



A Taxonomy of Water Practices, Functions and Values across Space and Time: Water Icons 2.0

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In 2022, when we proposed capturing water, culture and heritage with a set of icons, we were hoping to gain a better understanding of the relationships between different types of water uses, spaces and practices. As a team, we were hesitant about categorizing water spaces and questioned the usefulness of doing so. However, after more than two years of working with the icons – through the *Blue Papers* journal, TU Delft's Water Systems Design course,¹ and numerous workshops – we have come to recognize the benefits of this type of categorization. Our experience has confirmed some of our initial assumptions while also offering new insights. To reflect on what we have learned, we decided to revisit and update the icons and their descriptions. Classification through the icons, per se, is not a solution to any particular problem involving water, culture and heritage. Yet, discussions around their use – for structuring research, connecting seemingly different practices and organizing exchanges of views among diverse groups – can lead to better understanding of diverse perspectives and potentially to the development of solutions. This contribution shares the process of visualizing, describing and activating the various water spaces and functions through design and practices. In this contribution we share how we have developed and used the icons. We also share our thoughts about the use of water icons and their relevance across various contexts, as well as their potential and limitations.

When planning the first issue of *Blue Papers*, we proposed developing a set of icons – a taxonomy – designed to capture the diverse conditions of water spaces and practices (Hein et al. 2022), building on earlier work on classifying water heritage (Hein 2020). We envisioned the icons as a way to capture and represent the various ways humans have engaged with water. Building on our work for *Blue Papers*, we started to use the icons in participatory exercises. We worked with stakeholders to help them grasp the multiple scales of water systems, their historical trajectories and contextual particularities. The use of the icons during workshops played a key role in facilitating discussions by highlighting different – often conflicting – perspectives and unveiling values that stakeholders attributed to the same water spaces and functions. As we refine our tools and methodologies, we see the need for a more nuanced and adaptable form of categorization, one that takes recent research efforts into account and is open to evolving practices and underrepresented uses.

1. Water System Design: Learning from the Past for Resilient Water Futures is an online professional education course developed by Carola Hein, Matteo D'Agostino, Carlien Donkor, Lea Kayrouz and Zuzanna Sliwinska in collaboration with the TU Delft Extension School. More information at: <https://online-learning.tudelft.nl/courses/water-systems-design-learning-from-the-past-for-resilientwater-futures/>.

< Fig. 1 Participants at a workshop held in Le Havre's Port Center debating water functions within the port infrastructures (Source: Lea Kayrouz, 2025).

Our reconceptualization of the icons stemmed from a strategic dismantling of the set we had developed, in a manner that can be described as “reflective disruption.” This allowed us to find renewed meaning and confidence in some of our earlier decisions while questioning our assumptions and priorities along the way. This article 1) reflects on why we believe such a taxonomy is helpful, 2) explores the process of refining the icons and descriptions and 3) invites discussions on ways one might expand visual language, through which users can adapt and reinterpret the icons to suit their specific contexts.

Why a Taxonomy Helps: Visualizing, Awareness Raising, Discussion, Diagnostics

The taxonomy is designed to help a diverse group of people communicate about interconnected systems of water that humans have developed as they have engaged with the hydrological cycle. In providing a visual framework, we aim to address these systems’ inherent complexity while providing abstractions to simplify it. This is especially important when working with diverse stakeholders and in multidisciplinary activities or programs: some may feel alienated by professional languages and perspectives, while experts who have trained and worked in a specific field for many years might find it challenging to consider water uses and functions they do not normally think about. It was with this in mind that we envisioned a taxonomy of water practices, functions and values that would be applicable at multiple scales and in relation to any point in time. We envisioned creating a helpful tool for use in abstraction and simplification.

The aim of the taxonomy is not to perfectly capture reality, but to enable experts and citizens to engage in more inclusive, grounded conversations backed up by mutual understanding and a strong grasp of the many interconnections between water, spaces, practices and culture. We imagined, and have experienced through our research activities, that this process helps people identify missing connections and reach shared solutions capable of protecting the interests and values of multiple stakeholders simultaneously. Using the icons not as fixed categories but as a base for understanding the evolving relationships shaped by social, political and environmental change, stimulated a broad range of conversations, indicating potential for their expanded use, which, in turn, led us to revisit and refine both the visuals and the descriptions of the icons. In addition to facilitating conversation and rethinking, the taxonomy documents the many water-related themes that surface in literature as well as in our research, projects, publications and working experience. Linking these diverse elements through classification helps foster conversations, invites comparisons and reveals connections across different localities as well as across spatial, temporal and social scales and contexts.

Since our first attempt at creating icons, we have encountered other successful ways of using icons in maps. The work of the Timorese NGO Rebia is a prime example of how taxonomies and icons can be used to gather knowledge and map different activities in catchment areas. Through participatory workshops, Rebia creates community land use plans that align the needs of people, animals and the environment. For example, animal free grazing and certain agricultural tech-

niques, such as slash-and-burn, created tensions and had a detrimental effect on residents and the ecosystem. By using icons in mapping exercises, the NGO raises awareness within communities about the cascading territorial effects of various activities, thereby promoting the adoption of more sustainable practices along the entire watershed (Raebia n.d.). Other uses of icons in mapping include the water points in Athens as presented in the Atlas for Mediterranean Liquidities (Goethe Institut/CDA Holon 2025).

To support this evolving approach, we make the updated icon visualization and description available open access. On the *Blue Papers* website,² readers can now access and download the icons in various formats and build upon the existing set according to their own contexts. This move acknowledges the limitations of a predefined and closed taxonomy: no fixed set of icons can fully capture the shifting, situated and often contested meanings of water practices across different geographies and communities. By making the icons adaptable and open-source (CC-BY), we aim to foster a dialogue around water values and invite collaborative engagement, one that remains responsive to ongoing research and grounded in local realities.

Why Visuals Help: Visualizations at Different Scales

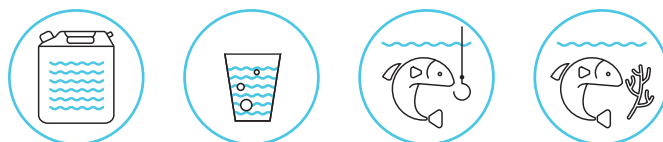
The use of icons in a variety of activities has sparked several relevant conversations, which have also helped refine the icons and their use. The following four segments show how the icons have evolved as a result of their use in discussions, workshops and trainings, as carriers of cultural specificities, as conveyors of complexity, as translators of overlooked values and as promoters of constructive binaries.

Icons as Carriers of Cultural Specificities

Some of the icons are culturally embedded. People in many countries may associate drinking water with a glass, given that they can drink tap water. Other parts of the world rely on bottled water, which could be represented by a (plastic) bottle. Because the context we are writing and thinking from is sensitive to the use of non-reusable waste, we decided not to use this representation. In many places people use canisters to carry water over large distances, which inspired our initial drinking water icon (fig. 2a). We opted for a change in iconography, without necessarily dropping the canister icon, but rather keeping it as a secondary option, to become part of a cluster of icons that cater to the cultural specificity of drinking water. These visualizations can also vary according to time period. For example, drinking water could be represented using a historic image for a water carrier, who would have served entire cities and has even an iconic character, such as the Hummel in Hamburg, captured in sculptures throughout the city and in the historic idiomatic greeting such as “Hummel, Hummel! Mors, Mors!” Capturing cultural and social mean-

2. <https://bluepapers.nl/index.php/bp/index>.

ings was a central motivation in rethinking our icon set, which also prompted us to reconsider the representation of humans within the taxonomy. Conversations with colleagues from ecology suggested that we also need an icon for nature, as space should be allocated to non-humans. We created a fish without a hook as an icon for aquatic ecosystems (fig. 2d), but moved it to the outer rim of the icon's circle as a secondary option, keeping the focus on the ways in which humans have interacted with their environment.



^ Fig. 2a Previous version of the "drinking water" icon.

Fig. 2b Current version of the "drinking water" icon.

Fig. 2c Current version of the "food from water bodies" icon.

Fig. 2d Current version of the "aquatic ecosystems" icon (Source: Zuzanna Sliwinska and Lea Kayrouz, 2025).

Icons as Conveyors of Complexity

The practice of using icons to advance debate also reveals the shortcomings of visualization. Each icon encapsulates a broader field of themes, yet participants may reflect upon it from their unique perspective, inviting different forms of visualization. Choosing a kayak as an emblem for leisurely practices on water (fig. 3a), for example, can alienate rowers or swimmers, who each have their own specific expectations of water spaces and uses. For example, in Nijmegen, people pointed out that kayakers and rowers have very different interests. Rowers need long water routes and sit backward while moving, not seeing where they are going, which can pose a threat to their safety and the safety of swimmers. Kayakers need less space and move at a much slower pace. The diversity of leisurely activities on water calls for a careful reflection on the implications of specific water practices and is one of the reasons why we propose an open-access set of icons that is adaptable for research or discussion purposes. Leisure practices on water depend on the water body itself – e.g., depth, currents, water quality – captured by the kayak icon without the access point represented (fig. 3a). The kayak icon also reflects the intersection between places of leisure and shipping, as the sheer size of the vessels captures the difference in water uses and speaks to the conflicts between commercial and leisurely water uses. However, leisure practices are also closely linked to access points. Steps, slopes and ladders all provide different types of access to the water and facilitate different water activities. A swimmer can enter and leave the water using a ladder, while putting a kayak in the water via a ladder is more difficult and a platform or quay would be preferable. This reasoning made us rethink the original design of the "places of leisure" icon, to also include considerations of the land-water interface related to leisure (fig. 3b). In light of these reflections, we decided to merge the icons for "recreation" and "festivals and ceremonies" into a single "leisure practices" icon (fig. 3c), while reassigning "ceremonies" to the icon representing "rites and rituals." This adjustment allowed us to make room for values and practices that had previously been overlooked.



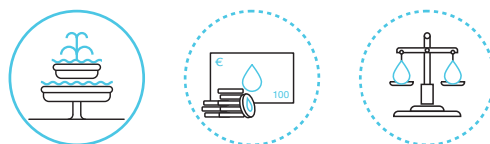
^ Fig. 3a Previous version of the “places of leisure” icon; current version of the “kayak” icon.
 Fig. 3b Current version of the “places of leisure” icon.
 Fig. 3c Current version of the “leisure practices” icon. (Source: Zuzanna Sliwinska and Lea Kayrouz, 2025).

Icons as Translators of Overlooked Values

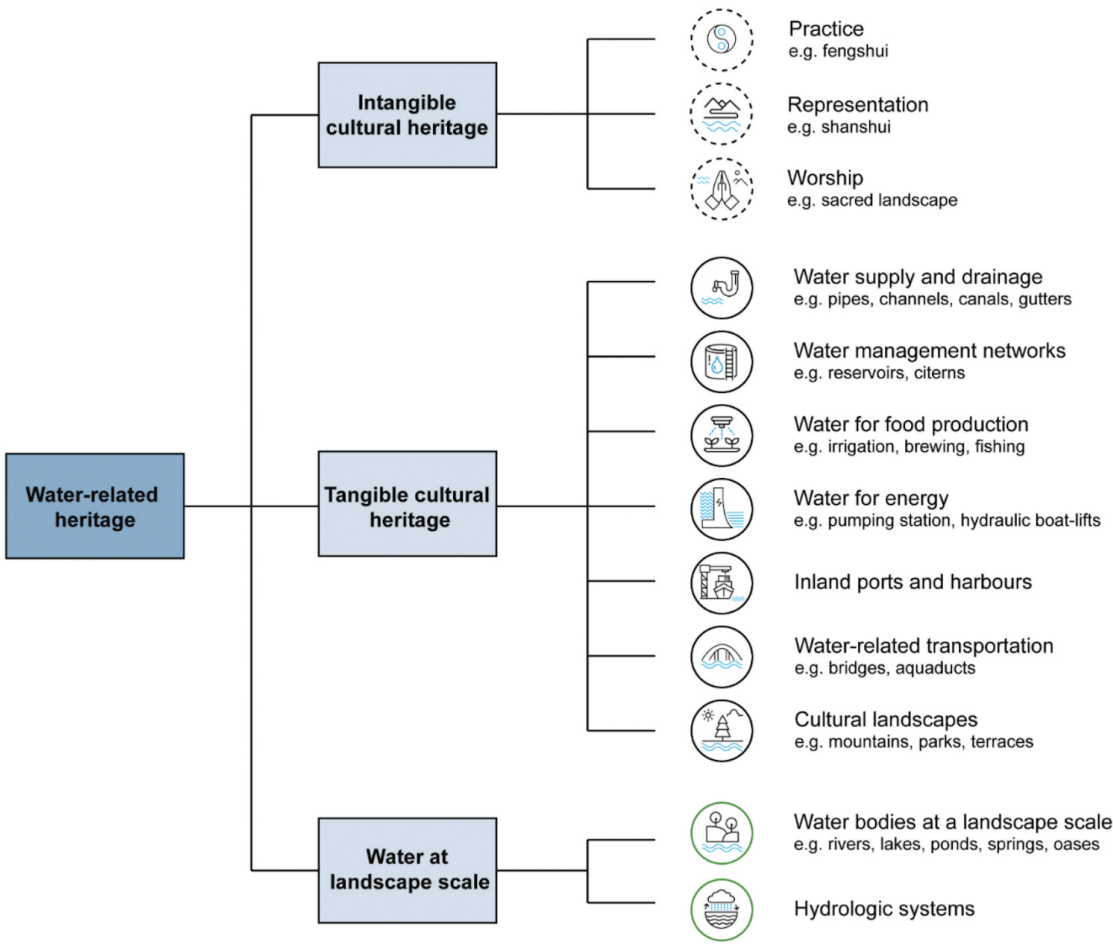
As we revisit the icons, we ask questions like “How do we categorize a fountain?” Fountains serve as refreshment points in urban centers, supply water to clean streets and mitigate urban heat island effects. Because it can serve such utilitarian purposes, a fountain could arguably be reduced to a tap. However, fountains, stepwells and similar structures introduce aesthetic qualities into urban spaces and embody spatial expressions of artistic human interaction, carrying sensible value and offering moments of enjoyment. A new “aesthetic water sites” icon (fig. 4a) allows for spatial quality considerations in the broader framework of water uses.

In the previous edition of the icons, artistic production was represented solely as an intangible practice, neglecting its spatial and material implications. Conversely, income-generating activities such as fishing or boat-building were depicted purely as physical tasks, omitting the broader dynamics of the blue economy. By including the “economic value of water” as an intangible icon (fig. 4b), we acknowledge the externalities created by the resources and networks enabled by fishing, trading, water extraction and related practices involving an economic dimension, or value, given to water. These activities often initiate multiple other practices that affect territories and communities’ materialities, often sparking debates about social justice, making their inclusion critical.

Water access and equity are key issues in water governance. We are therefore adding an icon to foreground the distribution and access to water resources as a key dimension of water systems. In developing this icon (fig. 4c), we consider factors such as the role of privatization in water access, the disproportionate environmental impacts of water policies on different communities, and the efforts of local groups to participate in decision-making processes related to water governance.



^ Fig. 4a Current version of the “aesthetic water sites” icon.
 Fig. 4b Current version of the “economic value of water” icon.
 Fig. 4c Current version of the “water access & equity” icon. (Source: Zuzanna Sliwinska and Lea Kayrouz, 2025).



^ Fig. 5 The coding tree for categorizing water and heritage, developed to gain better understanding of water as related to the descriptions of UNESCO World Heritage properties (Source: Tianchen Dai and Carola Hein, 2023).

Icons and Clustering

We first established icons as visual keywords, but quickly also started to group them to explore themes to identify the water spaces and practices controlled by water managers such as “shelter and defense” and “energy and industry” or the ones apt to be studied by social scientists or humanities scholars (e.g., rituals and festivals). This can be a way to identify gaps, suggesting the benefit, for example, of courses for engineers that include historical and cultural knowledge.(e.g. Hein 2022)

Dai and Hein (2023) have also used a classification system to get a better understanding of UNESCO World Heritage descriptions and abstracts and to collect, code, categorize and interpret the descriptions of UNESCO World Heritage properties created by state members and approved by



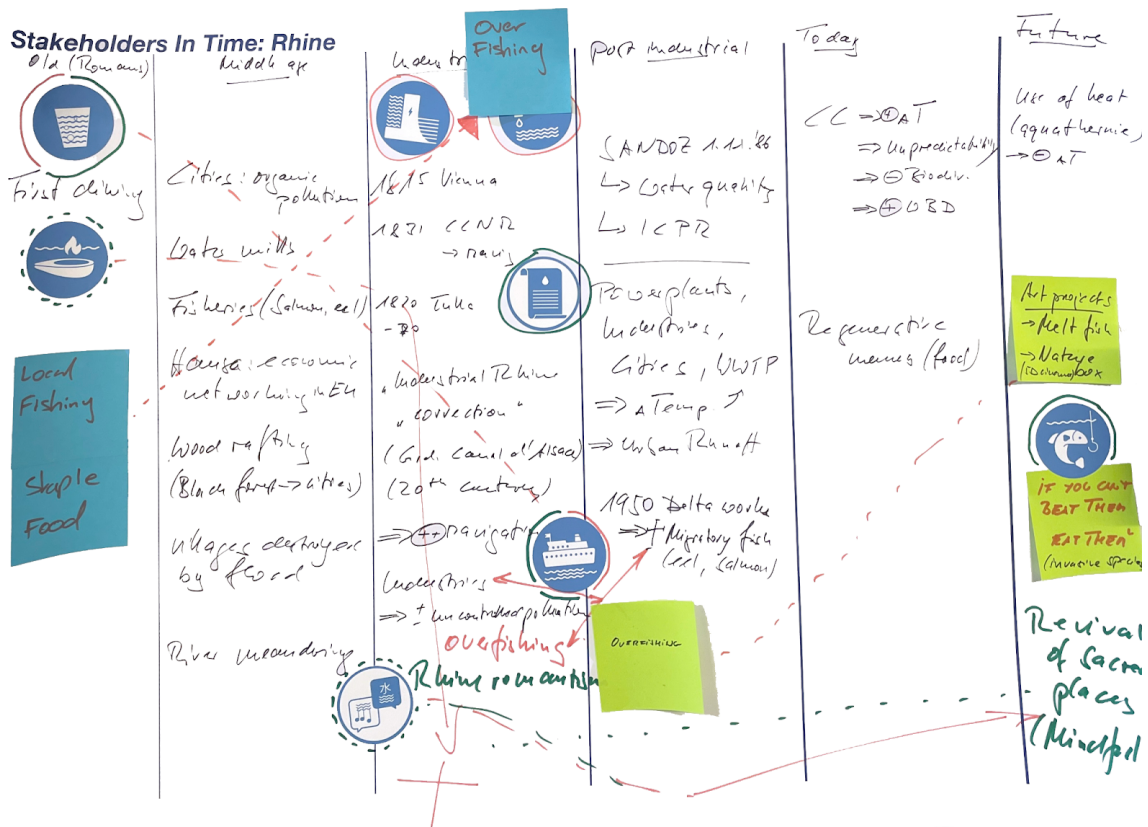
^ Fig. 6 Current configuration of the set of icons, with the main circle consisting of 22 icons and the outer rim of 5 additional ones. (Source: Carola Hein, Lea Kayrouz, Zuzanna Sliwinska and Matteo D'Agostino, 2025).

UNESCO (fig. 5). They built upon the first attempt with the goal of better understanding the role water systems play in the identification and protection of heritage properties. For the analysis of UNESCO abstracts, they developed additional icons to distinguish between natural, cultural and intangible heritage. For example, ports have a special icon, as do bridges. Natural water systems are also given their own visuals. Most of these aspects are covered by the existing icon system, for example, shipping references ports, water management includes bridges, but depending on where emphasis is needed, additional visualizations can help facilitate discussions.

Our discussions on the use and usefulness of the icons, their coverage of diverse water spaces and practices and the opportunities for clustering them led us to experiment with different ways of grouping them. Placing them in a radial configuration allowed us to reflect on connections between, for example, drinking water and sewage, but also the relationship between tangible and intangible practices. One can even imagine drawing lines between related or unrelated practices.

In the radial configuration of the proposed taxonomy (fig. 6), tangible and intangible icons are placed opposite one another, exploring possible counterparts. For example, "rites and rituals" faces "sacred spaces" and "aesthetic sites" is positioned opposite "music, arts, and dance." Some less-obvious pairings – "sewage and sanitation" paired with "education," and "shipping" paired with "institutions" – are intentionally placed on the circle to provoke discussion and suggest underlying conceptual or functional links.

Another major advantage of the circle is the opportunity to create clusters, or constellations, that stem from, or relate to, one specific icon, but that don't cover a larger field. For example, the kayak icon is related to both "places of leisure" and "shipping," as it can demonstrate properties relevant to either depending on the context in which it is used.



^ Fig. 7 A timeline of the Rhine River, co-created during a workshop in Nijmegen (Source: Lea Kayrouz, 2025).

How Icons Help

The updated water icons have been developed with versatility in mind, allowing them to be used in a wide range of formats and settings. In workshops, stickers have been proven especially effective as they allow participants to immediately translate thoughts to paper, using these visual markers on maps, timelines or stakeholder maps. The multiplicity of available stickers also prompts participants to consider categories outside their immediate expertise, getting into gray areas they might have otherwise overlooked. By presenting the full set of icons on a single sheet of stickers, we encourage workshop participants to use as many as possible, even if doing so initially feels unnatural, to start thinking about water systems in their entirety. For broader public engagement, we have also experimented with larger cardboard “tokens” that were particularly successful with younger audiences. As they often respond more readily to oversized illustrated elements, children were invited to play and reflect on their own water systems from an early age.

Icons can also play a diagnostic role, making visible the dissonances among siloed understandings of urban waters. In a workshop held at Le Havre's Port Center in March of 2025, participants used icons to identify water functions in space. The use of icons rendered the rupture between port and city more visible (fig. 1). It also pointed to the absence of a space for cultural activities within the port area. Participants argued for reconnecting the port to the city. Moving tokens slightly across the landscape triggered discussions on the potential for water spaces to reconcile port and city. In this way, icons are not merely representational tools, they are operative aids for discussion, negotiation and co-creation.

During a workshop held in Nijmegen with representatives from academia, the local and national government, as well as citizens, the participants first reflected on key historical moments and future trajectories related to the Rhine River, noting the events on a timeline (fig. 7). Participants then identified key water-related themes over time using stickers. In this group, concerns focused on fish, overfishing and the need to regenerate biodiversity. The question of invasive species emerged in the discussion as a challenge, with one participant proposing as a solution “If you can't beat it, eat it.” Attention to locally sourced food and regenerative menus is growing, raising the question of how to integrate local ecosystems into daily routines.

The timeline started to clearly showcase a range of trajectories, where some values remained independent and others exhibited stark trade-offs, which swung back and forth due to various societal, cultural and climatic shifts. These trajectories, highlighting how certain values have been compromised to achieve other objectives, were color-coded in green and red, inspiring the decision to make available a set of water icons for each color.

These activation formats aim to equip users with tools that not only document but also help problematize water systems across space and time. To support such a reflective process, we have created red and green versions of the icons to indicate perceived negative (fig. 8b) or positive (fig. 8c) impacts, or to identify transformation strategies, such as using the goal of swimming in the Seine in Paris to transform river practices (IEA de Paris 2025; Hein 2025).



^ Fig. 8a Current version of the “aesthetic water sites” icon.

Fig. 8b Red version of the “aesthetic water sites” icon suggesting a negative connotation.

Fig. 8c Green version of the “aesthetic water sites” icon suggesting a positive connotation (Source: Zuzanna Sliwiska and Lea Kayrouz, 2025).

Conclusion: An Open Invitation

As we continue to refine and expand the water icons and their accompanying descriptions, we encourage their use and critical engagement. We also invite feedback from users who identify omissions or aspects that remain underrepresented so that future iterations may more accurately reflect the plurality of water-related practices and values.

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