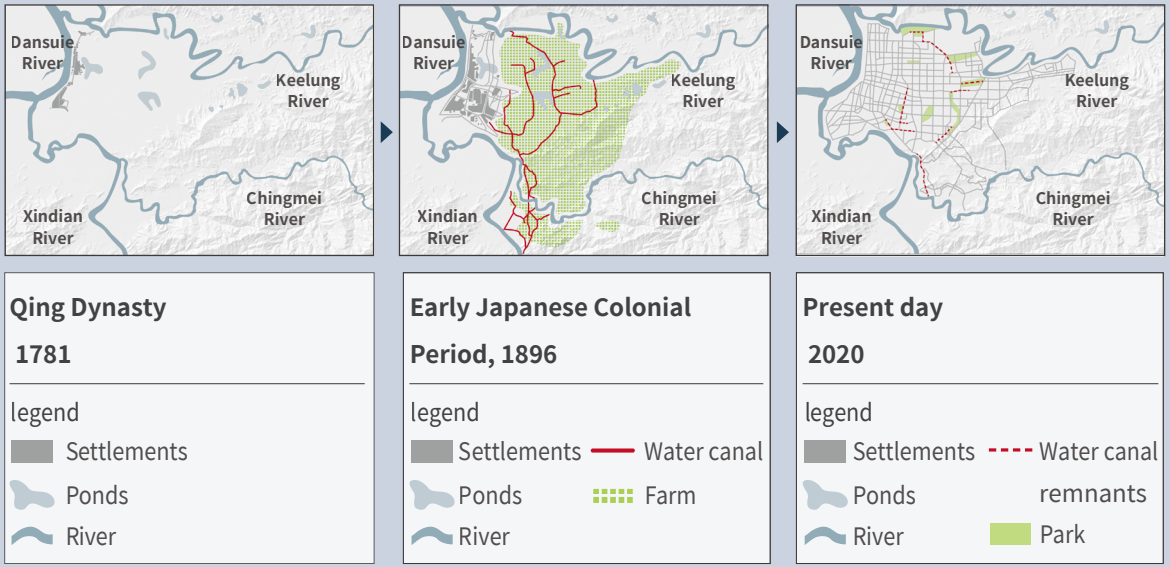
Rediscovering the Hidden Hydrology and Envisioning the BGIs (blue-green infrastructures) for Taipei Metropolitan

Project Statement:

Urbanization has introduced grey infrastructure into natural environments, while modern urban contexts must respond to climate change and new visions. This project envisages to inventory resources within Taipei's water system, assess locations with ecological development potential, and establish connections between historical and present waterways based on local cultural and historical resources and development context. The goal is to integrate and propose improvement suggestions and management methods to facilitate subsequent planning. Through the long-term promotion of water environment improvements, the project expects to foster overall flood resilience, urban ecological diversity and the quality of waterfront recreation. The aim is to find a balance between urban life, nature and living conditions, ultimately creating a livable city where humans and nature coexist harmoniously.

Project Background:
Taipei: From a Water City to a Terrestrial City

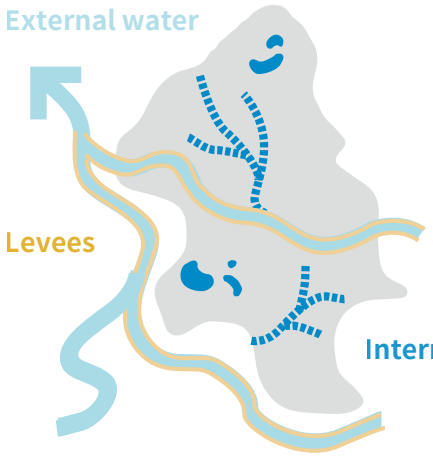
Taipei's old waterway system rapidly declined during the post-war years due to rapid urban development. Water management projects diminished, with numerous ponds shrinking, disappearing or merging into narrow river drains to allocate more land for human use.



Internal waters in Taipei Metropolitan

What is internal water?

Water within levees.



- Streams near hillside areas
- Areas around sedimentation ponds and upstream/downstream of lakes
- Urban streams or major drainage areas (open or covered channels)

Taipei Basin's Environmental Matrixs

MOUNTAIN:
North: Datun and Qixing mountain ranges with igneous rocks.
South: Wuzhi, Nangang, and Ergeshan mountain ranges with sedimentary rocks.

WATER
River Systems: The convergence of Xindian River and Keelung River forms the Tamsui River, the cradle of Taipei's settlements.

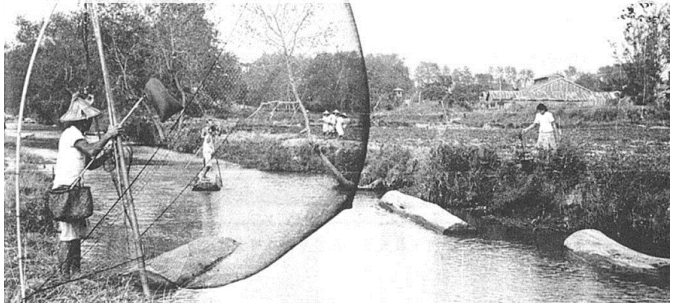
WIND
Summer: Dominated by easterly winds. Winter: Characterized by northeasterly monsoons.
=Diverse, heterogeneous and rich ecological and vegetation composition

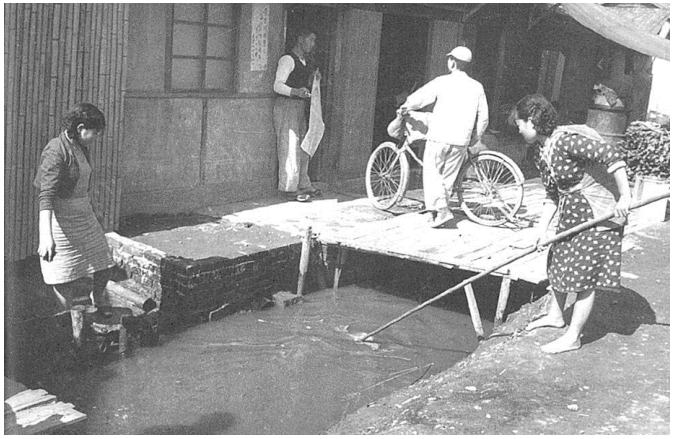
Project Issues

01.

Reconnecting Water Culture and Everyday Life

Waterways were once everyday landscapes, familiar to people as they left their homes and playgrounds where children caught fish and shrimp. The challenge is how to integrate these remnants of old waterways with urban space resources to address various urban issues.

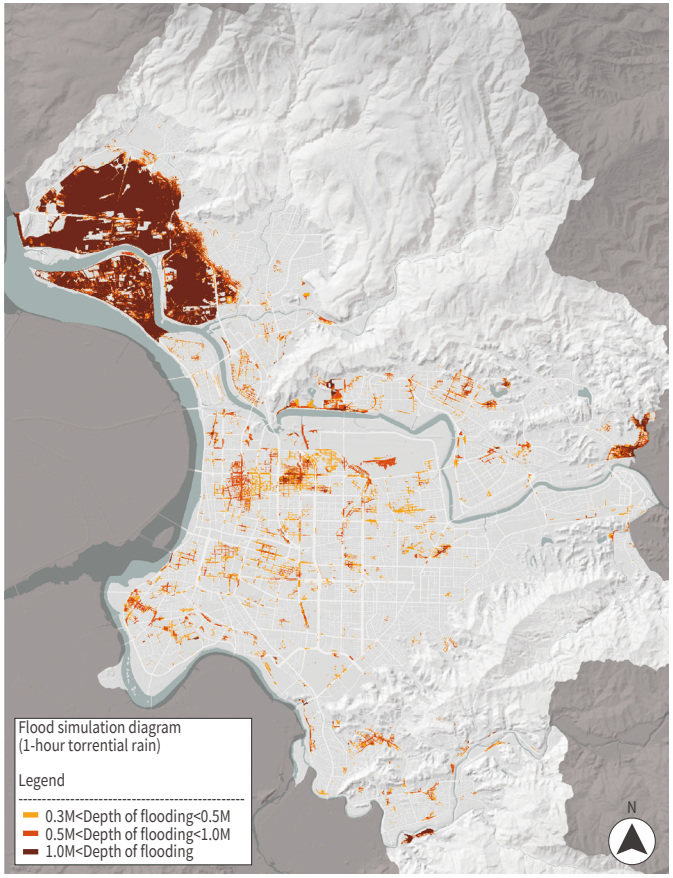




02.

Stormwater Management under the Impacts of Climate Change

Areas at the foothills and around rivers, as well as low-lying urban areas, are potential flood zones. Strategies for runoff management need to be considered.



03.

Ecological Restoration for Urban Waterways

Urban development has profoundly affected "plains wetland" environments, leading to their disappearance. Beyond flood control, ecological restoration measures are

Vision: Proposing the Initiatives for Urban Blue-Green infrastructures

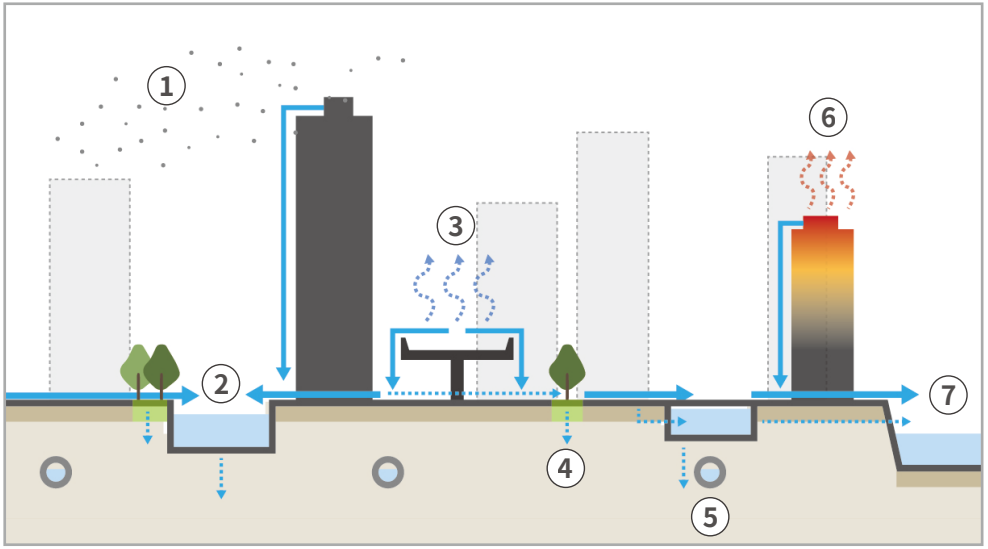
Enhancing Drainage System Capacity and Integrating Blue-Green Infrastructure

Unlike conventional grey infrastructure, blue-green infrastructure contributes to multiple aspects and incorporates multifunctional uses into urban infrastructure:

1. Enhances the cyclical use of water in local areas, balancing water resource conservation and urban development.
2. Improves water quality through filtration and retention methods.
3. Through retention and storage, increases surface permeability, reducing runoff during rainstorms and easing the burden on drainage systems.
4. Through stormwater management strategies, meets urban needs for recreational water activities and improves landscape aesthetics.

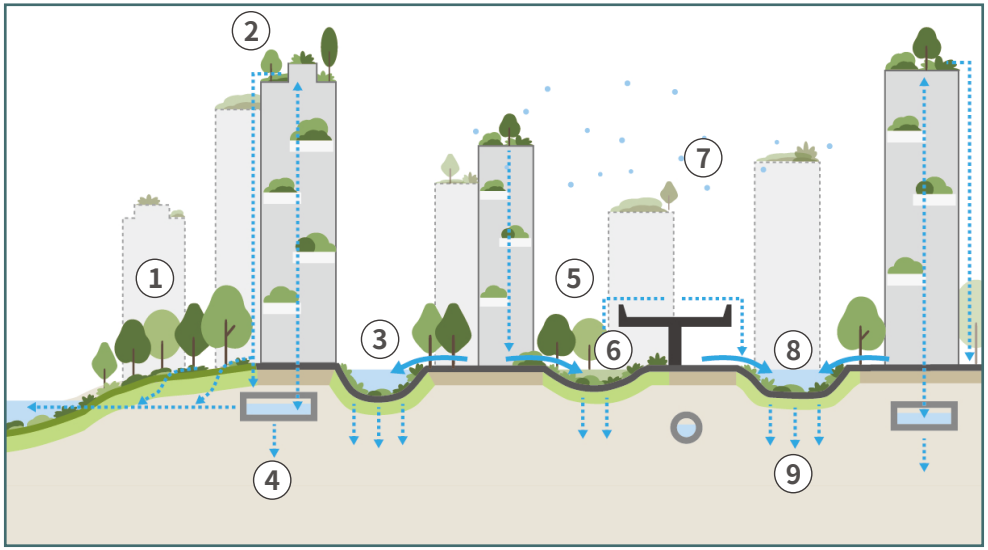
Grey infrastructure city

1. Airborne pollutants
2. Water confined to waterways
3. Low evapotranspiration
4. Lack of access to green spaces
5. Urban heat island effect
6. Low infiltration and lack of groundwater recharge
7. Rapid rainwater runoff



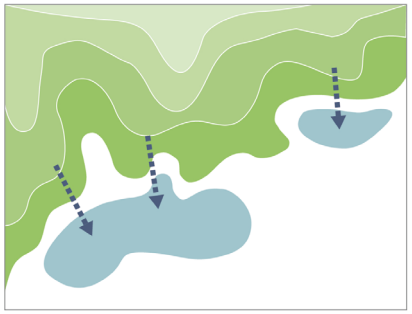
Blue-green infrastructure city

1. Vegetation purification
2. Rainwater retention cycle
3. Opening up of waterways
4. Use rainwater for irrigation
5. Canopy transpiration
6. Provide habitats for wildlife
7. Air purification
8. Naturalization of river waterways
9. Increase infiltration and groundwater recharge



Strategy: Three Context-Specific Spatial Prototypes

Over the past two to three decades, Taiwan's rising civic awareness has expanded public expectations from merely fulfilling basic functions to addressing issues such as local culture and history, ecology, environmental protection, and climate change. The future development of urban drainage systems should adapt to the specific terrain, location within the catchment area (upstream, midstream, downstream), and the challenges encountered. In this context, blue-green infrastructure can play a multifaceted role.



+ Point-Based Prototype: Restoration for Hillside Ponds

Overlaying ancient maps reveals the former presence of ponds at the foothills in mountainous areas. It is recommended that these ponds be gradually restored to address issues such as stormwater accumulation and reduce downstream flood peaks. Furthermore, the restoration will help establish new aquatic habitats that connect with the mountain ecosystems, aiding in ecological restoration and providing environmental education opportunities.

+ Line-Based Prototype: Built Environment Urban Waterway Remnant Development

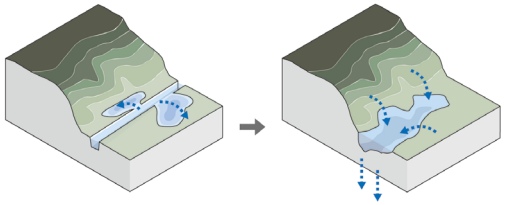
For the future development of urban waterway remnants, it is advisable to integrate historical contexts, urban recreational needs and ecosystem services, to provide multifunctional capabilities.

1. Leverage adjacent public lands to restore the splendor of old water canals.
2. Redesign major infrastructure elements, such as water distribution gates, to enhance their symbolic and functional value.
3. Prioritize using the areas along the old water canals as green spaces in urban redevelopment projects.
4. Prioritize the transformation of areas where waterways meet rivers into riverbank wetlands.

+ Plane-Based Prototype: Integration of Blue-Green Infrastructure in Catchment Areas

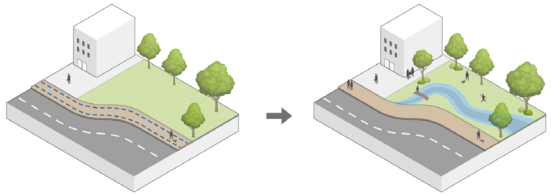
From an overall urban drainage perspective, it is recommended to integrate blue-green infrastructure within various catchment areas to enhance urban flood resilience and mitigate the impacts of heavy rainfall. In addition to point-based pond restoration and line-based waterway environment creation, efforts should be made to utilize public land for flood retention tasks. For example, parks and green spaces can assist with runoff distribution and roads can be modified for flood retention.

before after

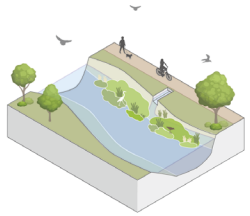


Pond restoration:
ecology + disaster reduction

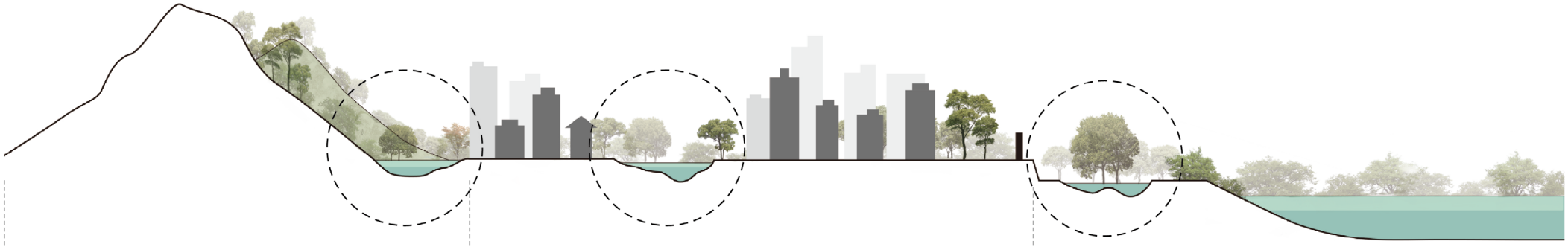
before after



Opening up canals
to increase flood retention space,
combined with creating park green spaces



Creation of riverbank
wetlands and
water purification



Adjacent to mountainous areas	Built areas	Waterfront areas
Enhance flood retention capacity		
Reduce disasters caused by sudden drops in runoff speed	Irrigation canals combined with public land for opening and excavation to increase flood retention space	
Revival of water culture		
Restore existing ponds	Development of existing water canal environments	Create a new water culture
Ecological aspects		
Ecological focus area: wetlands near mountains		Ecological focus area: riverbank wetlands

Approach:
Top-down GIS Investigation and Bottom-up Citizen Workshop for Identifying Feasible Areas

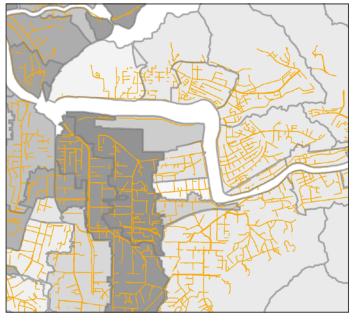
After extensive urban development and landscape changes, many of the former irrigation canals and ponds have either been transformed into urban road and street drainage systems, filled in, covered for other uses, or their water courses have been diverted, leaving only remnants visible as depressed terrains that now form parts of parks or open spaces between buildings.

Therefore, the construction of internal water features requires a systematic approach to assess feasibility.

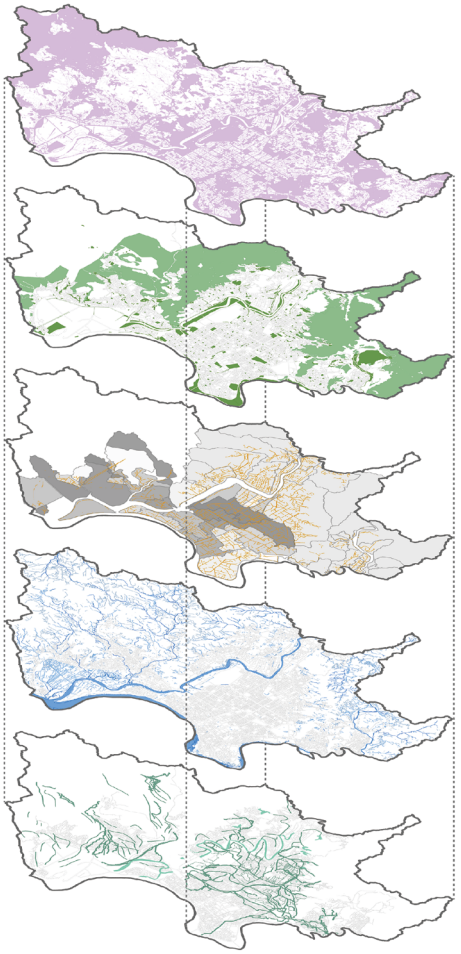
▼ interviews with community

▼ On-site identification: confirm feasibility

▼ mappings with various themed layers



▼ Collaborating with NGOs and Citizens



Public land

Green spaces

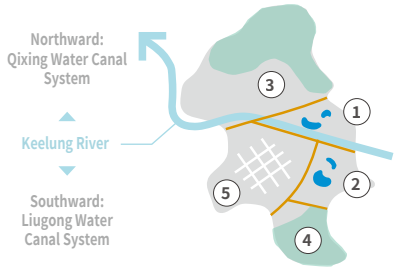
Stormwater drainage system

Water system

Old pond and canal waterway

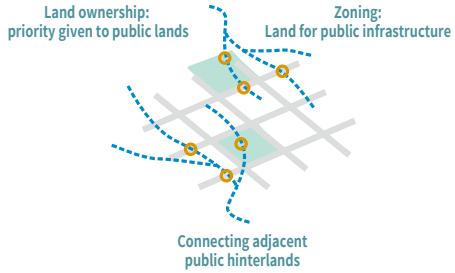
Process:
Process for Site Selection

STEP 1.
Zoning of internal water environments
divide areas based on environmental conditions



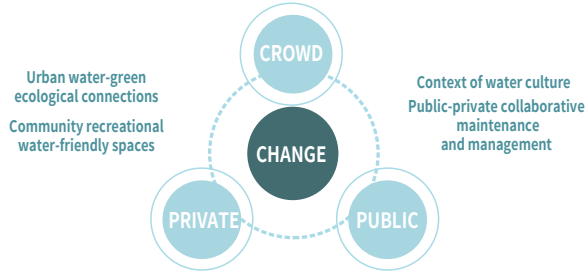
Ponds：① Neihu District、② Xinyi & Nangang District
Adjacent to mountainous areas：③ Shilin & Beitou District、④ Wenshan District
Built、Basin areas：⑤

STEP 2.
Management of waterway remnants
such as by evaluating feasibility
based on land characteristics



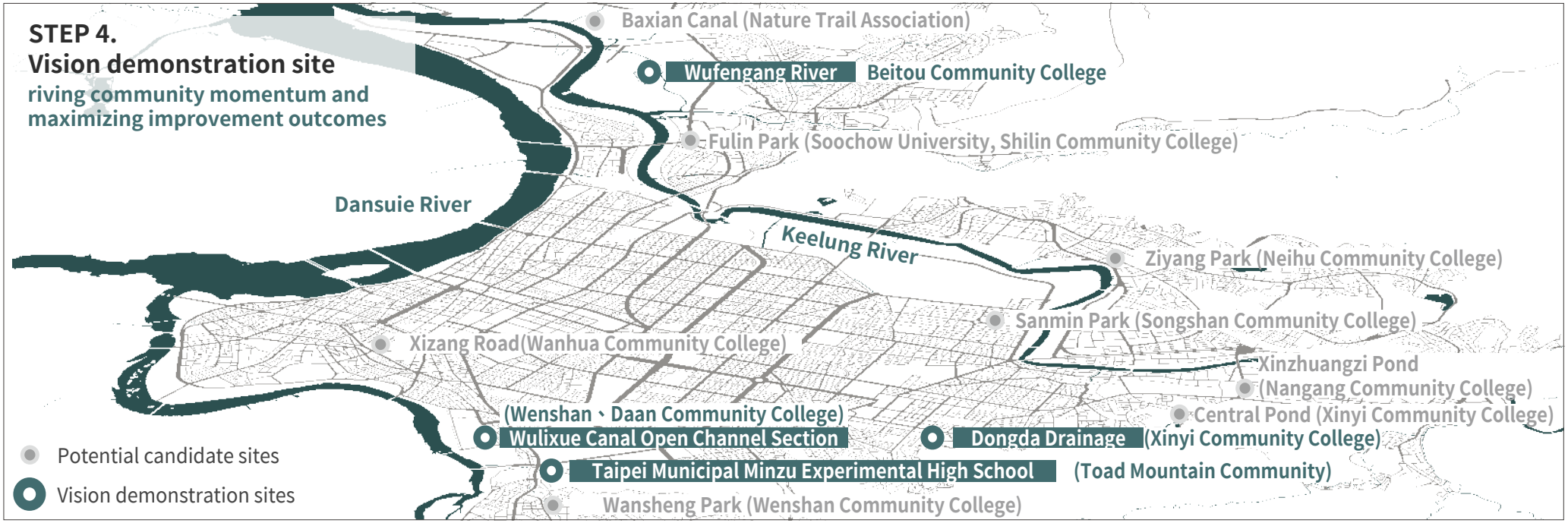
Select areas with intersection of waterway remnants,
drainage systems, parks, and public lands

STEP 3.
Convene expert panel workshops
together with community involvement to foster
discussion about potential development sites



Civic learning spaces to advocate for coexistence with rivers
Flood prevention and disaster reduction

STEP 4.
Vision demonstration site
riving community momentum and
maximizing improvement outcomes

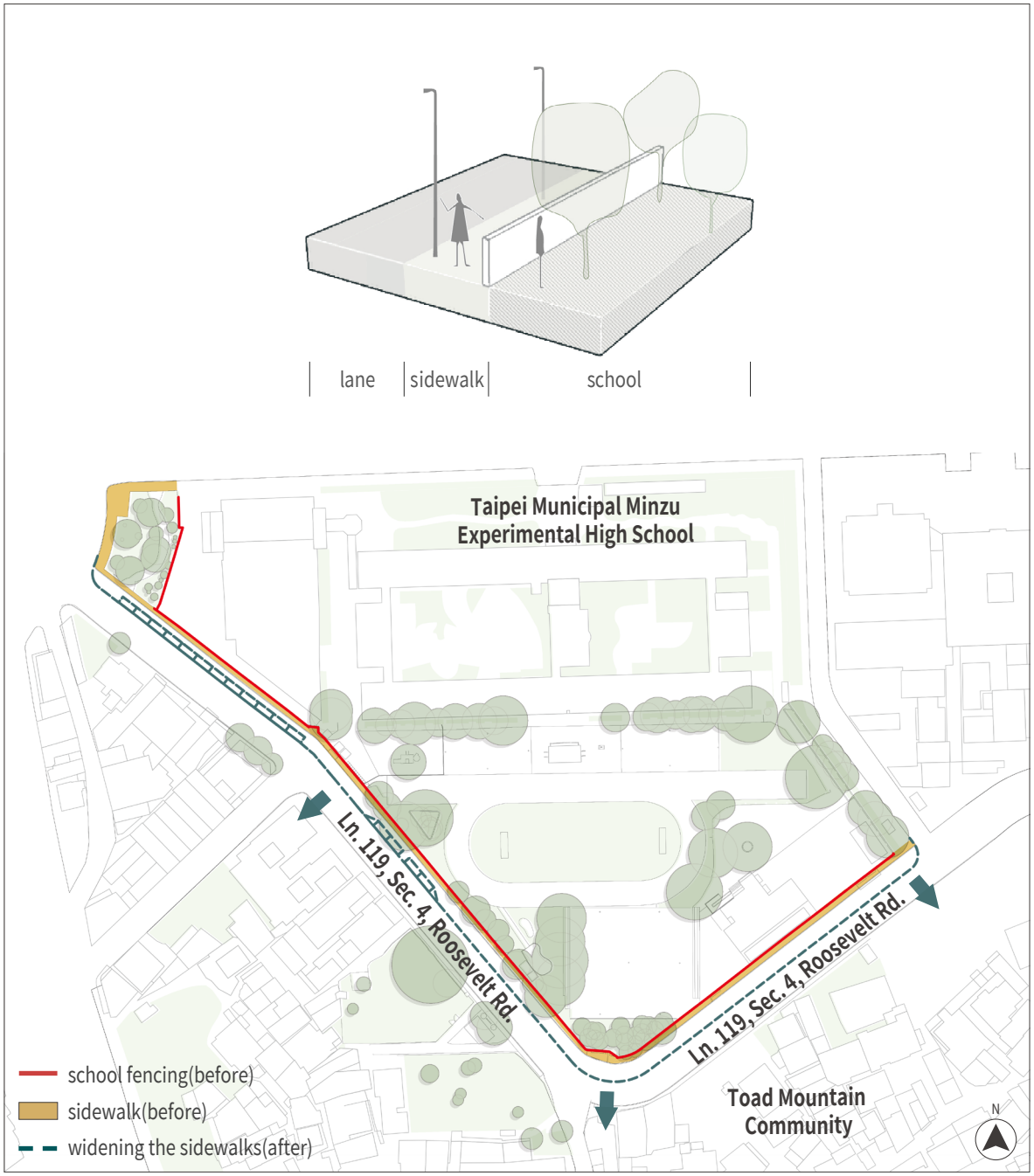


Demonstration Site for Line-Based Prototype : Drainage Environment and Campus Environment Regeneration Around Minzu Experimental High School

01.

Opening up campus boundaries and linking with the local community to rehabilitate past ecological environments

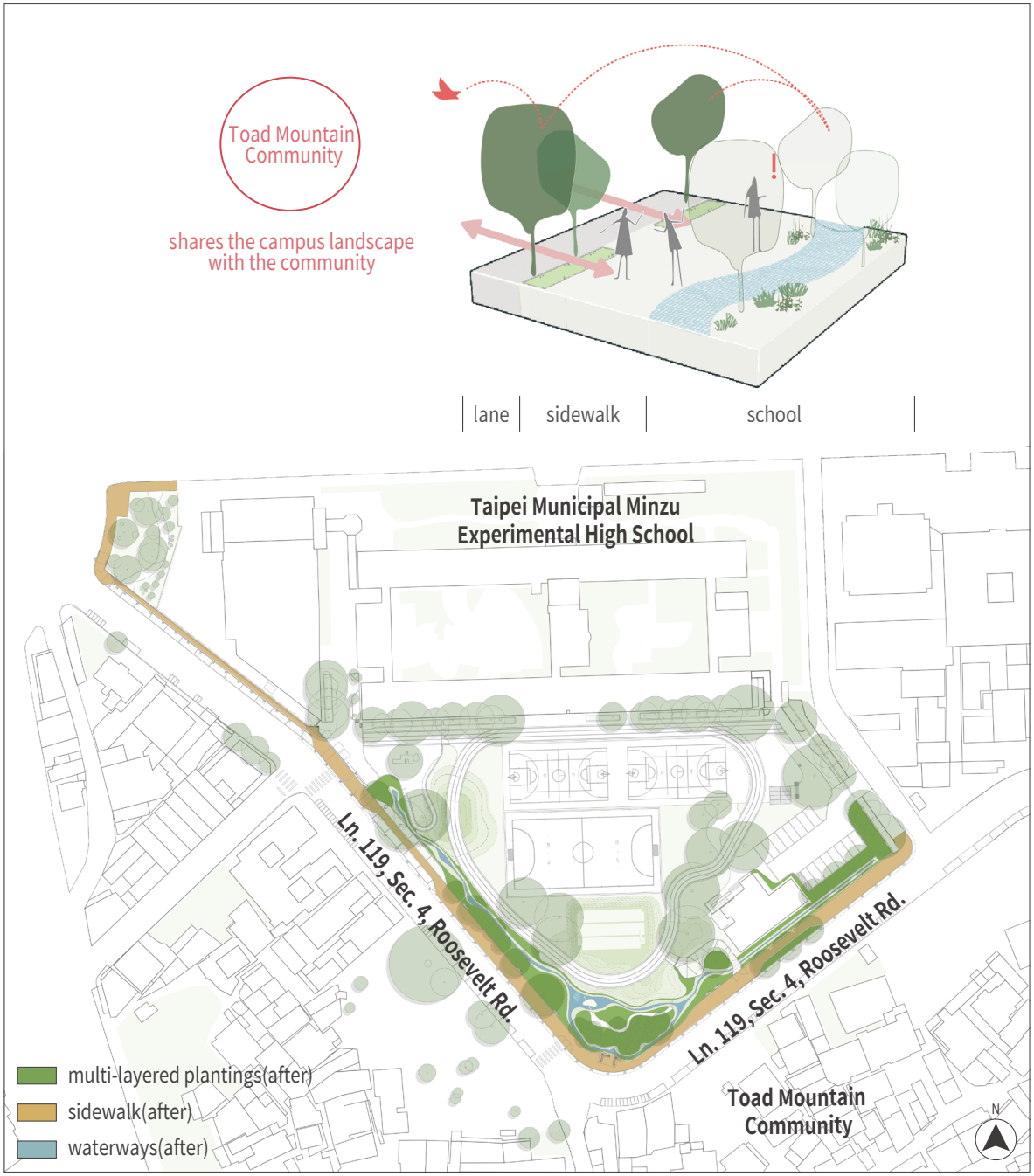
Replace physical campus walls with multi-layered plantings and waterways to allow the school and community to function independently yet integrate seamlessly. This not only enhances visual transparency and shares the campus landscape with the community but also leverages the proximity to Toad Mountain, a site rich in ecological potential, transforming the school into a crucial ecological stepping stone.



02.

Reopening water canals in Taipei, rekindling the historical memory of Taipei as a city intimately connected with its waterways.

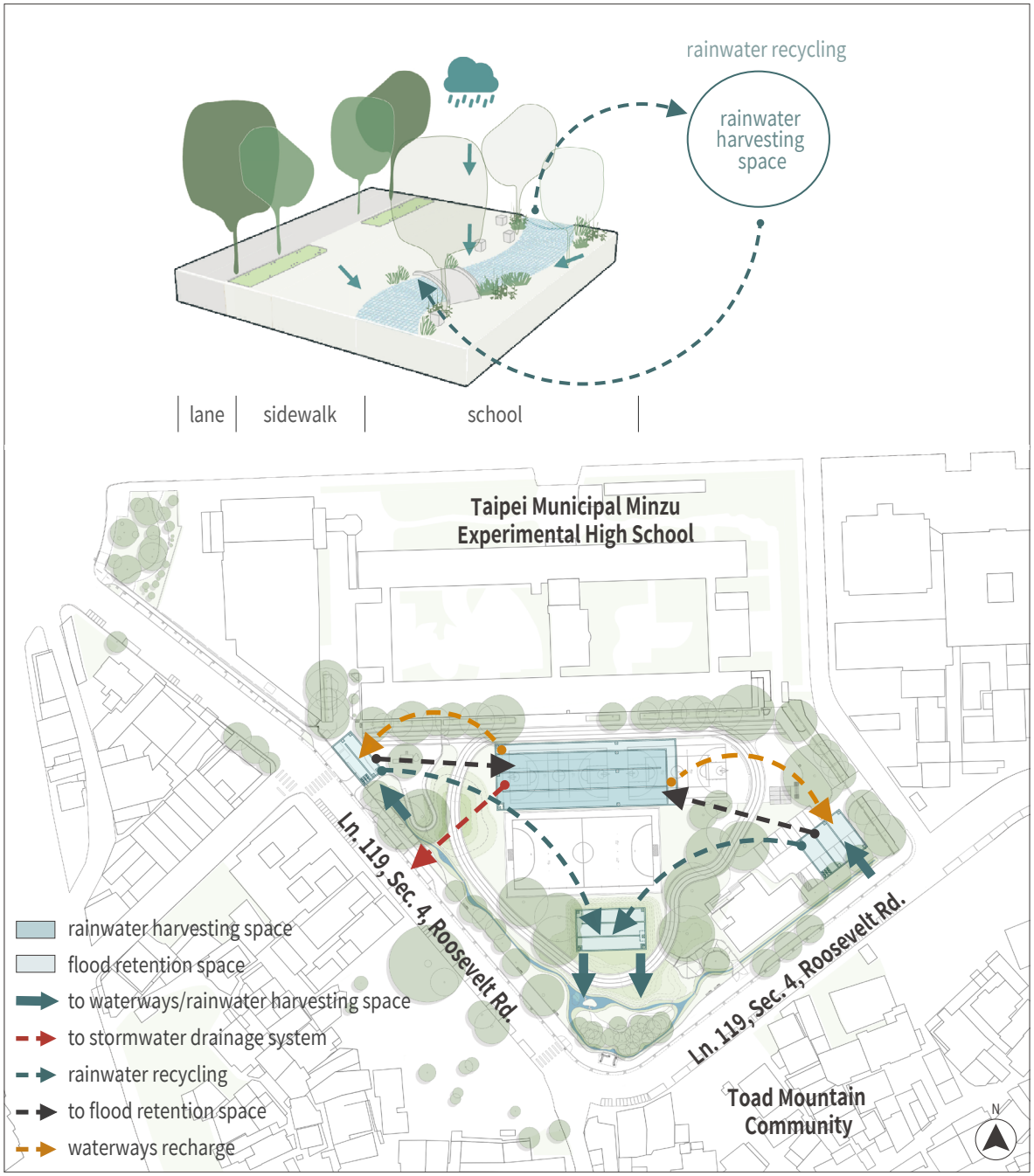
Minzu Experimental High School once lay along the first trunk line of the Liugong Canal, a vital waterway that has since been replaced by a modern stormwater culvert system, rendering the historical canal landscape invisible. This project aims to synergize the school's ecological-themed curriculum with the broader goal of creating an environment that balances historical awareness, educational engagement, lifestyle, culture and ecological coexistence with the southern Toad Mountain.



03.

The water channels collect and recycle surface runoff, also serving as flood retention catchment areas during heavy rains.

The campus is equipped with four such retention areas to collect surface runoff, enabling rainwater storage and re-use. These measures help mitigate the impact of heavy rainfall on the urban environment by delaying the flow of surface runoff into the drainage system.



Demonstration Site for Plane-Based Prototype: Environmental Construction at Dongda Drainage

01.

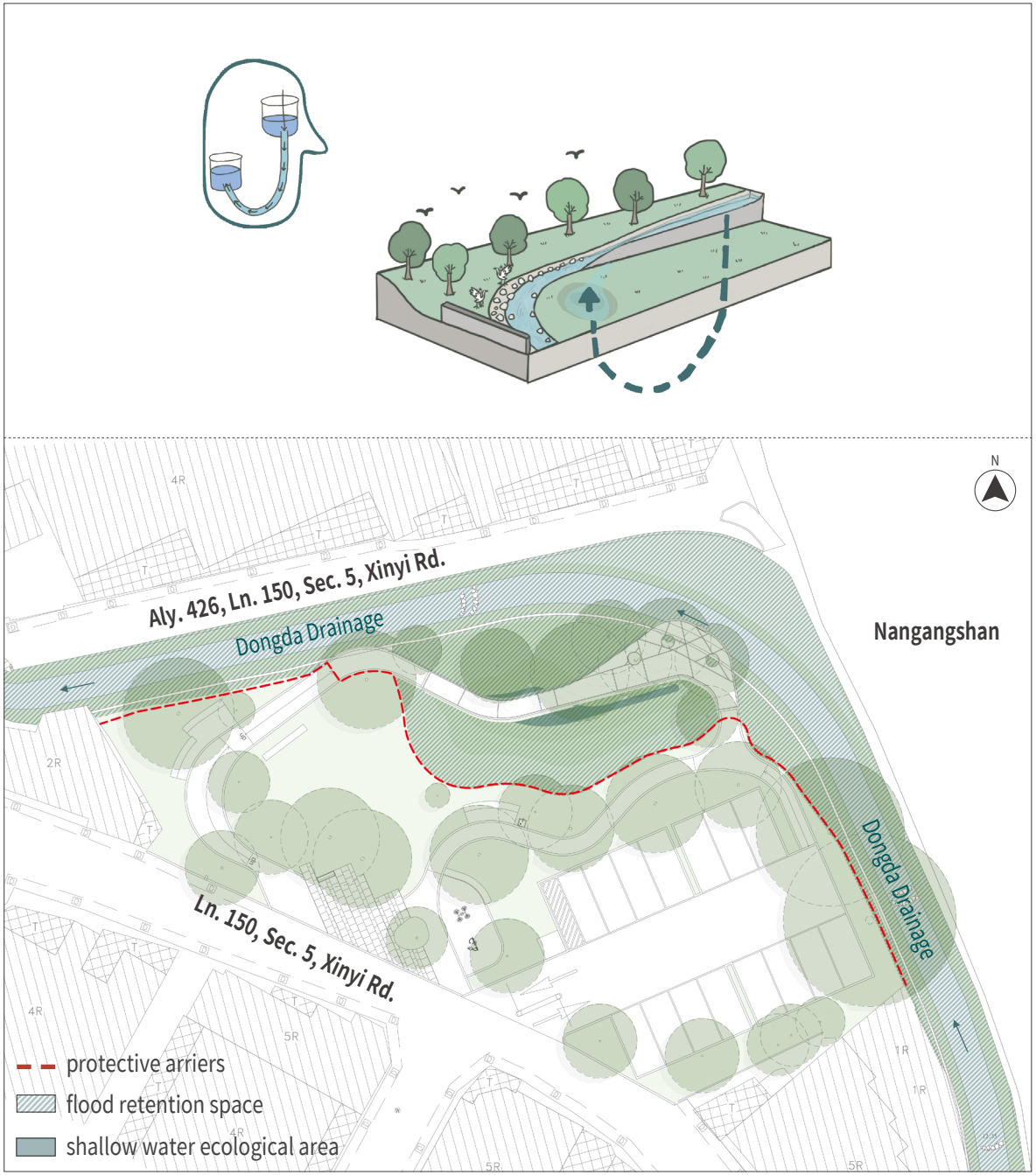
Adjusting waterway routes to minimize water flow impact .

Located near the Nangang Mountain range, the Dongda Drainage green space is rich in ecological potential. However, the steep embankments have hindered the interaction between wildlife and the water. This project aims to realign the waterway, reducing the impact of water flow at bends, with a focus on safety. By partially opening the river embankments, we provide a wildlife-friendly pathway.

02.

Shallow water areas are being developed to act as sponge-like flood retention spaces.

By employing the principle of siphoning, water from upstream of Dongda Drainage is diverted into the green space during high water levels. Overflow weirs are installed along the embankments to ensure that during heavy rains, the recessed areas within the protective barriers can act as flood retention areas. This setup slows down the surface runoff entering the drainage system, significantly reducing the impact of heavy rains on the urban environment.



03.

Eco-Friendly Environmental Classroom.

Using natural materials to construct varied habitats and transforming steep concrete embankments into gradual slopes enhances the previously disrupted connections between wildlife and water. This method facilitates interaction with water and wildlife observation, promoting greater awareness of aquatic environments and boosting biodiversity.