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Reconnecting Nature and Culture through Built Environment and Cultural Heritage: The Seine in Paris and Île-de-France as a Model for Sustainable Urban Futures

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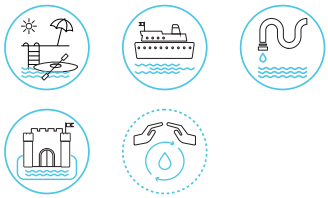
Abstract
Historic river cities embody centuries of interaction between hydrological systems and the built environment. As societal values have shifted—from economic development and public health to flood protection, ecological restoration and recreation—so have the spatial forms and practices through which cities live with water. Successive planned and unplanned interventions constitute an archive of changing relationships between nature and culture and provide a foundation for future design that supports human life and hydrological processes while adapting historic cities and heritage to climate change. Using the Seine in Paris and Île-de-France as an example, this article examines how four interconnected water uses—shipping, sewage, safety and swimming—have shaped the city and become embedded in its heritage, including its UNESCO World Heritage property. The case demonstrates how historic cities and heritage record changing values while providing resources for future transformation. It proposes reconnecting natural processes and cultural forms through dynamic flows, historical narratives, and explicit societal values to guide inclusive, ecosystemic approaches to sustainable urban futures.

KEYWORDS

built environment
water values
value case approach
Paris
Seine

WATER ICONS



Policy Recommendations

- Integrate historic cities, landscapes and cultural heritage into river management in line with the UNESCO HUL approach.
- Recognize the reciprocal relationship between water and the built environment / hydrological processes and cultural practices.
- Use historical narratives and temporal analysis to inform future-oriented, place-based design by revealing changing water uses, inherited infrastructures and societal values.
- Develop collaborative, value-based and multi-scalar decision-making frameworks that connect stakeholders, territories and timescales to support river governance.

< Fig. 1 A freight ship between the Ile de la Clté and the Ile Saint-Louis on the Seine in the center of Paris seen from the top of the Zamansky tower (Source: Carola Hein, 2025).

Introduction

Historic cities and cultural heritage occupy a central position in the archive of human engagement with natural systems. They embody the accumulation of past values while simultaneously providing resources for future-oriented thinking. As engineering works, architectural structures and urban forms accumulate over time; they create a palimpsest of material traces that embody successive layers of values, including those related to changing relationships between nature and culture. Rivers, for example, have been used, constrained and controlled for a wide variety of purposes, and have served as the foundation for the construction of major cities. They have served as places of worship, sources of drinking water and as shipping corridors, sewage channels and energy generators. Over time, changing approaches to water management, engineering, architecture and urban design, along with shifting societal values, have reshaped riverine environments, notably in cities.

When interpreted not as a fixed collection of objects but as an ongoing process of engaging with natural features, built heritage and spatial practices become a means of negotiating change. A focus on values, and especially widely shared values, enables a more nuanced understanding of tensions between competing priorities such as efficiency, sustainability, equity and cultural continuity. Values are often implicit, embedded in institutional frameworks, design practices and everyday behaviors, yet they decisively shape which uses are prioritized and which are marginalized, including through planned and unplanned interventions (D'Agostino and Hein 2024). Rather than privileging one objective over another, a focus on shared values supports the development of strategies to balance these concerns in transparent and inclusive ways.

As hydrological regimes change, the built environment and cultural heritage inherited from the past can become either obstacles or enablers in the interaction between river flows and historic cities and their surrounding landscapes. Designing future urban areas – and helping water and cities coexist more productively – requires understanding how rivers and human interventions have jointly shaped spatial forms, land use and governance over time. Such an understanding of the role of water (in terms of both quantity and quality) in urban development, together with the layered evolution of architecture, urban form, planning practices and narratives, can provide knowledge that can help preserve historic cities while respecting ecological processes and honoring what communities have built. Because these dynamics play out across scales, stakeholders and long stretches of time, understanding them can help integrate historic cities, landscapes and heritage into how rivers are managed today – and support water-aware visions for preserving and adapting heritage, which accelerating climate change makes only more urgent (Hein 2025a, 2025b).

The article examines how river uses and associated societal values have shaped the development of Paris. These values – captured by *Blue Papers* icons (Hein et al. 2025) – are embedded in the city's historical landscape and cultural heritage. The recent reorganization of water uses and practices along the Seine, in response to evolving societal values and innovative planning approaches, can serve as a model for other historic river cities worldwide. The conclusion argues that an integrated approach toward ecological systems and cultural heritage can support more resilient, inclusive and sustainable relationships between rivers, cities and heritage in the twenty-first century.

Connecting Values: Water, Nature, Cultural Heritage and Climate Change

Increased attention to the ecologies of rivers has led to a rethinking of river-human relationships. This development can be seen in a growing body of scholarship seeking ways of addressing climate-related water challenges, while also protecting water bodies and pursuing more just and sustainable futures (Ballestero 2019a, 2019b; Couling and Hein 2020; Hein 2020; Kaika and Swyngedouw 2000; Krause and Strang 2013; Lestel et al. 2023; Linton 2013; López-Cuervo 1988; Strang 2004; Wantzen 2023; Xue 2026). Researchers increasingly recognize that water-related challenges cannot be addressed solely through technical or ecological solutions but require approaches that acknowledge the complex relationships between environmental processes, social practices and cultural meanings (Cunha 2018; Strang 2004; Wantzen 2023).

Recent research on blue-green infrastructure highlights the need to reconnect ecological and urban systems through integrated design approaches (Bell et al. 2022). Similarly, architect and planner Dilip da Cunha (2018) challenges conventional understandings of rivers as bounded linear entities, proposing instead that water be understood as dynamic and interconnected flows that extend beyond riverbanks. Within river ecology and heritage studies, Karl Matthias Wantzen, UNESCO Chair on Rivers and Heritage, has developed the concept of river culture, which seeks to reintegrate natural hydrological regimes into contemporary river management (Wantzen et al. 2016; Wantzen 2024). The concept calls for new priorities in river and land management and recognizes that human well-being, cultural diversity and biological diversity are threatened by common processes of environmental degradation. Across Europe, these ideas have informed growing movements for river restoration and renaturalization.[1]

At the same time, scholarship connecting water and cultural heritage has begun to emerge, particularly in relation to UNESCO's Historic Urban Landscape (HUL) approach (Dai 2023; Cai and Nasu 2025; UNESCO 2011). While these contributions represent important advances, they remain largely confined to heritage studies and have yet to engage fully with broader debates in river management, ecology, climate adaptation and future-oriented design. Historic cities – particularly those that include UNESCO World Heritage sites – are often valued for their engineering achievements, architectural qualities and urban form. Yet the role of water in shaping these heritage landscapes remains insufficiently conceptualized. Even in Paris, where the Seine is central to the UNESCO World Heritage designation, the relationship between water systems and heritage remains only partially explored (Lestel et al. 2022, 2023).

Existing studies on architecture in ports and cities generally focus on select objects, treating rivers as background infrastructure or natural setting rather than as an integral part of heritage. A more thorough examination is needed of how built form and cultural heritage interact with rivers over time. Conceptual frameworks that simultaneously advance heritage preservation and sustainable development are insufficient. Future spatial design interventions

1. https://environment.ec.europa.eu/news/restoring-european-rivers-win-win-scenario-humans-and-nature-2023-10-18_en; https://wwfcee.org/news/rivers2restore-identifies-key-river-restoration-projects-across-europe-that-could-lessen-the-impact-of-floods-droughts; https://www.ecrr.org/Publications#paging:number=10|paging:currentPage=0.

– whether involving architecture, urban design, planning or landscape – must acknowledge the multiple and often competing needs of river dynamics and urban development to facilitate adaptation to climate-induced changes. Such interventions must recognize changing natural systems – water flows, seasonal variability and diverse temporalities – while enabling the co-existence of multiple human uses of the river as well as the preservation and adaptation of existing historic cities and cultural heritage.

The absence of cultural heritage within river-management debates, and the need to connect history, heritage, culture and sustainable development has been repeatedly noted by the UNESCO Chair on Water, Ports and Historic Cities, particularly in discussions surrounding river regeneration and nature-based solutions. Only recently have scholars in water and river studies begun to recognize this omission and call for greater integration of heritage perspectives within ecological restoration strategies (Enu et al. 2025). Yet disciplinary boundaries remain strong. As a result, European initiatives aimed at renaturalizing rivers – e.g., through dam removal or ecological restoration – often overlook cultural heritage concerns. Conversely, heritage practice frequently treats water as a static feature rather than as a dynamic flow shaped by seasonal variability and climate-induced transformation.

The challenge of maintaining active ports and navigation systems within historic urban environments illustrates the complexity of integrating these diverse concerns. Multiple stakeholders converge at the interface between land and water, where decisions require understanding ecological processes, engineering and architectural infrastructure, regional and global logistics networks and cultural heritage and values. UNESCO's (2011) Historic Urban Landscape (HUL) approach offers a valuable framework for addressing these interconnected dimensions, yet practical methods for integrating them remain underdeveloped.[2] Bringing these strands of scholarship together offers new opportunities for understanding how heritage, water and design can contribute jointly to sustainable and climate-resilient futures.

Building on recent discussions of nature-based solutions, this article advances three propositions. First, it advocates a water-oriented perspective that recognizes water as a dynamic system of flows, uses and ecological relations that shape and are shaped by the built environment. Such a perspective requires attention to spatial layering and the representation of water environments. Second, it proposes that historical narratives can serve as tools for reimagining heritage sites by recovering forgotten practices and relationships to water that are very different from those dominant in the present day (Hein 2025a, 2025b). Third, it argues that a deeper understanding of the values embedded in human-water relationships can support more socio-ecological approaches to planning and spatial design.

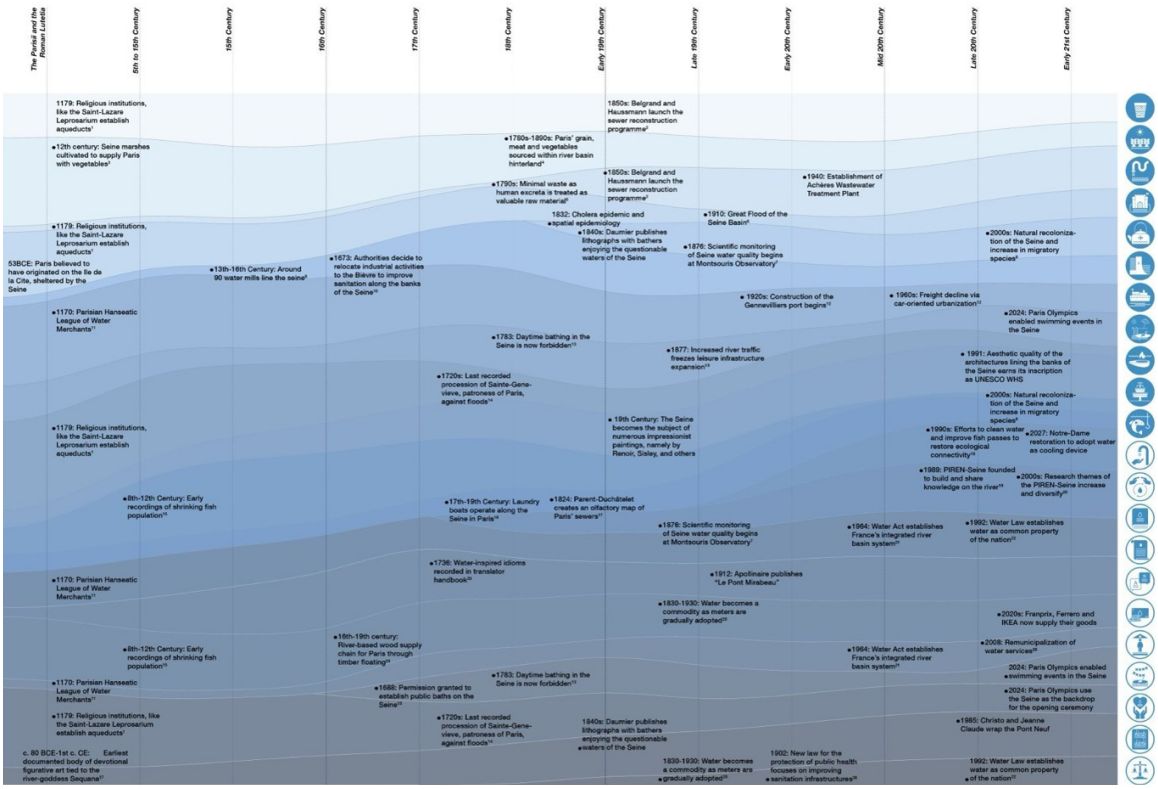
Paris and the Île-de-France

Paris and the surrounding Île-de-France region offer a particularly rich case through which to examine the long-term, multi-scalar and multi-stakeholder dynamics of water use and water management and how both have changed over time. In this context, the Seine is more than a geographic feature: For centuries it has struc-

2. https://whc.unesco.org/en/hul.

tured urbanization, spatial organization, governance systems and cultural representations. As historically layered environments, Paris and the Île-de-France embody successive engagements with the river, expressed materially in architecture, infrastructure and cultural heritage that intersect with social structures, institutional frameworks and cultural values (as visualized in Hein 2025b).

Existing studies of the Seine have explored hydrological systems, environmental change, navigation, ecology, public health and river perceptions (Flipo et al. 2021; Lestel et al. 2023). Lestel and colleagues, for example, demonstrate how different river uses – including shipping, industry, agriculture and drinking-water provision – have had distinct impacts on the river and its floodplain, while reflecting changing perceptions of the river. They also highlight the coexistence of multiple river uses and the spatial organization through which competing activities are managed and represented. However, existing scholarship largely stops at describing these uses and their environmental consequences. It does not fully examine how shifting societal values have shaped the architectural and urban forms associated with the Seine, nor how these transformations have become embedded in cultural heritage. Building on the value-case approach (Hein 2025a, 2025b) and inspired by the graph created by Michel Meybeck and Aurélien Baro as part of a collaborative article (Lestel et al. 2023, 674), the author led an analysis of water history and heritage of the Seine in Paris and the Ile de France in line with the *Blue Papers* icons, refined and visualized by Lea Kayrouz (fig. 2).



^ Fig. 2 Time-based diagram of the evolving relationship of Paris to its river based on a literature review (inspired by the visualization presented in Lestel et al. 2023), exploring simultaneously each of the 22 water icons (Source: Lea Kayrouz, 2026).

^ Fig. 3 Water icons added to a photograph of the Paris quays during the 2024 Olympics, showing multiple water values in one location (Source: Carola Hein, picture taken in 2024; icons added in 2025).

^ Fig. 4 Colored icons added to a photograph of the Paris quays during the 2024 Olympics, showing conflicts between changing water values and uses (Source: Carola Hein, picture taken in 2024; icons added in 2025).

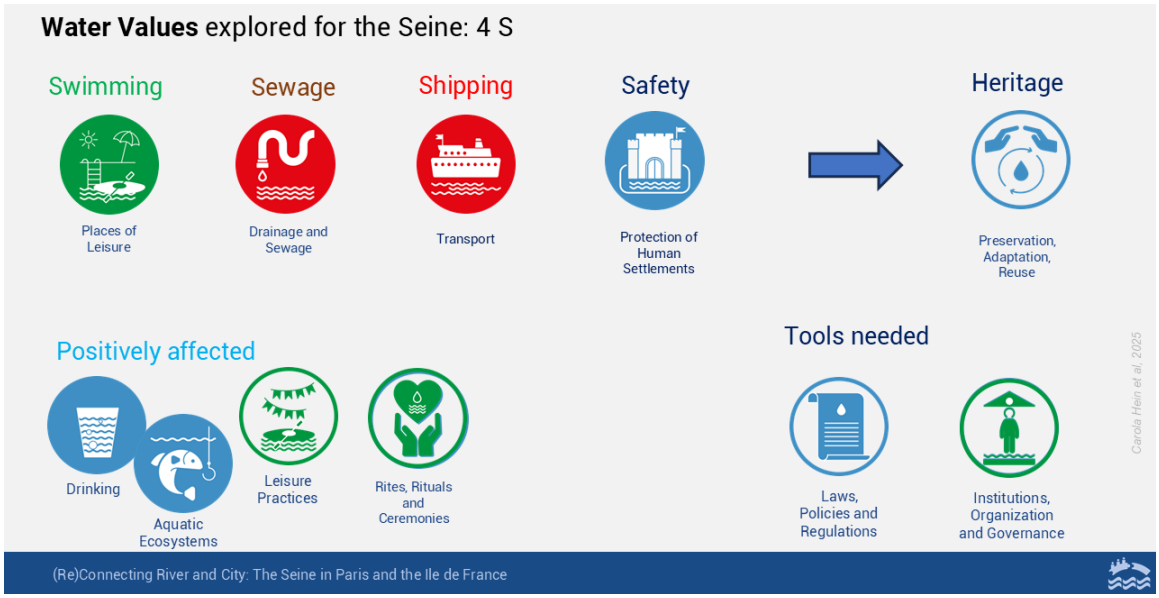
While the Seine River supports a wide range of functions – e.g., energy production, drinking water provision, fishing, rituals, health and recreation (as captured in the *Blue Papers* water icons) – this article focuses on select interconnected water uses that have significantly shaped planned and unplanned urban development in Paris and the Île-de-France since the nineteenth century. As human relationships with water evolve, so too do spatial patterns, practices and imaginaries. Shifts in values create opportunities to rethink how we preserve, restore and continue to use rivers and other water bodies. Yet scholarly and professional perspectives on Paris (and on other river cities) have often remained fragmented, focusing separately on water management, ecology, architecture, urban planning, spatial design or heritage conservation. A few writers take more integrated approaches toward the analysis of Paris (e.g., Backouche 2016; Carré 2014; Carré and Deutsch 2015; Guillerme 1990; Lestel and Carré 2017). However, the role of water flows, changing ecologies and their interaction with the built environment remains insufficiently acknowledged as a foundation for value-based design and planning.

The Seine also constitutes a key element of the UNESCO World Heritage property *Paris, Banks of the Seine*, inscribed in 1991. Since then, the City of Paris and other stakeholders have increasingly mobilized the World Heritage designation as a catalyst for urban transformation, contributing to the gradual reconfiguration of the river in the center of Paris from an industrial shipping corridor and sewage channel into a space of leisure, recreation and ecological engagement. This transformation illustrates both the opportunities and challenges of value-driven change in river environments and highlights the role that water-related heritage can play in shaping more sustainable futures.

To illustrate the interplay between competing and complementary water uses, this article examines four dimensions that have featured prominently in recent debates about the Seine: shipping, sewage, water management (safety) and leisure (swimming). The aim is to explore how the built environment acts as a carrier of water-related values, how these values interact across space and time, and how cultural heritage can help reconnect natural and cultural systems.

Studying the Seine's different uses and the values underlying them reveals the river as a dynamic socio-ecological and cultural system, in which changing values are continuously negotiated and renegotiated through infrastructures, institutions and everyday practices, as nature and culture shift in relation to each other. Each of these values is associated with specific forms of heritage, and each offers opportunities for activating historical narratives and culture-based approaches to support both heritage preservation and sustainable development. Figures 2–4 visualize select coexisting tangible and intangible water values in the context of the Seine in Paris, near the Louvre, as seen during the 2024 Olympics. Combining a picture taken by the author with the *Blue Papers* icons helps highlight specific uses and practices that are inscribed in the built environment.

Using colored icons can help reveal potential conflicts because of changing uses, practices and values, as demonstrated here by the author. River spaces, uses and governance are shaped by implicit value hierarchies. The Paris case demonstrates that shifts in values can drive systemic transformation. By reimagining the river as a space for leisure, ecology and culture, the city has created new opportunities for sustainable development. In contrast to figure 1, which illustrates the coexistence of various



^ Fig. 5 An initial analysis – value grammar – extracting the values used to analyze the photos of the Seine in Paris, showing how different water spaces and uses intersect and the role that heritage can play therein. It proposes that promoting and facilitating specific water uses can be facilitated by a shared values approach (Source: Carola Hein, 2025).

water uses and practices, figure 2 aims to show how a change in use affects other water practices. For example, a focus on leisure practices such as swimming, facilitated by a transformation of intangible practices such as heritage preservation, institutional focus and leisure (marked here as green), leads to conflict with other water uses. The desire to swim (green icon) in the Seine is closely linked to heritage preservation and institutional change (green). It also required interventions to address the pollution of the Seine, including pollution generated upstream, as well as inside the city. The use of the Seine for commercial shipping – a use that often competes with swimming, given the needs of ships for deeper channels and the risk of swimmers being hit by ships – has been addressed through spatial interventions, notably large pillars. The combined image allows for a discussion of different water values in space as they may compete with, but also complement, one another (fig. 3).

The use of colored icons helps identify value dynamics, changing uses, competing interests and their impact on space. For example, the recent promotion of swimming in the Seine as a leisure practice aligns with the interest in increased biodiversity and cleaner water and benefits from heritage and culture, but it competes with values such as economic growth, which relies on shipping and industrial uses and results in water pollution, as the icons on the image suggest (fig. 4).

Collectively, these functions rely on water management; how exactly this is interpreted, however, changes as dominant values shift. Using the tools developed for the value case approach (see *Blue Papers*, e.g., Hein et al. 2026; Hein 2025a, 2025b; Manzione 2024; Mulay and Gokhale 2025; Salzinger 2025a, 2025b), this visualization aims to capture the value change initiated through the focus on swimming (represented as part of leisure) notably in the fight

^ Fig. 6 Panels in the Grenelle Sector explaining the dangers and conditions of swimming in the Seine (Source: Jean-Baptiste Gurliat / Ville de Paris, 2024).

against water pollution and the transformation of shipping, and their anchorage in the built environment and in heritage. This approach is suggestive rather than data-driven (fig. 5). The representation of values in the photograph of the Seine in Paris is reflected in the panels next to the swimming pool in the Grenelle Sector that speak to the competing interests and values related to swimming in the Seine and its competition with shipping or even nature, such as clinging plants that can pose a risk to swimmers (fig. 6). A swimmable river requires access appropriate for swimmers. High quay walls are not appropriate for swimmers, who require ladders or steps to access the water. Spaces need to be provided for people to dry and shower. Swimmers also need places to dry and change; they may wish for showers and coffee shops. These landside transformations in the service of swimming may have both positive and negative effects: They attract more people, whose presence may increase attention to nature, but at the same time, the presence of swimming may become a threat to other living beings in the river and to other water users.

Shipping

Shipping has been one of the foundational uses of the Seine, as reflected in the motto of Paris – *Fluctuat Nec Mergitur* ("Tossed by the waves but does not sink") – which can be found in multiple locations (fig. 7). Shipping has long been central to the economic development of cities and territorial integration (Schubert 2011) internationally. It has been a key value in the spatial organization of the region, influencing the construction of quay walls, port

^ Fig. 7Historic chairs in the town hall feature the city's motto *Fluctuat Nec Mergitur* ("She is tossed by the waves, but does not sink")., speaks to the role of water and shipping in the city's growth (Source: Carola Hein, 2025).

facilities and transport infrastructures. In fact, the growth of Paris and the Île-de-France has depended on extensive networks of production, exchange and distribution linked by the Seine and its ports, including Gennevilliers, Rouen and Le Havre. Port areas, with their transshipment facilities and connections to road and rail networks, remain present throughout Paris and the Île-de-France (Elicio 1920; Pawlowski 1910). Even today, agricultural produce and building materials are shipped across the city from the hinterland to the sea, a fact that is largely invisible in the public discussion focused on tourist boats (fig. 8). Commercial shipping introduces tensions with other river uses, particularly those related to recreation, environmental quality and ecological restoration. Reconciling these competing demands requires recognition of shared values and new

^ Fig. 8 The Seine River hosts multiple shipping activities, from tourist boats to urban logistics. Building materials, waste and other bulk travels daily by ship through the center of Paris (Source: Carola Hein, 2025).

forms of integration in planning, design and governance that recognize the port city heritage of Paris.

Recent projects demonstrate the potential for such integration. The design of the Javel Bas Port, which features moveable gates and a multifunctional space that serves transshipment at certain times and public uses at others, won a special mention of the AIVP Antoine Rufenacht Prize in 2024 launched by the International Association of Port Cities (AIVP). It illustrates how active port functions can coexist within a World Heritage landscape. HAROPA, the agency in charge of shipping on the Seine in Le Havre, Rouen and Paris has adapted to the requirements of this special location in recent years, promoting multifunctional spaces and multitemporal activities (fig. 9).[3] Similarly, emerging models of circular and multifunctional logistics infrastructures suggest new ways of combining economic activity with environmental and social objectives. In Bercy, for example, the port accommodates multiple functions, including nighttime river-based deliveries of goods for IKEA stores and customers in Paris. The Franprix grocery store chain similarly uses the river for distribution. Such practices can activate historic ports

^ Fig. 9 Javel Bas Port is an innovative multifunctional port city space, with temporal transshipment, and industrial facilities on stilts (Source: Carola Hein, 2025).

^ Fig. 10 The Port of Bercy, where HAROPA combines swimming, shipping and heritage at a former wine port now used for concrete production (Source: Carola Hein, 2025).

^ Fig. 11 The Port of Bercy stands as an example for innovative maritime practices for last mile urban logistics (Source: Carola Hein, 2025.

and maritime heritage spaces, linking historic practices of river use to contemporary needs (figs. 10 and 11). Such initiatives demonstrate how architectural, urban and landscape design can help reconcile shipping with broader sustainability goals (Hein et al. forthcoming). Maintaining and revitalizing navigation on the Seine can therefore be understood as a form of living heritage practice. Ports and shipping infrastructures are not merely remnants of the industrial past but active components of the region's identity and economy. As underrecognized forms of cultural heritage, they offer opportunities for both heritage preservation and sustainable development. Multifunctional port city spaces along the Seine may serve as models for river port cities worldwide seeking to balance economic vitality, environmental quality and cultural continuity.

Sewage

People have historically used rivers to facilitate urban growth by providing drinking water and facilitating transport. At the same time, increasing urban density and industrial development have often transformed rivers into conduits for waste disposal. During the nineteenth century, concerns about public health became a central driver of urban planning. The discharge of human waste, industrial effluents and agricultural pollutants into waterways contributed to recurring epidemics of cholera and other water-borne diseases, highlighting the need for new forms of water management. In Paris, the construction of a comprehensive sewer system under the direction of Eugène Belgrand was fundamental to improving urban health and making metropolitan growth possible (Reid 1991). This vast underground infra-

3. https://www.haropaport.com/fr/reamenagement-du-port-de-javel-bas.

structure remains one of the city's significant yet least visible achievements, while remaining largely inaccessible to the public (Gandy 1999; fig. 12). Sewage infrastructure is key to health and well-being, a major societal value that also aligns with the promotion of biodiversity, yet underground infrastructure is rarely seen and not sufficiently acknowledged.

The Paris Sewer Museum, located within the World Heritage property, offers an important example of the needs of the sewer system, its impact and relation to rivers and demonstrates how this hidden infrastructure can be interpreted as living heritage. As part of the city's water management division, the museum first opened in 1867 and serves as an outstanding example of the connection of river, sewage and education. By connecting technical systems with public education, the museum reveals the historical, social and environmental dimensions of urban water management (fig. 13). Recognizing sewer systems as cultural heritage not only highlights their historical significance but also encourages new forms of public engagement with the infrastructures that sustain urban life. Such recognition broadens conventional understandings of heritage and opens new possibilities for integrating technical systems into architectural, urban and landscape design.

^ Fig. 12 Some underground galleries of different sizes that are part of the sewage system of Paris are accessible as part of the Paris Sewer Museum (Source: Carola Hein, 2025).

^ Fig. 13 The Paris Sewer Museum in the World Heritage property of Paris, seen from the outside (Source: Romain91, 2021. CC BY-SA 4.0, via Wikimedia Commons).

Water Management and the Theme of Safety

Water safety provides the overarching framework within which other water uses operate. Shipping, public health, ecological management and leisure activities all depend on interventions designed to regulate water levels, mitigate flood risks and ensure the long-term functioning of the river system. Hardening the sides of the Seine and burying the Bièvre River exemplify these multiple goals of containing the river, creating stable water levels for navigation and preventing flooding (fig. 14). The construction of quay walls, their maintenance and preservation are both the foundation and the challenge for addressing water risk and safety. These interventions operate across multiple scales, from local riverbanks to the entire Seine basin, through infrastructures such

^ Fig. 14 Prior to the hardening of the quays, the Seine was accessible for multiple activities, including horse bathing (Source: Parimagine, early twentieth century; Autour de Paris).

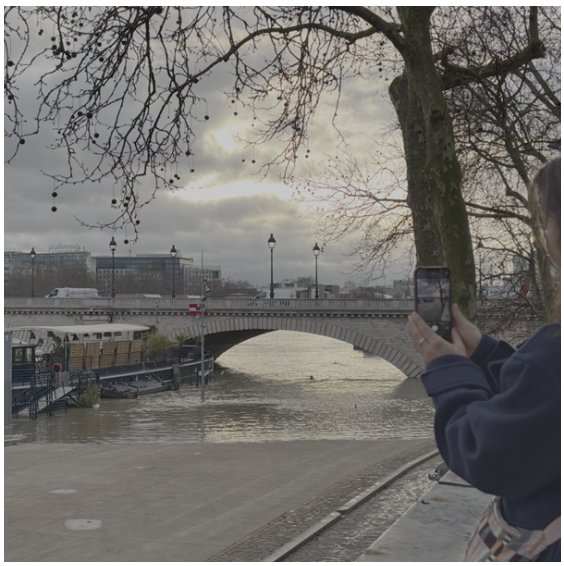
^ Fig. 15 The 1910 flood let to a rethinking of water management and safety in Paris (Source: J. Hauser, 1910; reproduced from Le Fil du Temps).

as dams, dykes, reservoirs and retention basins. The governance of water safety involves a complex network of actors, including municipalities, port authorities, national agencies and Voies Navigables de France (VNF) (Coeur 2024). Managing the Seine today requires balancing traditional concerns such as navigation and flood protection with emerging challenges and new values related to climate change, biodiversity, public health and recreation.

Decisions taken at one scale or for one purpose frequently affect other uses and stakeholders, making coordination essential (figs. 15–17). Water management, notably for flood control, influences other uses of the river – shipping, swimming, sewage disposal – shaping the physical and institutional framework within which they operate. Meaningful flood control requires a thorough understanding of the hydrology of the river basin and its architectural and urban heritage. A better understanding of the heritage underground offers a new perspective on heritage and invites the sharing of new perspectives on living with water in the past, present and future. As high-water moments in 2026 have shown, again flooding limits the passage of ships and hinders exchange between water and land. Quays were covered with water and ships could not pass under bridges. Water safety is a complex theme that has long been reduced to the question of flooding. Extreme drought in the summer of 2026 stopped river shipping on other European rivers and serves as reminder of the multiple facets of climate-related water system change.

The recent reintroduction of swimming in the Seine illustrates how shifting societal values can challenge established management practices. Ensuring safe bathing conditions requires new approaches to water quality management, navigation regulation and public safety. Initiatives such as the European Interreg project Connected River demonstrate the need for governance frameworks capable of addressing multiple and potentially conflicting water uses simultaneously.[4] Likewise, proposals for river

4. https://www.interregnorthsea.eu/connected-river.



^ Fig. 16 Flooding of the Seine in February 2026 (Source: Carola Hein, 2026).

^ Fig. 17 Flooding of the Seine in February 2026 (Source: Carola Hein, 2026).

renaturalization may come into tension with long-standing infrastructures such as quay walls, flood-control systems and historic waterfronts. Water safety itself constitutes an important form of heritage. The infrastructures, institutions and practices that developed to manage flooding and navigation have shaped Paris and its riverbanks over centuries. They form an essential part of the historical landscape that underpins the World Heritage value of *Paris, Banks of the Seine*.

Swimming as Leisure

Swimming in open urban waters has recently reemerged as a prominent leisure practice worldwide, reflecting broader ambitions to renaturalize urban rivers and promote more ecological and multifunctional forms of urban development (Cao 2026). The opening of supervised swimming sites in the Seine has renewed public interest in historical bathing practices, including the floating swimming pools that lined the river for much of the nineteenth and twentieth centuries. The possibility of swimming is closely tied to water quality and therefore requires a river-basin perspective. The preparations for the Olympic Games of 2024 accelerated major investments in water treatment, sewage management and pollution control, highlighting the extent to which recreational uses depend on broader infrastructural systems. Swimming thus serves as a visible indicator of the ecological condition of the river and a symbol of its cleanliness.

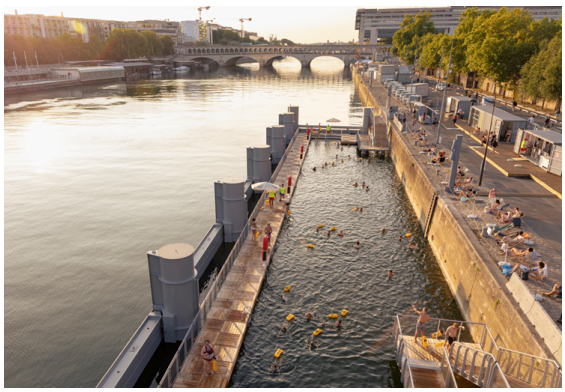
Recent initiatives such as the Swimmable Cities Charter advocate for urban waterways as shared civic spaces and promote swimming as a means of reconnecting people with nature.[5] These value-based approaches reflect changing societal priorities, although they do not necessarily account for the needs of

5. https://www.swimmablecities.org/; Swimmable Cities Charter July 12.2024.

^ Fig. 18 Swimming pool in the Bras Marie near the Île Saint-Louis was made possible by rerouting shipping flows in 2025 (Source: Jean-Baptiste Gurliat / Ville de Paris, 2025).

^ Fig. 20 The Bercy bathing area in the 12th arrondissement of Paris. Strong barriers fixed on metal pillars have been created to delineate the swimmable area in the Seine (Source: DPE / Ville de Paris, 2025).

^ Fig. 19 Swimming at the foot of the Eiffel Tower has positive ecological implications for the Seine (Source: Josephine Brueder / Ville de Paris, 2025).



^ Fig. 21 The emphasis on urban swimming in natural waters expands the framework of water management (Source: Guillaume Bontemps / Ville de Paris, 2025).

non-human species, as increased human presence may disrupt ecological habitats (Zingraff-Hamed et al. 2018). Whether or not citizens choose to swim in the Seine, the possibility of swimming brings together questions of water quality, accessibility, public engagement and environmental stewardship. It exposes the infrastructural, regulatory and cultural conditions that enable and constrain human interaction with rivers. In this sense, swimming functions both as an indicator of change and as a driver of further transformation. Swimming also requires new spatial arrangements. Access points, stairs, ladders, changing facilities and safety infrastructures create interfaces between people and water that are designed at the human scale (figs. 18–21). Efforts to improve water quality benefit biodiversity, while increased public awareness fosters support for environmental protection. In this sense, swimming acts as a catalyst, aligning social, environmental and cultural objectives. Policies will be needed to protect biodiversity, ecological systems and cultural heritage challenged

by climate change-induced water system transformation. Such interventions resonate with broader planning concepts such as the 15-minute city, with its emphasis on accessibility, walkability and everyday engagement with urban environments. These qualities align closely with the heritage values of the banks of the Seine and contribute to their continued relevance as living cultural landscapes.

Activating Interconnected Values and Heritage

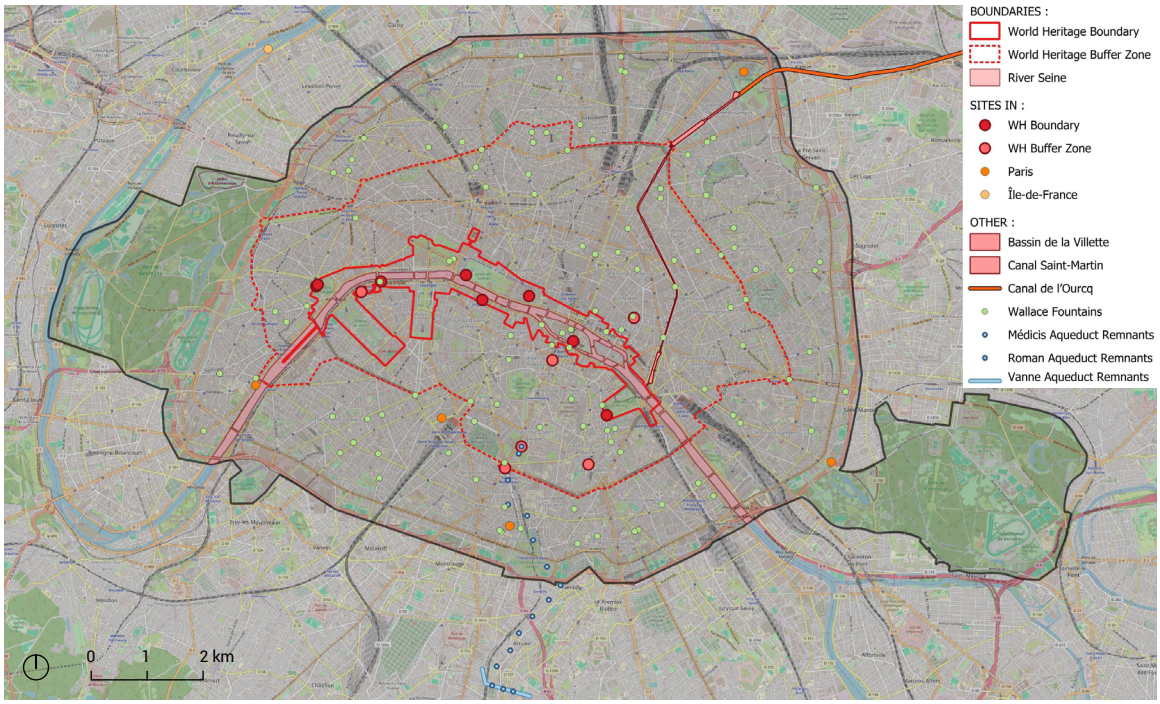
The four forms of engagement with the Seine discussed here – shipping, sewage, water management (safety) and leisure (swimming) – illustrate the entanglement of water uses, infrastructures, values and cultural practices. Together and over time they have shaped the Parisian landscape, particularly the banks of the Seine. Each has left distinct traces in the built environment: Active ports testify to enduring networks of exchange and logistics, underground sewer systems reveal the legacy of public health interventions, quay walls and flood-control infrastructures embody centuries of water management, and contemporary swimming facilities reconnect the city with historical bathing traditions while supporting more ecological forms of urban development. A value-based approach to water governance requires recognizing water as a system of flows and integrating heritage into decision-making processes. It calls for making values explicit, fostering cross-sectoral collaboration and linking local interventions to regional systems.

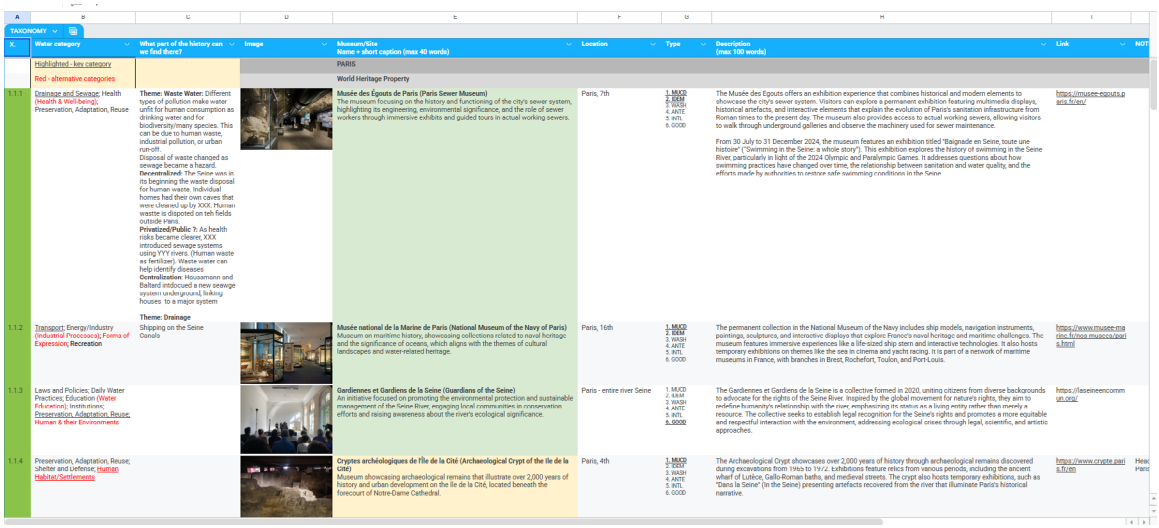
Taken together, these layers form a complex landscape that reflects the long history of Paris and the evolving relationship between people and the river. They anchor historical narratives (think of the recognition of shipping and port activities as a key reason for the construction of the city), reveal interdependencies among different water uses and demonstrate the importance of integrated approaches to heritage preservation. Historical narratives can further reinforce these processes by shaping how dominant water values are recognized and how rivers are perceived, managed and transformed (Hein et al. 2026). They can reveal how societies have managed competing demands on water resources, negotiated conflicts among stakeholders, and adapted to changing environmental, technological and cultural conditions. Understanding water uses not as isolated functions but as interconnected systems offers new opportunities for heritage-led planning and sustainable development. By recognizing the relationships between infrastructures, practices, values and ecological processes, cities can develop more comprehensive strategies for living with water in the future.

This article only scratches the surface of the research that is possible on how various water values have shaped the Seine in Paris and the Île-de-France over time and how they can be mobilized to support contemporary urban and regional development. Greater attention should be paid to the ways in which museums, living heritage practices and historical narratives can foster awareness of the interconnected nature of water systems while strengthening both heritage protection and sustainable development. Advancing such a socio-ecological approach requires new conceptual frameworks and practical tools capable of bridging natural and cultural dimensions, multiple scales and diverse stakeholder perspectives.

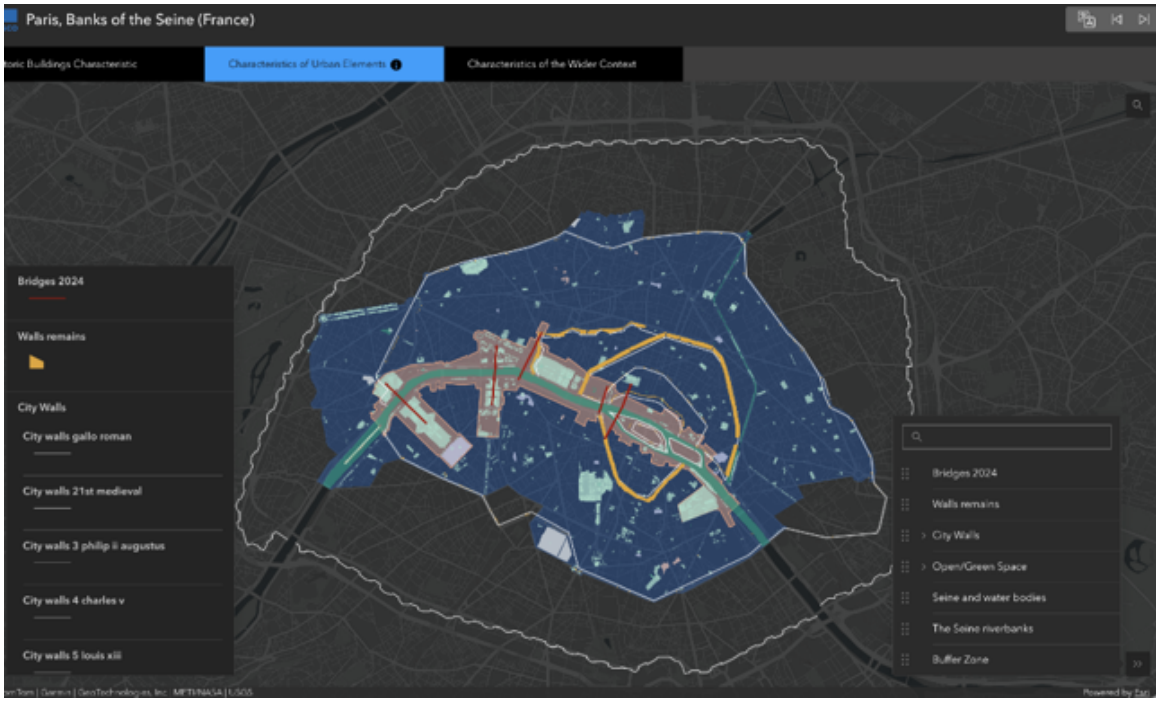
Existing initiatives provide a foundation for such an approach. The Water Museum Network (WAMUNET) has developed a taxonomy of water museums along river systems to

map relevant institutions and encourage collaboration among them. Within the UNESCO World Heritage property, the Paris Sewer Museum offers a particularly compelling example. As a museum, a functioning component of the city's water infrastructure and a member of WAMUNET, it is uniquely positioned to communicate the significance of the multiple flows of water that sustain urban life and to demonstrate the interconnections among water quality, public health, mobility, safety and leisure. Recognizing sewage systems, ports





^ Fig. 22 Applying the WAMUNET World Inventory to the World Heritage property of Paris visualizes the locations of musea in relation to the World Heritage property. These are places where new integrated historical narratives on water values and functions in and on the Seine can be told (Source: Zuzanna Sliwinska, 2025).



^ Fig. 23 Geospatial mapping of the World Heritage site of Paris in the context of the UNESCO Urban Heritage Atlas (Source: UNESCO Urban Heritage Atlas, 2025).

and water management structures as heritage expands the scope of conservation and opens new avenues for engagement. Initiatives such as mapping water-related museums and cultural institutions illustrate the potential for using heritage as a framework for integrated storytelling. These sites can serve as nodes in a network that connects different aspects of the water system, fostering public awareness and participation. The museum's 2024 exhibition Bathing in the Seine illustrates the potential of integrated water narratives to connect historical practices, technical infrastructures and contemporary environmental concerns. Similar approaches could be extended to other cultural institutions. Interpreting collections at museums such as the Carnavalet or the Louvre through the lens of water would bring greater visibility to the role of rivers in shaping the history, heritage and identity of Paris (fig. 22).

Such initiatives can build upon and connect to emerging tools such as the UNESCO Urban Heritage Atlas, developed within the framework of UNESCO's HUL approach (https://whc.unesco.org/en/hul). The HUL framework seeks to overcome fragmentation by emphasizing the interconnections between cultural and natural systems and by promoting integrated approaches to heritage management. Yet implementation remains uneven, and long-term, systems-oriented thinking is often limited. Water is fundamental to the Outstanding Universal Value of the World Heritage property *Paris, Banks of the Seine*. As UNESCO notes, "From the Louvre to the Eiffel Tower, from the Place de la Concorde to the Grand and Petit Palais, the evolution of Paris and its history can be seen from the River Seine" (https://whc.unesco.org/en/list/600/). The river functions not only as a setting for monuments but

^ Fig. 24 Geospatial mapping of *Paris, Banks of the Seine* in the broader territorial context, as seen in the Urban Heritage Atlas (Source: UNESCO Urban Heritage Atlas, 2025).

also as a connective element that over centuries has influenced many different aspects of life.

Despite its central role, the characteristics of water – as a flow, a connector and a constantly changing socio-ecological system – remain insufficiently addressed in existing heritage tools (figs. 23 and 24). Application of the UNESCO Urban Heritage Atlas methodology has revealed both its strengths and its limitations. While geospatial mapping successfully visualizes relationships between heritage sites and the Seine, it pays comparatively little attention to the ecological, social and cultural dimensions of water. The impact of water flows across scales, the interdependence of multiple water uses, and the role of infrastructures associated with shipping, sewage, water safety, fishing and recreation remain only partially represented. As a result, water often appears as a static spatial feature rather than a dynamic system whose qualities, uses and meanings change over time.

Analysis of the HUL framework and the Urban Heritage Atlas suggests several opportunities for enhancement.

1. Historical narratives could be integrated more systematically as a means of linking heritage preservation with future development scenarios (see Hein et al. 2026). Such narratives would make visible the changing values, practices and spatial configurations associated with water over time.
2. Greater attention should be paid to temporality, including daily, seasonal and long-term rhythms that shape water environments and their use.

3. Engineering structures such as quay walls, foundations, embankments, revetments, stairs and flood-control infrastructures should be recognized not only as technical interventions but also as heritage assets and spatial design elements.
4. Water should be represented as a dynamic system characterized by flows, changing water levels and qualities, ecological processes and interactions among human and non-human actors.
5. Climate change should be more explicitly addressed as a long-term process affecting both heritage assets and water systems.
6. Stakeholder mapping should be expanded to include key water-related actors, including port authorities, water managers, navigation agencies and environmental organizations, whose actions have historically shaped the development of river landscapes.

Educational and design-based activities can further contribute to the development of new narratives and planning approaches. By encouraging students, professionals and local communities to explore historical and contemporary water values, such initiatives can help reveal interconnections, for example between heritage and environmental processes. They also offer opportunities to test new methods for integrating cultural heritage into climate adaptation, ecological restoration and urban development strategies. In the course Adaptive Strategies Port de Bercy-Paris, students developed adaptive strategies grounded in historical and map-based analysis. They proposed narratives for exploring how port cities might respond to sea level rise, shifts in logistics, changing energy systems, and environmental pressures. In the case of Port de Bercy in Paris taught at TU Delft in spring 2025, they proposed new ideas for integrating multiple functions – combining shipping, swimming and urban activities to

^ Fig. 25 In the course Adaptive Strategies 2025, students developed an architectural project for a floating structure that can accommodate multiple water values and functions (Source: Beate Verbeek, Cato Jansen, Haruka Noguchi, Lina Andonova, Pim Warmerdam, Sagarika Sengupta, Tom Schipper and Veerle Beeldman, 2025 [in Hein et al, forthcoming]).

provide spaces that can support multiple uses and shared values (fig. 25). Innovations in port design and operation demonstrate the potential for integrating shipping with other uses. Multifunctional and multitemporal spaces allow for the coexistence of industrial activities and public access. Examples include ports that serve logistics functions during certain hours and recreational uses at others.

Conclusion: Toward an Ecosystemic and Value-Based Framework

The analysis presented in this article points to the need for a fundamental shift in how water, heritage and spatial design and planning are conceptualized and integrated. Through the example of the Seine as a multi-scalar and multi-value system, it demonstrates the limitations of fragmented approaches and highlights the potential of a value-based framework to bridge disciplinary, institutional and territorial divides. The four interrelated forms of engagement examined here – shipping, sewage, safety and swimming –

reveal the complexity of living with water in a contemporary urban context while providing a lens through which to examine relationships among infrastructures, practices, heritage and values.

This framework also highlights several issues that require further attention. The recent emphasis on swimming has drawn renewed attention to other water-related systems, particularly shipping and sewage infrastructures, which remain essential to the functioning of Paris but are rarely recognized as heritage assets. It also underscores the importance of considering the temporal dimensions of water systems, including seasonal rhythms, long-term environmental change and evolving practices of living with water. Moreover, the territorial dimension of the Seine – which connects Paris to its wider region and to broader hydrological, ecological and economic systems – remains insufficiently reflected in current planning frameworks. Interdependencies among different water uses and stakeholders are still only partially understood and rarely integrated into decision-making processes.

Building on recent efforts to advance culture-based approaches and spatial mapping methodologies, this article proposes three directions for future research and practice. First, it argues for a water-oriented perspective that recognizes water not as a static surface but as a dynamic system of flows, uses, ecologies and meanings. Second, it proposes historical narratives as a means of reconnecting heritage with past practices and alternative futures, thereby expanding the possibilities for heritage activation and adaptation. Third, it suggests that a deeper understanding of the values associated with different ways of engaging with water can support a more ecosystemic approach to reconnecting the Seine and its heritage landscapes. Such an approach requires frameworks capable of bridging nature and culture, linking multiple scales of analysis, and accounting for the movement of water across territories and through time.

Although water flows connect upstream and downstream environments and link ecological, economic and social processes, water governance remains largely fragmented across sectors and disciplines. Urban planning frameworks continue to operate primarily through administrative boundaries and sectoral logics, often overlooking the interconnected nature of water systems. This challenge is particularly pronounced in port-city regions such as Paris, where many different flows of water, goods and people intersect and where infrastructures simultaneously operate at local, metropolitan and global scales. As a result, the spatial and temporal dimensions of water are frequently simplified, and key relationships remain insufficiently understood.

Climate change further exposes the limitations of fragmented governance. Flooding, drought, groundwater fluctuations and changing hydrological regimes increasingly affect historic urban landscapes and reveal the vulnerability of both heritage assets and water infrastructures. In Paris, these pressures intersect with shifting societal values. Growing demands for environmental quality, ecological restoration and recreational access to water have challenged long-standing priorities associated with navigation and waste management. The World Heritage designation of *Paris, Banks of the Seine* has played an important role in supporting this transformation, contributing to the reconfiguration of riverfront spaces from vehicle-oriented infrastructures to pedestrian, recreational and ecological environments for residents and tourists.

The experience of Paris demonstrates how cultural heritage can act as a catalyst for rethinking human relationships with water. By recognizing the multiple values embedded in water systems and by integrating historical narratives, ecological processes and spatial design, cities can develop more comprehensive approaches to sustainability. As interest in urban rivers continues to grow worldwide, the Seine offers an important example of how heritage-based, value-oriented and ecosystemic approaches can help reconcile competing water uses and support more resilient and inclusive futures.

Acknowledgment
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