

# WATER!

## About the Book and How to Navigate It

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This book explores WATER—not only as a vital resource, but as a cultural, ecological and technological force that shapes landscapes and is often transformed by human ingenuity. It presents a curated selection of traditional, human-made water systems from around the world, offering insights and reflections for researchers, designers, and a wider audience.

Many of these water systems represent context-sensitive, low-tech solutions that emerged through centuries of adaptation to specific landscapes and climate. As UNESCO's International Hydrological Programme emphasises, such practices embody intangible cultural heritage and local ecological knowledge that remain highly relevant to addressing today's challenges of water scarcity, water quality, and climate resilience (UNESCO, 2019). Rather than approaching traditional knowledge solely as a matter of looking to the past, this book, written from a landscape architectural perspective, situates it as a living archive of landscape and ecological design intelligence. Aligning with the vision of several international organisations like UNESCO, the IPCC, and the World Bank Group, our body of work argues that traditional water systems should not be understood as individual structures or technologies. They are landscape systems shaped by ecological processes, cultural practices, technical knowledge, and human stewardship, offering timeless lessons of resilience, balance, and long-term adaptation. By engaging with them critically, we can carry forward their insights to create sustainable and equitable water futures in a rapidly changing world.

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Global climate discourse, such as the 2023 UN Water Conference, has increasingly positioned water at the centre of the planetary crisis and the actions required to address it. Initiatives such as Water as Leverage (WAL), led by the Dutch Ministry of Foreign Affairs, and policies such as Singapore's Active, Beautiful, Clean (ABC) Water Policy exemplify this shift towards understanding water as a complex, interconnected system. Traditional water systems provide inspiring precedents for advancing contemporary water-sensitive urbanism and climate adaptation. Their value lies not in their direct replication but in understanding the context-specific principles, relationships, and management arrangements that have enabled them to function over time. This moment presents a timely opportunity to bridge local practices with global decision making, contributing to sustainable development at all scales.

UNESCO frames water security as both a technical and cultural challenge, emphasising that infrastructural solutions must be accompanied by strategies that engage communities and sustain traditional knowledge (UNESCO, 2019). These perspectives reinforce the use of water as a design agent and cultural medium. By learning from traditional water systems and embedding their principles into contemporary design practices, we can create landscapes and infrastructures that are more resilient, adaptive, and socially meaningful.

This study was conducted between 2019 and 2025 in the Circular Water Stories (CWS) lab, a graduate design research studio at the Faculty of Architecture and the Built Environment, Delft University of Technology, the Netherlands. Within this research framework, international master students in Landscape Architecture have explored traditional water systems in diverse geographical settings. These investigations formed the basis of their thesis projects, which culminated in speculative design proposals linking landscape architectonic thinking with resilient water management practices. These investigations formed the basis of this book. Analytical materials from more than 30 traditional water systems across different parts of the world were used to conduct comparative studies, providing even greater insight into how water shapes ecological, cultural, and spatial systems and vice versa. In doing so, the book serves as a guide for the next generation of designers and engineers, especially landscape architects who must navigate the intersections between water, ecology, and urbanisation in a warming world. Our work also seeks to contribute to a landscape approach to contemporary water challenges, one that understands water not as an isolated technical issue but as part of interconnected ecological, spatial, cultural and governance systems.

## WATER IS UNIVERSAL

This book engages with water systems across multiple spatial and experiential scales. Every drop of water participates in the global hydrological cycle and is mobilised for diverse purposes, ranging from drinking and irrigation to navigation and recreation. At a more intimate level, water is encountered through sensory and cultural practices such as touching, tasting, listening, playing, and worshipping. However, as we studied these layers, we observed that these fluid relationships are increasingly under strain.

Even in countries such as the Netherlands, where two-thirds of the land lies below sea level and water has played a central role in shaping both the landscape and daily life, the bond between humans and water is being tested. Through our research on traditional water systems, it is evident that water represents more than a challenge of flooding, scarcity, pollution, or

inadequate infrastructure. It also reflects a deeper relationship that the Dutch seem to have lost.

At its core, the book reflects on a growing disconnection among humans, communities, more-than-human life, and water itself. Modern societies are increasingly alienated from the socio-ecological systems that sustain them, and this detachment extends to the built environment where water infrastructure is often hidden or abstracted (Berkes & Folke, 1998; Moffatt & Kohler, 2008; Ramaswami et al., 2012). In some places, the absence of shared responsibility among governmental bodies, communities, and individuals undermines sustainable water stewardship. A significant portion of the global urban population relies on bottled water for consumption, while denying access to clean, swimmable rivers due to severe pollution (UNESCO, 2019). In water-scarce regions, rainfall often runs off impermeable surfaces instead of infiltrating the ground or being stored for future use. This challenge is exacerbated by the decline of localized knowledge and collective institutions for managing water resources (Ostrom, 1990; Berkes, 1999). Consequently, unsustainable water management reflects a broader failure to design environments that foster human-water interactions, ecological resilience, and social awareness.

From a landscape architectural perspective, water is a fundamental force that structures (urban) landscapes across multiple scales. It functions simultaneously as a site-specific feature and a component of broader socio-ecological systems, linking ecological, social, and economic processes (Corner, 1999; Orff, 2016).

The potential of landscape architecture and ecological design lies in the integration of natural processes, including water cycles, into form and space. This enables water, as part of the landscape, not only to shape landscapes physically, but also to cultivate meaningful relationships between people and places, contributing to community formation and collective identity. Integrating these design perspectives can help to address the detachment between people and water, making it legible, interactive, and adaptive.

Motivated by the desire to identify water systems that continue to embody and reinforce these qualities, this study focused on traditional water systems. Notably, the existing, long-lasting water systems are not isolated interventions; they are dynamic, living frameworks that shape the land, integrate human activity, and promote sustainable futures. These aspects are presented in multiple drawings in the book. By demonstrating how they integrate ecological knowledge, cultural practices, and human stewardship across scales, they present an alternative model for landscape design that views water as an integral, systemic element within both natural and built environments (Boelens, 2014; UNESCO, 2019).

## A COLLECTION OF LONG-LASTING WATER SYSTEMS

Given the diverse international backgrounds of graduate students, they were encouraged to investigate enduring water systems in their countries of origin. Many of these systems were developed in response to agricultural needs as early human settlements depended on reliable water sources to sustain food production. Over time, these systems evolved through adaptation to physical, social, ecological, and climatic conditions, initially by trial and error and later through the exchange of knowledge between communities. A defining principle of their development and maintenance was simplicity: ensuring accessibility and encouraging widespread community participation. This inclusivity fostered both stewardship and equitable

benefit sharing. At that time, a strong awareness of humanity's interdependence with the ecosystem was deeply embedded in daily life.

In the selected case studies, preference was given to traditional water systems that harmonised with natural environments and did not produce adverse ecological impacts. Well-known examples such as the Mexican Chinampas were included, alongside less widely recognised systems such as the flooded meadows in the eastern Netherlands and England, or the Amunas water channels in the Andes of Peru. Resilience is non-negotiable, which is exactly what these systems champion. For example, the Sea Salt Fields on the island of Hainan in China also function as natural breakwaters that absorb wave energy during high tides, stabilise the shore, and simultaneously support mangroves and other marine species. Dutch polder-boezem and India's below-sea-level farming systems are designed to adapt to fluctuating water levels, allowing them to remain functional even during heavy rains. Systems such as the Honghe Hani Rice Terraces in China and Kampung Naga in Indonesia utilise gravity-fed irrigation and wastewater recycling, ensuring that every drop of water falling within the village is captured and recycled, thereby creating circular water cycles. Similar circularity values are also embedded in the Chinampas Agrosystem in Mexico, where human-made islands built from lake sediments and organic matter continuously recirculate water and nutrients between canals, soils, crops, and aquatic life.

CWS research also reflects a deep interest in the management structures and technical components of traditional water systems in relation to the landscape, as well as their circular characteristics and lived experiences surrounding their use. This title signals an integrative approach that values both technological and sociocultural dimensions, seeking to understand how these systems function in cyclical ways within ecological and communal contexts. 'Circular' refers here to the sustainable management of water through continuous cycling within natural and anthropogenic processes without degradation, depletion, or waste. It prioritises the reuse and reintegration of water in ways that preserve quality, support ecological resilience, and meet human needs across multiple domains. Central to this concept is the idea of closed-loop systems, in which water serves functions such as irrigation, sanitation, and spiritual practice, while remaining balanced within local environmental and cultural frameworks. The term 'stories' reflects the embeddedness of water in cultural, social, and spiritual narratives. It highlights the role of water not merely as a resource, but also as a central actor in shaping human-environment relations across time.

#### SPIN-OFF

Ongoing research is presented on an eponymous web-based platform<sup>1</sup>, which is visited by professionals, designers, and researchers worldwide. The traditional water system analysis published on the site follows the representation format of the Illustrative Method. The Illustrative Method is a tool used to analyse Traditional Water Systems. The term 'traditional' emphasises the focus on water systems that have functioned for hundreds of years. This method was designed as an educational tool for landscape architecture graduates at TU Delft. This ensures that these water systems are analysed using the same criteria and are consistently represented (Bobbink et al., 2022). Since the project's inception, several articles have been published and additional opportunities have arisen to showcase the work.

The results of the first studio on traditional water systems were shown at the Faculty of Architecture and the Built Environment, TU Delft, in 2019 (Figure 1). Drawings of the Angkor Vat Hydraulic City, Cambodia (Thienvutichai, 2019), were exhibited in the 'We, the Rivers' exhibition at the Musée des Confluences in Lyon, France.<sup>2</sup> The museum integrated various visual materials produced in the studio, such as maps, diagrams, and glossary elements, into its audiovisual system to explain the ancient city's hydraulic infrastructure. In 2025, circular drawings of seven case studies were displayed in the Indigenous Intelligence: Ancient Knowledge in Contemporary Design Exhibition at TU Delft (Figure 2). A curated selection of this work, including contributions from the CWS lab, was also featured at the Venice Architecture Biennale, Italy, 2025, underscoring the growing significance of indigenous knowledge in shaping forward-looking design discourse. A drawing based on an analysis of Rome's traditional water system is featured in *Walking Rome's Waters* (Wentworth Rinne, 2025). This inclusion highlights the continued relevance of traditional water systems and underscores the importance of preserving their legacies in contemporary contexts. In March 2024, some Alumni and I were invited to visit the National Institute of Technology (NIT), Calicut, India, to conduct a workshop for students, during which the Illustrative Method was introduced, and some aspects of the method were covered. In the 'Stories from Akalapuzha' chapter, the workshop is discussed as an example of how the CWS reaches out into the world. In April 2025, Chie-Peng Chen<sup>3</sup> invited me to deliver a keynote lecture at the conference of Taoyuan Ponds System International Forum Taiwan on the contemporary significance of traditional water systems worldwide. The visit also included a field trip to the Taoyuan Plain, where Chen's research team collaborated with local communities for over three decades on the preservation and adaptation of pond-based water elements amid ongoing urbanisation. In August 2025, Nicolas Plain, founder of RISE<sup>4</sup>, a non-profit documentary initiative that addresses climate and biodiversity challenges through immersive storytelling, scientific research, and local knowledge, requested permission to use drawings of traditional water systems from the CWS lab for the film 'Peru's Ancestral Amunas Water Systems'. Volume Lo-TEK Water-Field Guide for TEKology (Watson, 2025) marks a significant continuation and expansion of research on indigenous and traditional ecological knowledge, particularly regarding water-based technologies. Four alumni of the CWS course, Naeema Ali, Amina Chouairi, Boomi Kim, and Ayu Tri Prestasia, were invited to contribute chapters to the volume, presenting work on the Kayalnilam dikes,

**Fig. 1**  
Exhibition *Traditional Water Systems* at the Faculty of Architecture and the Built Environment, 2019. Participating students: Melinda Marján, Anhubuti Chandna, Rapa Surajaras, Boomi Kim, Krit Thienvutichai, Jui Deuskar, Catalina Rey-Hernández and Huadong Zhu. Photograph by Inge Bobbink.



Fig. 2

Exhibition *Indigenous Intelligence: Ancient Knowledge in Contemporary Design* at the Faculty of Architecture and the Built Environment, 2025. Participating students: Nicola Vollmer, Kanako Inai, Houxuan Zhang, Carolina Marquez Luna, Tobias Macchione, Camila Rosado and Xiaolei Ma. Photograph by Inge Bobbink.



ponds, and canals of the Malayalis, the Valli da Pesca fishing ponds of the Venice Lagoon, and the Ngais Pasir terracing system of the Sundanese in Indonesia. The CWS course provided the initial basis from which these research inquiries grew, later taking shape as mature contributions to the publication.

## COMPASS

This book offers readers a visually rich and intellectually grounded exploration of the traditional water systems. It presents a combination of original drawings, maps, manipulated photographs, and field-based case studies from countries such as China, India, Indonesia, Spain, England, and the Netherlands. Organized thematically, the chapters guide the reader through comparative insights, design analyses, and narratives that unfold across diverse temporal and geographical contexts.

Alongside the nine richly illustrated essays, Parts 1 and 2 comprise five intermezzi: 'Circularity,' 'Water Landscape Elements and Waterworks,' 'Water as a Source,' 'Channelling Water,' and 'People Practices.' These concise visual documentations interrupt the sequence of essays and create moments of comparison and reflection. Each intermezzo explores a specific dimension of water systems, foregrounding themes such as the infrastructural elements that regulate water flows, interdependence of water and food production, and diverse ways in which people engage with, shape, and are shaped by water landscapes. By placing elements from different systems side-by-side, these intermezzles reveal new relationships and tell stories that might otherwise remain obscured. For example, the illustration could inspire readers to study whether certain waterworks were developed in parallel on different continents or whether inventors who travelled the seas brought their knowledge across the world. They also inspire fast readers to read essays to learn more about the elements that make up the water systems.

After this introduction, the book continues with the intermezzo 'Circularity' in Part 1, which introduces a propaedeutic concept that underpins the analytical perspective adopted throughout the volume. Through a series of drawings, this intermezzo demonstrates different ways of representing water systems, showing how the drawings can serve as tools for understanding their circular dynamics.

The essays in the second part are written by the alumni of the CWS lab across multiple academic years, united by a shared engagement with themes that emerged from their investigations into traditional water systems. Through comparative analysis and case study discussions, the essays provide original insights into diverse topics: 'Vanishing Waters,' 'Grand Projects,' 'Feeding Waters,' 'Water Heritage,' and 'Tracing Wetness'. Each chapter is illustrated using analytical and speculative drawings.

The third part presents the implementation of the CWS research. 'Co-design,' 'Stories from Akalapuzha,' and 'Calling to Map' demonstrate how the material has informed further research, pedagogy, and professional practice. The final and most comprehensive chapter, 'Lessons to Learn: Scaling Traditional Knowledge to Face Increasingly Complex Challenges', examines how the knowledge gained through these investigations was tested and applied in students' graduation projects, delivering a vast range of design tools for today's challenges.

We deliberately published this book as open access so that people around the world could freely reconnect with their ancestors' knowledge. By making these documented water systems accessible to everyone, we hope that they will inspire learning, spark new insights, and help inform solutions to today's water challenges. Readers are invited to navigate the book either sequentially or selectively, engaging with chapters and case studies, according to their interests. Whether consulted as a reference, source of design inspiration, or foundation for further academic or professional inquiry, the book is intended to be read slowly and visually, allowing for a deeper understanding.

By combining these systems through a shared visual language, we aim to make this knowledge accessible to everyone. The practices presented are understood as forms of situated knowledge that are shaped and sustained by communities over generations. They are documented here with recognition of the people, places, and traditions from which they emerge.

We hope that the projects, principles, stories, and illustrations presented in this book will inspire reflection and action across disciplines, encouraging professionals within and beyond landscape architecture and urbanism to reconsider the role of water in design.

## NOTES

## WATER!

1. <https://circularwaterstories.org>
2. The exhibition was on display from October 2022 until August 2023.
3. School of Design, Chung Yuan Christian University, Taiwan.
4. RISE connects the world's most remote communities with global decision-makers to scale the most ingenious climate, biodiversity and social solutions through film, science, and action (<https://riseourworldheritage.org>)