



Fig. 1
View from the bridge over the
Loudong River, the largest
tributary on the south bank of
the Lanyang River, looking east
towards the mountains. Adapted
from a photograph by Keng Ching
Chen.

Calling to Map

Taking the Water System as a Base for Development

Keng Ching Chen¹ and
Inge Bobbink²

This essay presents a nuanced examination of the evolving hydrological landscape of Taiwan's Yilan Plain. Combining personal narrative with historical and spatial analysis, the author employs the Circular Water Stories (CWS) perspective developed within the lab, returning to Taiwan after graduation to examine how traditional water systems have influenced local settlement patterns, agricultural practices and cultural identity. Drawing on field observation, archival material, and mapping, the essay also reveals how natural dynamics and shifting political regimes have altered these relationships over time. More than a technical study, it is also a personal diary of rediscovery and reinterpretation, calling for the reintegration of traditional knowledge into contemporary water planning and resilience thinking.

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Standing atop the bridge, I look over the lush green landscape. The Yilan Plain, also known as the Lanyang Plain, is a river delta known for its natural features and close relationship with water, bordered by high mountain ranges that open to the Pacific Ocean to the east (Figures 1 and 2). Yilan is known for its rich natural resources and agricultural activities (Figure 3), because of its abundant water resources, springs, hot springs, rivers, hyporheic flows, and natural ponds, which are rich in layers of stories and traces awaiting discovery. My training and studies at the CWS Lab in the Netherlands enabled me to do so by utilising a simple yet effective tool, mapping.

Fig. 2
Map of northern Taiwan showing the location of the Lanyang Plain. By the authors.

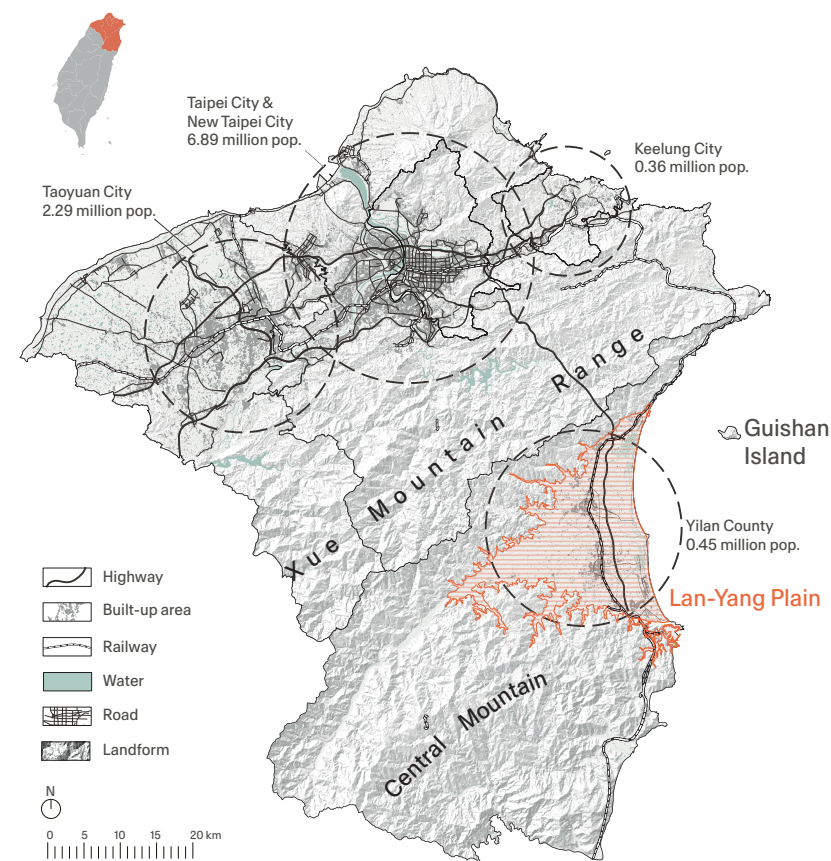


Fig. 3
Rice fields in winter, commonly found in Yilan and kept inundated, create striking reflections of the sky. By the authors.



Living in a delta involves constant negotiation with water. I am drawn to this entanglement between humans and nature—the co-authors of stories layered across a shifting palimpsest. I have come to realise that to truly understand cultivated landscapes, one must first read the story of nature, and then the narrative written by human hands.

Before me unfolds, a river flowing endlessly from the mountains to the sea, carrying both the power to destroy and the capacity to nurture the land. As every Yilaner knows, memories of flooding are deeply ingrained and bound to the Lanyang River's restless course, which has repeatedly erased towns and villages. Historical records testify to the hardships of farming under constant threat, preserving a lingering sense of struggle against the water.

However, another story is also discussed. The river also carries gravel and sand to form an alluvial fan that feeds vital aquifers, and the downstream deposits fine sediments that nourish wetlands and sustain diverse life. The river embodies a profound paradox in these twin acts of erosion and renewal. Water both takes and gives, shaping not only the enduring challenge of living beside an untamed river but also its enduring beauty. (Figures 4 and 5), respectively.

During the Japanese colonial period (1895–1945), a new balance emerged between humans and water. The introduction of Kasumi levees marked a shift towards a segmented, rather than a fully enclosed, flood-control system. Continuous reinforced embankments faced the river to withstand its force, while carefully placed openings allowed floodwaters to enter and slow down. Through this deliberate permeability, water can swirl, deposit sediment, release nutrients, dissipate flood energy, and gradually moderate the river's behavior, fundamentally reshaping prevailing notions of flood control.

Originating along Japan's Jōganji River¹, this system embodies an ancient principle: to accommodate rather than exclude water. Because Taiwan's rivers share key characteristics with those of Japan—steep gradients, short courses, and highly dynamic channels—this technique proved particularly well suited to Yilan. Since its construction in 1930, the Kasumi levee system has protected Yilan hinterland for nearly a century, reclaimed land for agriculture and settlement, and enabled rural life to flourish within its sheltered reach. When the original technical plans are aligned with the contemporary atlas, it becomes evident that the newly developed areas remain secured by this monumental intervention, while Yilan's principal townships continue to rely on their protection. (Figure 6)

Fig. 4
The Lanyang River is the major river in Yilan County, originating from mountain streams and running through the middle of the plain. By the authors.



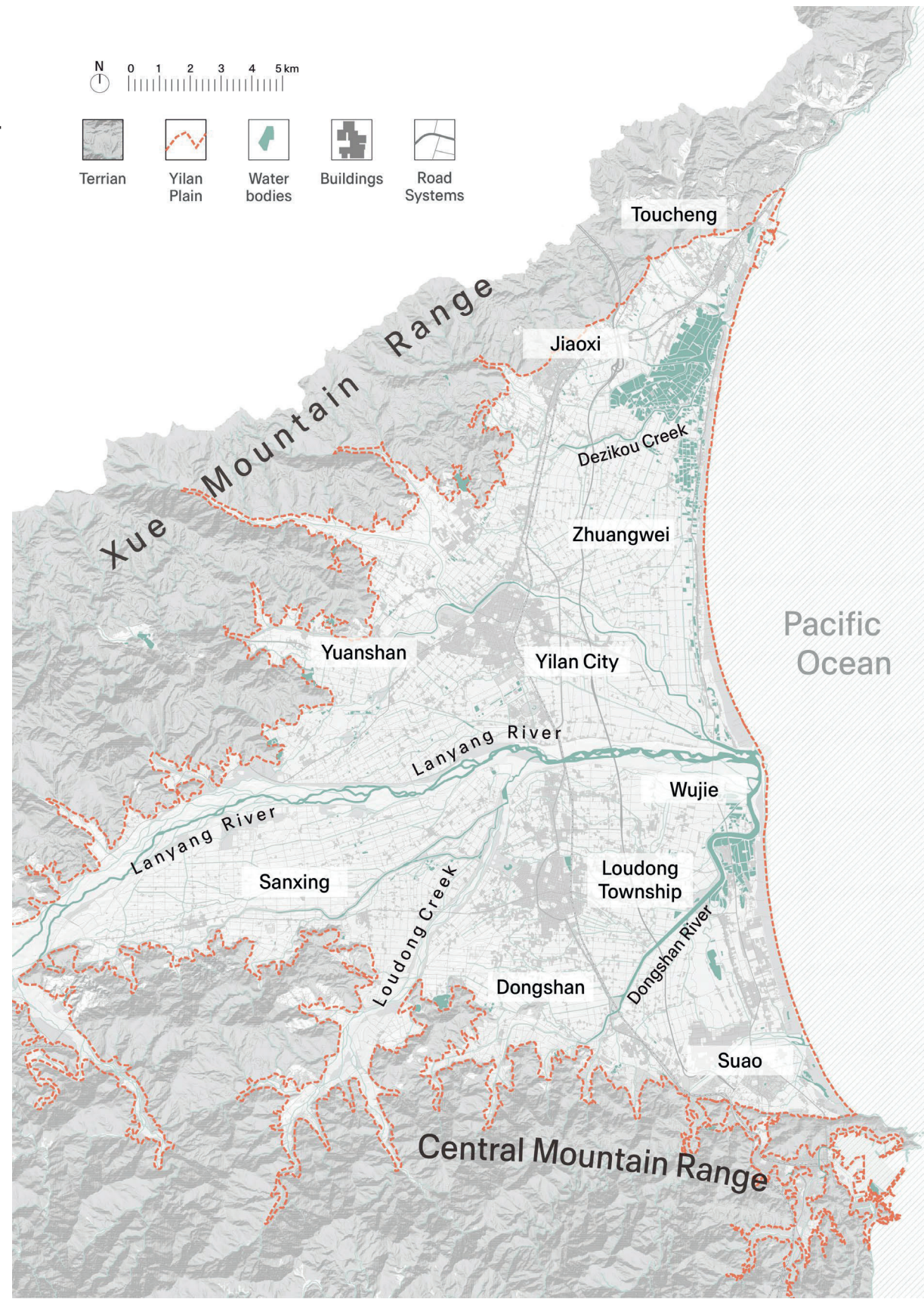


Fig. 5
The Lanyang Plain is a river delta formed by the confluence of many streams and rivers. By the authors.

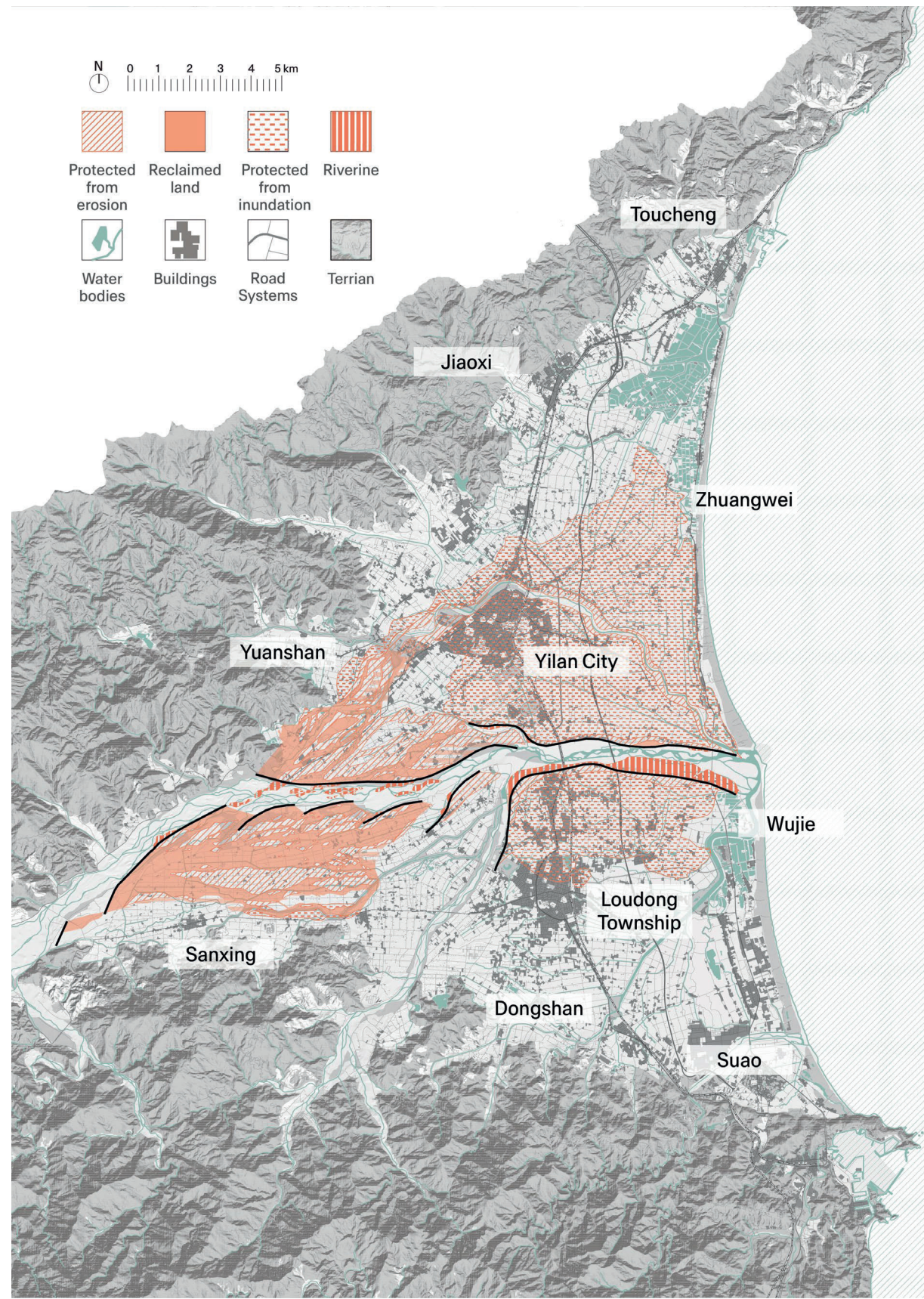


Fig. 6
The Kasumi levees and the reclaimed area. The drawing reconstructs how the Kasumi levees protected large areas of the plain from erosion and inundation, based on historical maps from Academia Sinica (n.d.).

What the Japanese brought to Yilan was not merely the implementation of new methods, but a systematic way of thinking about and managing water, as shown in the sourcing of irrigation water. The authorities consolidated numerous scattered irrigation systems constructed during the Qing Dynasty (1644–1911), many of which originated from the spring zone at the edges of a series of alluvial fan toes.² This system forms the basis of today’s agricultural landscape, a coherent water system that harnesses the fan’s abundant groundwater and spring flows. (Figures 7, 8 and 9).

Within this broader trend of modernisation, a key breakthrough was the use of concrete, a critical material that transformed both the effectiveness and reliability of water infrastructure. Early irrigation channels constructed from stone and wood were structurally fragile and highly vulnerable to storm damage. These were later replaced by concrete channels, which offered greater durability, reduced leakage, and enabled more precise measurement and control of water flow.

Japanese engineers have also integrated irrigation and drainage systems, and many primary irrigation channels have drawn water from drainage canals in higher areas before returning it to rivers or adjacent waterways. This interconnected design allows surplus water to be reused downstream, significantly improving the overall water-use efficiency. (Figures 10, 11 and 12)

Beyond the modernisation of channels, new methods have been introduced to extract greater volumes of water and retain it for longer periods within human-made systems. A notable example is the Meizhou system, which originated in Da Jiao Xi Creek. Its water-intake culvert was engineered to capture the hyporheic flow beneath the riverbed, thereby increasing the water supply to approximately 480 ha of downstream farmland (Figure 13). By stabilising flows and reducing the labor demands of irrigation, advances in hydrological knowledge and engineering have transformed earlier, rudimentary systems into a more sophisticated and efficient water infrastructure (Figure 14).

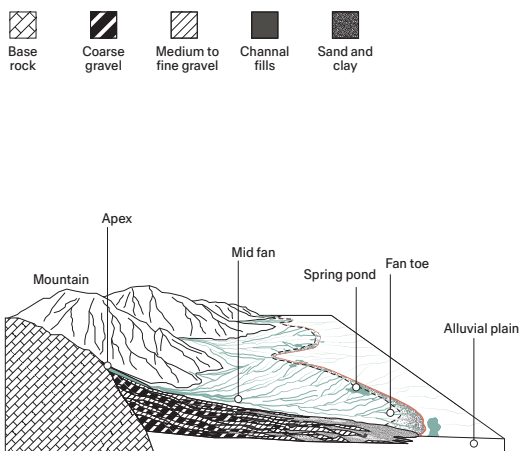


Fig. 7
Conceptualised hydrogeological section of an alluvial fan, illustrating infiltration through coarse upper-fan deposits and possible spring emergence near the fan toe. Alluvial-fan morphology and depositional framework adapted from Spearing (1974) and informed by Nilsen (1982); subsurface configuration simplified from local geological borehole data.

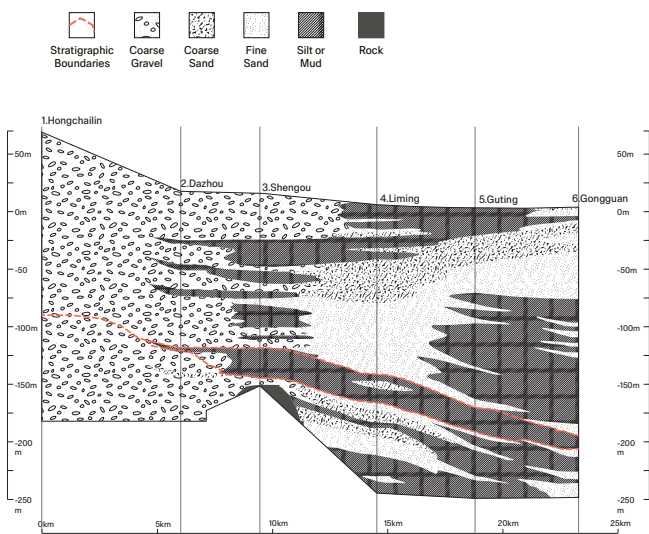


Fig. 8
Cross-section showing how soil types change along the gradient from the upper to the lower plain. The alluvial fans consist primarily of gravel, based on data from National Chiao Tung University (2013).

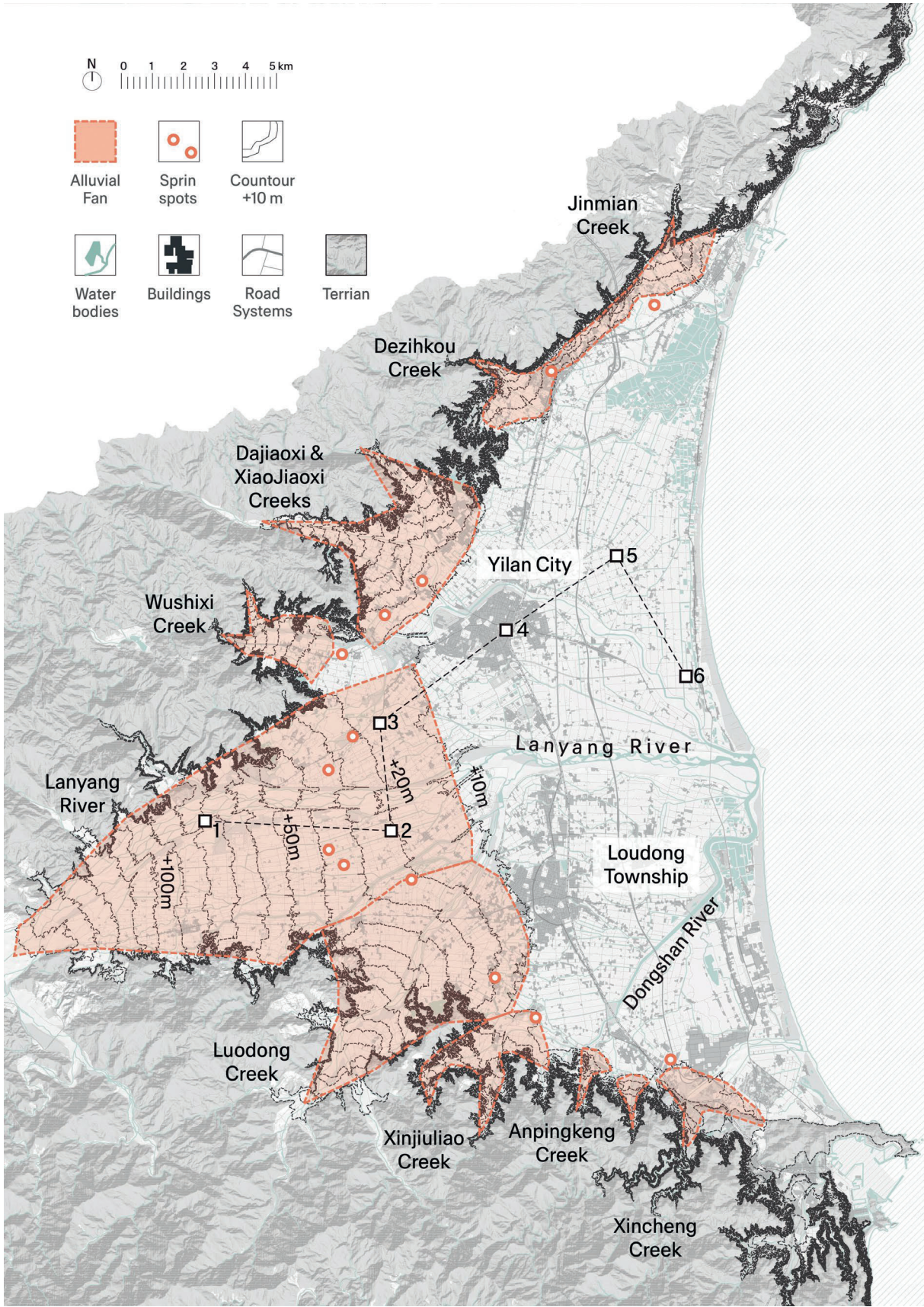


Fig. 9
Alluvial fans of the Lanyang Plain. Drawing after Chang (1995) and Chang et al. (1995).

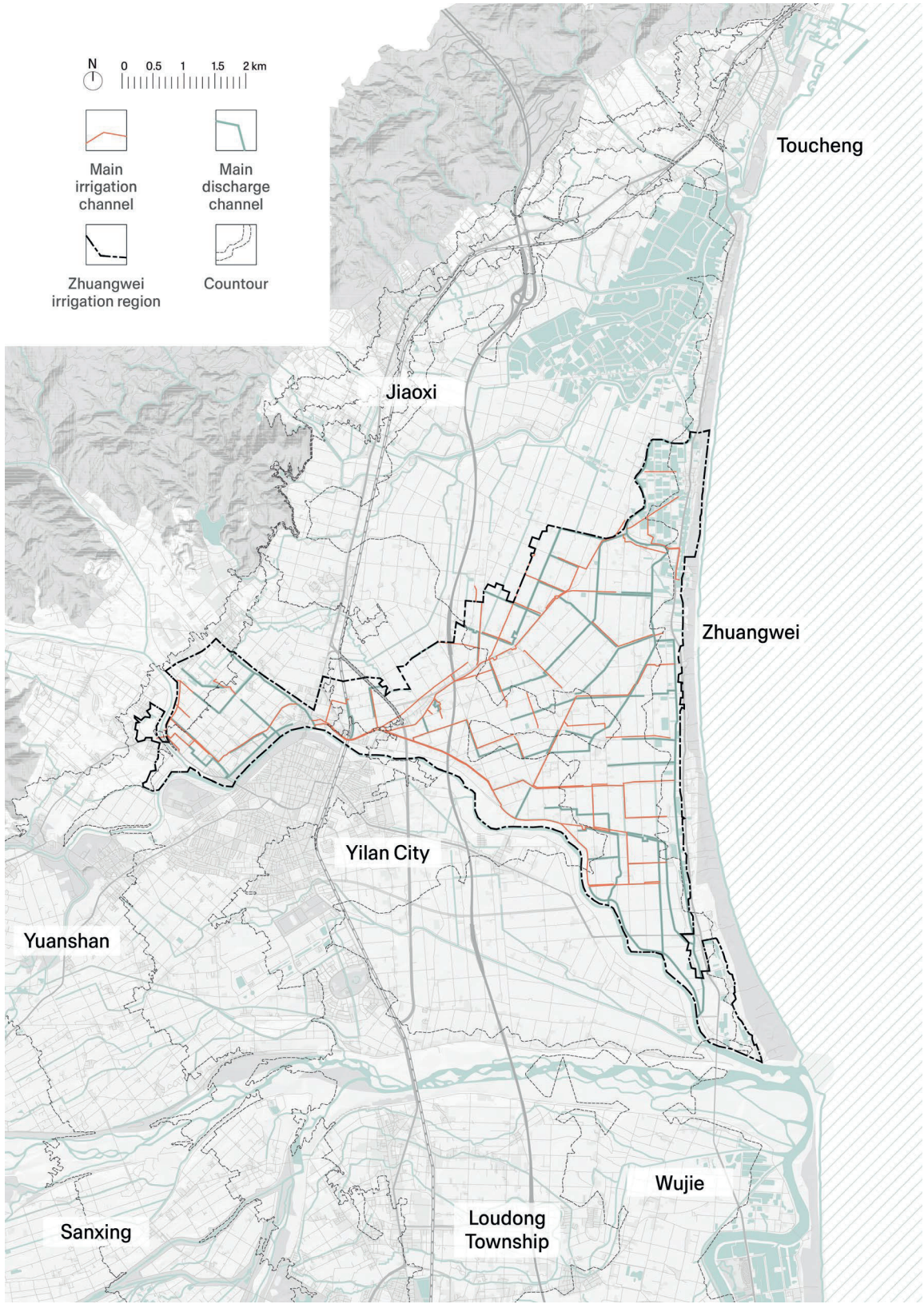


Fig. 10
Current water system in Meizhou, showing multiple water intake and outlet points. Drawing based on data from the Yilan Management Office (n.d.-a, n.d.-b).

Fig. 12
Irrigation and drainage system in Meizhou and Zhuangwei region. By the authors.

Fig. 13
Three-dimensional drawing of the water system illustrating the interaction of water flows, including the culvert in the Da Jiao Xi Creek riverbed, which captures hyporheic flow. By the authors.

Fig. 14
Water gate of the irrigation system in Meizhou, which forms the outlet of the water-collecting culvert. Adapted from First River Management Office, Water Resources Agency, Ministry of Economic Affairs (2011).



Fig. 12



Fig. 14

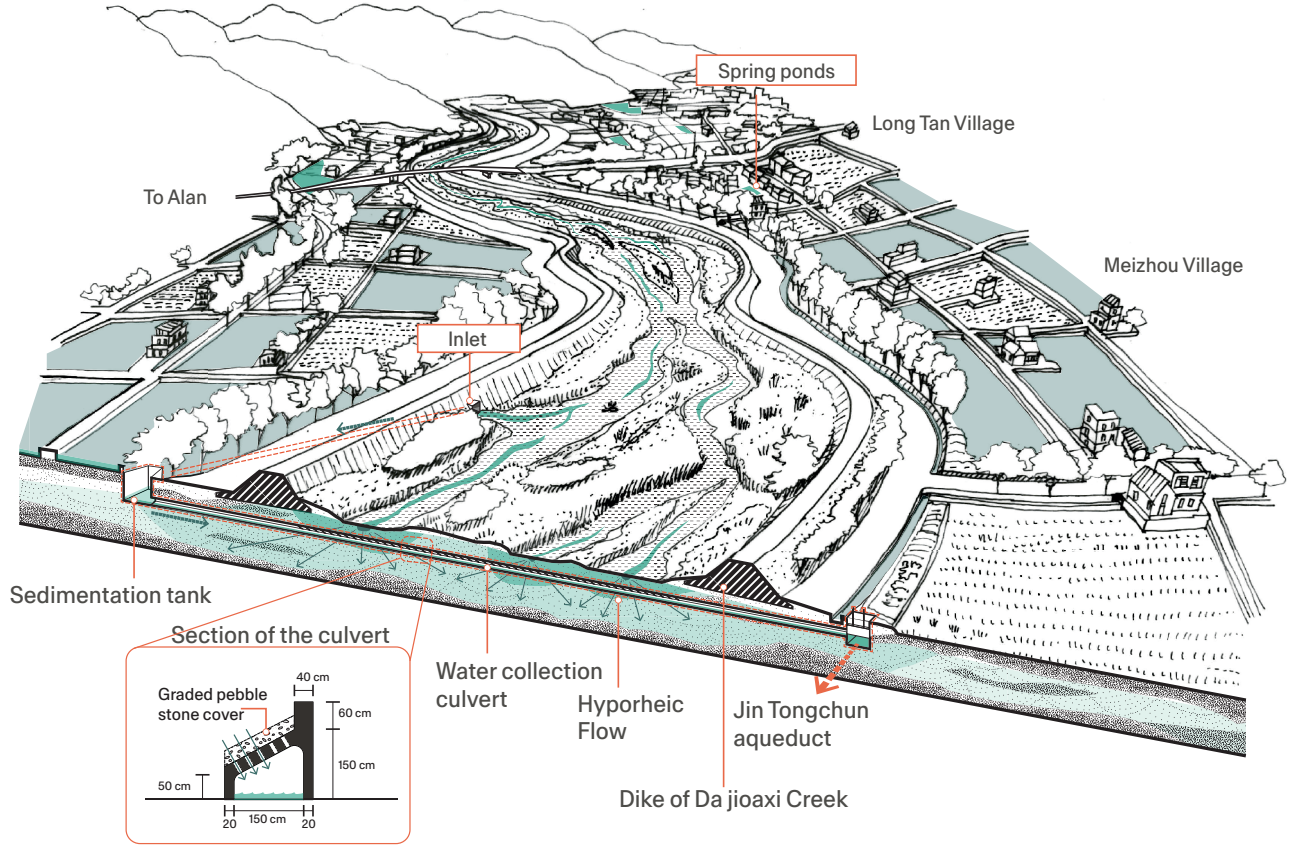


Fig. 13

The clean, reliable, and managed water flow enabled a distinct water-based way of life. In Meizhou, the culvert that enables hyporheic flow supports not only agriculture, but also daily routines, enabling activities such as laundry, vegetable washing, and other household uses. The related spaces—washing platforms, staircases, and access points—became informal gathering places for families and neighbors, serving both practical needs and social interaction.

The story of Meizhou is echoed throughout the Yilan Plain. Yilaners can easily enjoy refreshing midday baths in neighborhood ponds or fish beside channels during holidays. Generations of ancestors have shaped these numerous pleasant water spaces, and modern infrastructure has ensured access to clean and abundant water. Together, these practices and spaces have fostered a distinctive water-centred identity unique to Yilan. New designs are learning from these old water features, and the community is raising funds to create new water pavilions. (Figures 15 and 16), respectively.

OVER-COMPLEXITY

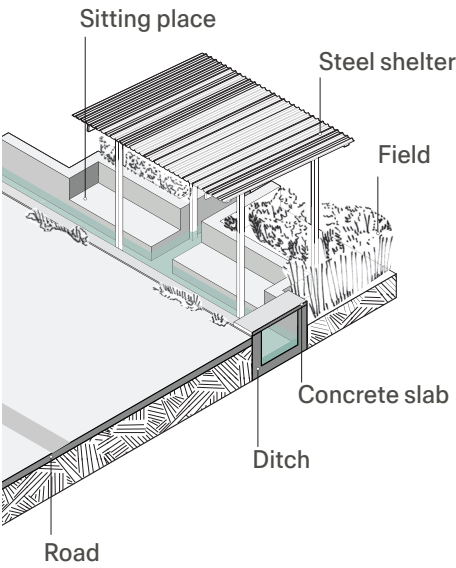
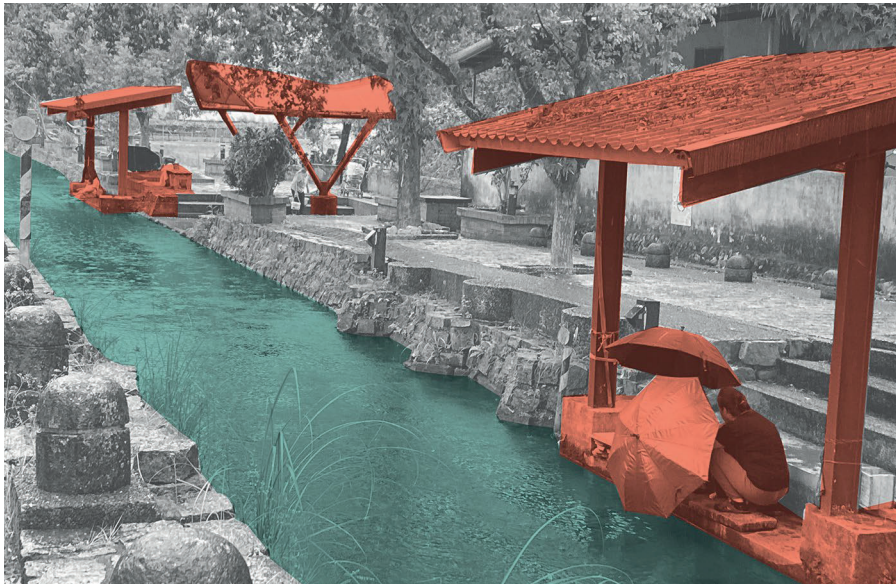
However, reliance on concrete and endless technical adaptations is risky. This became evident during several field surveys where the complexity of the water networks stood out. In these agricultural lands, a single road may be flanked by two or three ditches on each side, each with different water levels that intersect and overlap. Multiple ‘water highways’ and ‘water intersections’ crisscross the landscape. Understanding the system requires repeatedly drawing and redrawing the connections between these channels. (Figure 17)

DEVELOPMENT THAT LACKS SUSTAINABLE CONSIDERATION

As the water system becomes more complex, its capacity to adapt to future challenges weakens due to long-term climate and land-use changes. Climate change results in intense, short-lived rainfall followed by long dry periods (National Science and Technology Council, & Ministry of Environment, 2024). At the same time, the decline in farming has left vast fields abandoned or underused, creating a ‘blank canvas’ for large, luxurious villas

Fig. 15
Main channel of the Meizhou irrigation system. The pavilions and staircases were added as part of a recent redesign. By the authors.

Fig. 16
Axonometric drawing of washing places created by residents. By the authors.



Study on the water system in Meizhou Area

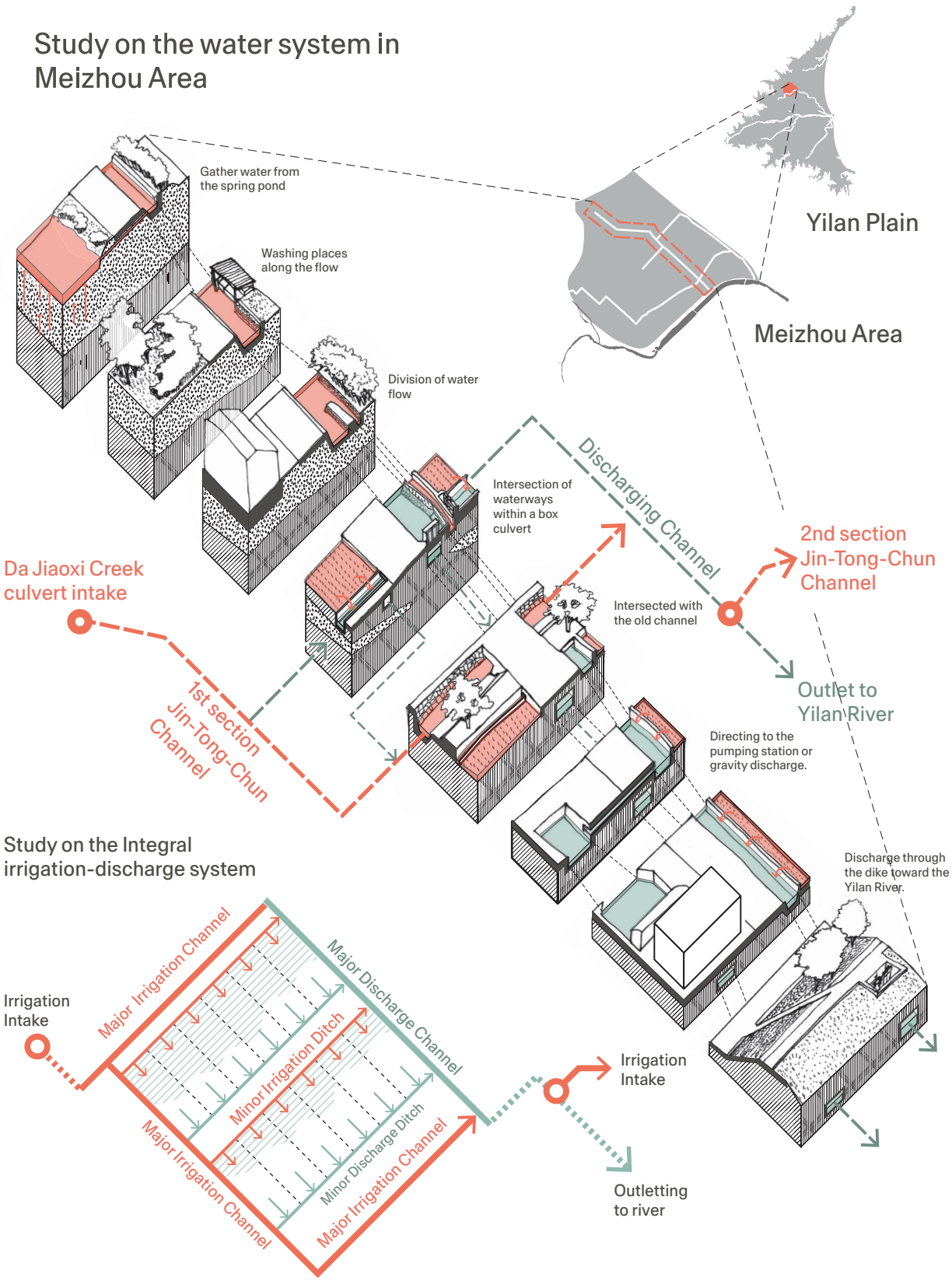


Fig. 17
Study of the Meizhou water system combined with spatial relationship diagrams, illustrating the complex network of pipes and ditches. Using one section of the area as an example, the drawing shows how the function of water channels changes with elevation: some irrigation ditches become drainage channels only a few hundred metres downstream. As the terrain becomes lower, the drainage network grows increasingly complex. The outlet to the main river includes both a gravity discharge and a pumping station designed to manage extreme rainfall events. By the authors.

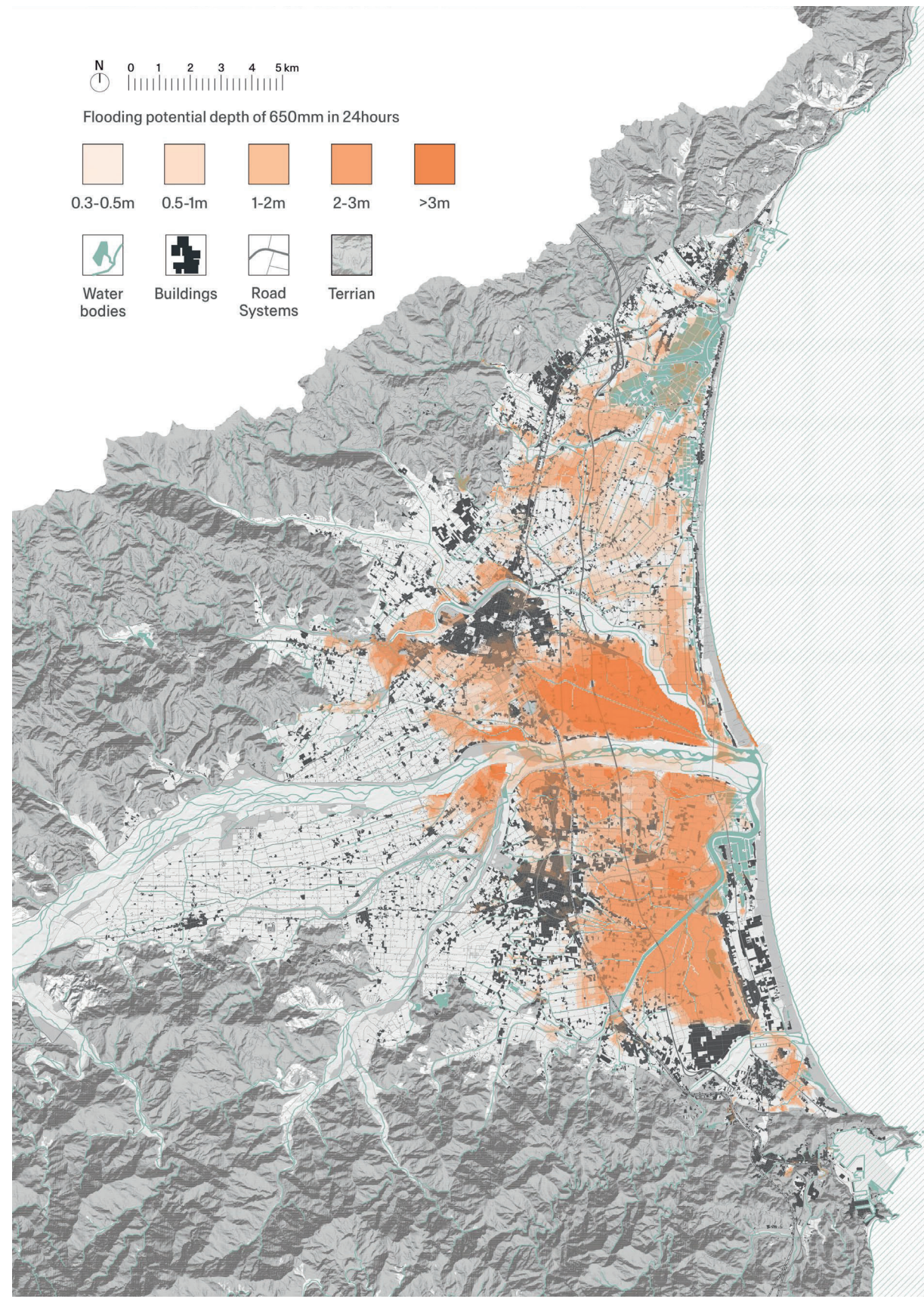


Fig. 18
Overlay of flood potential maps (650 mm of rainfall in 24 hours) with the current landscape, highlighting the urgency of development within a sustainable and resilient framework. Based on data from the Water Resources Agency, Ministry of Economic Affairs (Taiwan) (n.d.).

for retiring urban dwellers (Figure 19). However, short-term problem solving and single-purpose approaches are the main solutions to these issues.

Rural land is currently accompanied by the spread of impervious surfaces, which accelerates runoff and increases flood peaks. In response, expanding the drainage infrastructure and adding more pipes to accommodate changing land-use patterns are the best options. However, because public land is finite, this approach forces waterways to be built beneath road surfaces rather than as open spaces as they were once. Such an approach may address immediate demands; however, the complexity of the system makes maintenance more difficult and reduces the character of waterways, turning them into pipes and losing their role as shared public spaces. (Figure 18)

In addition, because authorities are falling short in thinking about long-term transitions and fixing immediate problems under public pressure, water management has become a problem only for engineers and not spatial designers. Designers play a key role in placemaking but are absent in most planning processes and major meetings. Over time, these vital, life-linked waterways have been reduced to mere pipes and underground structures, and with this transformation, Yilan's water-centred identity has gradually faded. It is increasingly imperative to reconsider the conceptualisation and management of waterways, moving beyond their conventional role as conduits for water transport, to recognise them as multifunctional landscapes that provide public amenity, enhance spatial quality, and deliver ecological services. (Figure 20)

Fig. 19
A parcel of land for sale (as indicated on the signboard) will most likely become the site of a villa. Adapted from a photograph by Keng Ching Chen.

Fig. 20
A ditch in Wujie Township showing vegetation thriving along its hardened edges (orange mark). Adapted from a photograph by Keng Ching Chen.



Fortunately, Yilan has a long-standing tradition of environmentally attentive development. Successive interventions have repurposed indigenous water spaces into prominent public landscapes that attract both residents and visitors, exemplified by projects such as the Dongshan River Park and the revitalisation of the Yilan River corridor (Figure 21). These initiatives facilitate renewed engagement with the natural environment and significantly contribute to Taiwan's landscape architecture canons. These concepts were realised in practice through the efforts of visionary decision-makers in the nineteenth century, forward-looking officials, and skilled designers, all of whom sought to understand and preserve Yilan's distinctive character.

Historically, Yilaners demonstrated a strong environmental consciousness, mobilising against polluting industries and advocating for sustainable development. During this period, the design and management of high-quality water landscapes were central concerns for authorities, with water serving



Fig. 21
The Dongshan River projects in the southern Yilan Plain, initiated around 1990, represent a groundbreaking example of river regulation and management in Taiwan. They illustrate comprehensive planning and intervention strategies. Adapted from Lai (1991).

as the fundamental design element. This represents a valuable yet fragile tradition, one that, after 30 years, risks being forgotten or overlooked by newer generations. As existing systems have once again become fragmented, they are no longer adequate to address the emerging challenges of climate change and land use transition. Rather than responding to these issues only partially and temporarily, Yilan must adopt a broader and more systematic perspective on the landscape as a whole and extend its vision beyond immediate concerns.

REFLECTION

Studying the Lanyang Plain has revealed that water has long been and continues to be central to the everyday lives of the Yilan people. Similar to many regions worldwide, Yilan’s existing water systems no longer fully respond to contemporary climate variability or modern patterns of living. Thus, it is essential to critically re-examine these systems and distil the knowledge embedded within them. Mapping and documenting these networks is a crucial first step, as it uncovers hidden layers of understanding that can inform adaptive strategies for future landscapes and water management.

Through this short expedition, I am convinced that landscape architecture plays a distinctive role. It can bridge multiple perspectives, engage diverse stakeholders, and reinterpret enduring water systems as new, functional, and meaningful spatial interventions. In doing so, we honor the resilience of Yilan’s people and their ongoing dialogue with water, one that landscape architects have a responsibility to help sustain.

NOTES

Calling to Map

1.

Jōganji River is a river located in Toyama Prefecture, Japan. Although relatively short, it has a very steep gradient. Combined with its location in one of Japan’s regions with the highest rainfall,

this makes the river highly prone to flooding. (National Highway Office, Hokuriku Regional Development Bureau, n.d.).
2.

Water infiltrates the apex of the alluvial fan, where the substrate is composed primarily of coarse gravel. As groundwater pressure within the fan increases, water emerges as springs.