

BLUE PAPERS

Water & Heritage for Sustainable Development

Special issue

(Re)Connecting River and City – The Seine in Paris and the Île-de-France

Edited by
Carola Hein and Laurence Lestel

Leiden-Delft-Erasmus Universities

2026 (Vol. 5 No. 2)

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Journal Description

Blue Papers: Highlighting the Critical Role of Water and Heritage in Sustainable Development

Water in all its forms is key to human survival and well-being. Humans have created intricate and ingenious solutions to survive and thrive in difficult and complex territories and to adapt changes in social and environmental conditions. Remnants of past practices, structures and objects are still with us – in the built environment, in our institutions, in our ways of living and in our languages. Sometimes we call these objects and practices heritage, but more often they are so much a part of our everyday lives that we take them for granted.

As emphasized in the *UNESCO Thematic Indicators for Culture in the 2030 Agenda,*[1] culture is an important part of the Goals and Targets of the 2030 United Nations' Agenda for Sustainable Development. Stand-alone technological interventions cannot solve the complexities of the social, cultural and economic implications of climate change in the long term. New solutions require the engagement of local interested parties and local knowledge to address social and cultural dimensions of water and to create a new embedded water awareness in the built environment, in institutions and culture(s), so that we can preserve and protect our heritage, understand and learn from the past and activate history and heritage for future sustainable and inclusive living.

The biannual peer-reviewed journal *Blue Papers* explores the complex relationship between water, culture and heritage to assess lessons from the past, to protect heritage sites, to make use of water heritage and to contribute to the development of inclusive and sustainable future water systems. The past can help build a new platform for awareness of water and heritage, which involves shared methodologies and terminologies, policies and tools that bridge disparate fields and disciplines. To achieve this, we also need to rethink the role of water in the UN Sustainable Development Goals (SDGs). Water is not fully captured in *Goal 6: Ensure access to water and sanitation for all*; it is also an integral and inseparable key to all SDGs that carry us forward to a more sustainable future.

All issues of the journal will be loosely based on themes that link to water, culture and heritage, including (but not limited to):

- Transcending the nature-culture divide
- Tangible and intangible aspects

1. The UNESCO Thematic Indicators for Culture in the 2030 Agenda (UNESCO Culture|2030 Indicators), https://whc.unesco.org/en/culture2030indicators/.

- Integrated discourses and practices
- Capacity building for holistic systems
- Long-term (living) history perspectives for comprehensive understanding
- Preservation, protection and reuse of water-related (living) heritage
- Human and non-human stakeholders
- New practices and rituals for water awareness and engagement
- Strategies for inclusive sustainable development, including those drawing on heritage.

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Cover image: A vibrant riverside atmosphere in Paris during the 2024 Olympic Games. Taken by Carola Hein.

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Icons as a Tool to Connect Water Practices, Functions and Values across Space and Time: A Second Attempt

Carola Hein, Lea Kayrouz, Zuzanna Sliwinska and Matteo D'Agostino

Humans have shaped water systems for millennia, creating complex networks of physical structures, institutions and cultural practices. These systems reflect locally embedded yet globally influenced values that evolve over time. From infrastructure and landscapes to rituals and laws, human engagement with water is both tangible and intangible, deeply influenced by societal preferences, climate conditions and historical choices. To better understand this diversity, we developed a set of icons to represent various water spaces, functions, practices and values. Rather than offering a fixed taxonomy, these icons are intended as tools for discussion – making visible the multiple dimensions of water and the meanings knowledge holders assign to it.

Originally introduced in 2022 (Hein et al. 2022), the icons were used by authors in our journal to highlight key themes in their work. While we envisioned them as a way to map specific water-related elements across time and geography, they also served as visual keywords, helping to reveal prominent aspects of water heritage and practice. This goal has guided our ongoing efforts to enhance the icons' interpretive and comparative value, stimulating deeper cross-contextual reflection (Hein et al. 2025). In our second attempt to build a taxonomy of water practices, functions and values, we have introduced new icons and revised others, notably by adding representations of aesthetic and economic aspects and refining examples.

Ultimately, these categories are suggestions – not exhaustive or mutually exclusive – designed to illuminate how water has been managed, valued and lived with across different times and places, and how the past continues to influence the present and shape our future.

As we make the water icons open source (CC-BY) available for download on the *Blue Papers* website, we invite readers to build on the current set and expand it to fit their own context. The goal is to foster a dialogue around water values, invite collaborative engagement and spur new insights.

To represent situations where multiple water functions, values, and practices are considered together, we use a circle to group the corresponding icons.

< Fig. 1 Water icons (Source: Carola Hein, Lea Kayrouz, Zuzanna Sliwinska and Matteo D'Agostino, 2025).

Tangible



Drinking Water
Access to and provision of fresh, potable water is a universal need. Humans employ many different techniques and infrastructures to transport, store, filter, pump, redistribute and use drinking water. Examples include the use of reservoirs and pipelines for storage and distribution, both above and under the ground, as well as filtration systems that ensure water quality meets safety standards.



Agriculture and Irrigation
A wide range of strategies and technologies are used to harness water for food production, such as by irrigating crops and providing water for livestock. Agriculture and irrigation practices vary across different contexts ranging from agroforestry to terrace farming, including techniques that leverage seasonal water changes like flood agriculture.



Drainage Water and Sanitation Systems
The removal of excess and sewage water, including rainwater, runoff, black water and gray water, requires extensive infrastructure and treatment systems. Sanitation systems are essential for public health and environmental sustainability. Examples include wastewater treatment plants that recycle water, formal and informal sewer networks, and waterless solutions such as composting toilets.



Protection of Human Settlements
Humans have created architectural, urban and landscape structures to adapt to their environments and address challenges posed by water, animals and enemies. Responses to rain, snow, floods and droughts include canals, dikes and moats. Water has also been used defensively through fortification walls and floodable landscapes designed to deter or delay potential threats.



Water and Health
Access to clean water is essential for human well-being, with water quality playing a critical role in individual, public and ecosystem health. The purification of water for human consumption, for example, through boiling, filtration or adding chemicals, has influenced the development of public health, planning and environmental policy and has sparked private and public interventions.



Energy and Industry
Water management systems play a critical role in supporting energy production and industrial processes, often facing challenges related to resource efficiency, environmental impact and sustainability. Examples include the use of dams for hydroelectric power generation, water-cooling systems in machinery and factories, and water-intensive industries like mining and breweries.



Shipping
Water bodies, including seas, rivers and canals, are vital for moving people and goods, supporting daily mobility, tourism and commerce. Natural and manmade waterways are linked to the boats and ships they serve. Specialized infrastructure such as quays, cranes, warehouses, ports and dredging operations enables navigation, transport and the storage of goods.



Places of Leisure
Water bodies, natural and man-made, serve leisure practices in multiple ways. The tangible aspect of water leisure focuses on physical spaces and infrastructure designed for recreational activities at the intersection of land and water. Examples include waterfront promenades, swimming pools, water parks and beaches, which serve as functional features that facilitate human interaction with water.



Sacred and Spiritual Spaces
Humans have long created sacred spaces to honor water, using it as a medium for spiritual connection or reverence for the divine. Religious architecture often includes elements like fountains, baptismal fonts, ablution facilities and temple tanks. These features not only symbolize purity and renewal but can also play a role in local water management.



Aesthetic Water Sites
Physical spaces and structures, whether permanent or temporary, serve as tangible manifestations of cultural and artistic connections to water, often becoming sites of community significance. Examples include architectural interventions such as squares and fountains, as well as the urban design of coastlines, waterfront parks and promenades that celebrate water and encourage interaction with it.



Food from Water Bodies
Natural and artificial water bodies, such as rivers, lakes, seas and ponds, support diverse ecosystems and provide vital food sources through a wide variety of traditional and modern practices, from seashell collection to large-scale aquaculture and industrial fishing. These waters are home to a wide range of plant and animal species, sustaining local livelihoods and global food systems.

Intangible



Daily Water Practices
Daily water practices are fundamental to human well-being, woven into routines that sustain health and hygiene. These include sourcing water for cooking and drinking, communal laundry, bathing and showering practices. Such everyday habits highlight water's essential role in both practical needs and sociocultural practices across communities.



Preservation, Adaptation, Reuse
Diverse traditional and contemporary practices aim at preserving or strategically changing water bodies, related ecosystems and the social customs connected to them. Examples include the use of local knowledge in cultural heritage protection, wetland conservation, modern techniques of river restoration and community efforts to maintain traditions, rituals and structures tied to water.



Knowledge Systems and Capacity Building
Socialization and education are key to healthy and sustainable living with water. This can occur through community engagement, school curricula, capacity-building initiatives, the preservation of traditional wisdom about local water systems and sustainable practices, and all initiatives aimed at exchanging or transmitting knowledge and raising water awareness.



Laws, Policies and Planning
Water management, access and use have long been regulated through governmental policies, customary law and land use planning. These frameworks, implemented by state, corporate or traditional authorities, determine rights and responsibilities through tools like zoning regulations, land ownership policies and infrastructure planning that affect how water is distributed, accessed and controlled.



Language and Idioms
People's connection to water is expressed through diverse cultural and artistic forms, reflecting its deep symbolic and practical importance. This shapes how communities understand and relate to water. For example, language often includes words and proverbs about water, embedding traditional wisdom and values that arise from close daily interaction with water in different environments.



Economic Value of Water
The economic value of water is often realized through its exploitation for agriculture, industry and energy production, such as intensive irrigation in agribusiness, dam-based hydropower, and mining operations that rely heavily on water access. These practices can generate significant income and infrastructure but also raise questions about equity, environmental impact and long-term resilience.



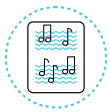
Institutions, Organizations and Governance
Water management involves diverse institutions and governance structures across local, national and cross-border levels. Formal entities like ministries and water boards, informal groups such as activist movements and community alliances, and customary bodies like traditional councils all play key roles. They set and enforce rules, guide social behavior and enable public participation in water governance.



Leisure Practices
Water-related leisure practices encompass activities and traditions that highlight the interaction between land and water. Examples include water sports, cultural events like fishing festivals, seasonal celebrations, informal gatherings for picnics or swimming at local rivers and recreational practices that bring communities together at waterfronts.



Rites, Rituals and Ceremonies
Water holds deep cultural, religious and spiritual significance, reflected in many practices and traditions. These include purification rites, blessings, baptisms, water festivals, and rituals that commemorate historic water events or celebrate the opening of new water structures. Such ceremonies highlight water's vital role in faith, community identity and cultural heritage across societies.



Music, Arts and Dance
Various cultural and artistic forms reflect the deep symbolic and practical importance of water. Examples include dance, spoken and written words, music, visual arts and other creative expressions. These forms offer insights into how communities relate to and understand landscapes shaped by water, highlighting its central role in human life and culture.



Water Access and Equity
Water infrastructures serve different users in different ways, with their social, environmental and economic impacts varying widely across contexts. These variations often reflect deeper inequalities of gender, ethnicity or economic background, which are at the heart of water justice and the power dynamics shaping access to and control over water.

References

Hein, Carola, Matteo D'Agostino, Carlien Donkor, Hilde Sennema and Queenie Lin. 2022. "Capturing Water, Culture and Heritage through Icons: A First Attempt." *Blue Papers* 1, no. 1: 1–3. https://bluepapers.nl/index.php/bp/article/view/19.

Hein, Carola, Lea Kayrouz, Zuzanna Sliwinska and Matteo D'Agostino. 2025. "A Taxonomy of Water Practices, Functions and Values across Space and Time: Water Icons 2.0." *Blue Papers* 4, no. 1: 14–25. 10.58981/bluepapers.2025.1.taxo.

The Rights of the Seine

Pierre Rabadan
Deputy Mayor of Paris in charge of Sport, Olympic and Paralympic Games and the Seine

As Paris continues to transform, the Seine appears more than ever as the guiding thread of its history and future. The river structures the city's geography, anchors its heritage and nourishes our imagination. Yet, over the decades, the bond between city and river has at times weakened, as if the intensity of urban life had relegated the Seine to the background. The 2024 Olympic and Paralympic Games offered a historic opportunity to renew this essential connection through an ambitious commitment to environmental restoration and social renewal. By placing the Seine at the heart of the opening ceremony and several competition events, the city restored the river to its central place in Parisian life – a legacy intended to endure well beyond the Games. This vision forms part of a long-term transformation aimed at reconnecting the city with its natural environment, reinventing the use of public space and opening new horizons for residents and visitors alike.

The pedestrianization of the riverbanks, the improvement of water quality and the creation of new areas for walking and relaxation all contribute to a single ambition: to make the river a vibrant, shared space. The return of swimming in the Seine, made possible by significant investments, symbolizes this collective reclaiming. Meeting this challenge in record time allowed 100,000 people to enjoy three designated swimming areas in Paris during the summer of 2025. This milestone has acted as a powerful catalyst, with 85 per cent of swimmers reporting a more positive perception of the river after their experience.[1] Yet swimming is ultimately the visible outcome of a broader ecological effort focused on ecosystem restoration, pollution reduction and climate adaptation. Flowing through diverse territories, the Seine connects cities, landscapes and ecosystems far beyond the boundaries of Paris. Ensuring its ecological continuity therefore requires close cooperation along the entire river, from upstream to downstream, to foster a shared vision of the Seine as a common good. Such a collective approach is essential to maintaining, over the long term, a balance between urban uses, environmental imperatives and the preservation of the river heritage that shapes the identity of Paris and the entire Seine Valley.

Reconnecting Paris to its river also means reconnecting with a memory and a heritage that have always been the soul of the capital. The city's bridges, quays, monuments and river landscapes form a unique ensemble, appropriately recognized by UNESCO as World Heritage property. Rethinking how the river is used is a way to preserve and enhance this heritage.

1. "Visitor Numbers and Users of Swimming Sites in the Seine," Apur, December 2025. https://www.apur.org/fr/mobilites-espace-public/seine-rivieres-canaux/frequentations-publics-sites-baignade-seine.

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Preface

This issue of *Blue Papers* therefore invites readers to reflect on a city in the wake of a historic moment, where water is once again becoming a structuring force in urban life and cultural identity. May the analyses gathered in these pages stimulate reflection and inspire public policies that, in the years ahead, will continue to bring Paris closer to its river and thus ensure the preservation of both for generations to come.

(Re)Connecting River and City: A Personal Reflection on Water Awareness

Jan Versteeg
Ambassador of the Kingdom of the Netherlands in France

When we speak about reconnecting cities and rivers, we are not just addressing engineering or urban planning challenges. We are talking about rediscovering a relationship — a relationship that shapes who we are, how we live, and how we imagine our future.

In France, this renewed relationship with water is taking visible form. The ambitious work to clean up the River Seine, to make it possible to swim again, and even to host the Olympic Games shows awareness and commitment. It shows that when a society decides to return life to a river, it can become a model for the world. It is a reminder that civic pride, environmental care, and technical innovation can flow together.

Coming from the Netherlands, I feel a deep kinship with that spirit. My country is built on wetlands, reclaimed from the sea over centuries through the construction of dikes, canals, and polders. For us Dutch, living below sea level feels completely normal — it's so ingrained in our daily lives that we hardly think about it anymore. Living with water is not only part of Dutch history; it is part of our daily consciousness. From the bedtime stories our grandparents told us about floods and windmills to the policies that guide our water boards today, the presence — and sometimes the threat — of water has shaped our identity. It has taught us resilience, cooperation, and respect for nature's power. Yet this very normalcy poses a challenge: we sometimes forget the real risks — the constant threat of water and the possibility of flooding that still looms large.

France and the Netherlands also share an old bond through this lens of water. The Dutch water management authority *Rijkswaterstaat* was created during the French period and remains a symbol of how our histories intertwine. Its mission extends beyond hydraulic works to protecting the built and cultural heritage — from rivers and canals to churches and towns that owe their existence to water.

For me, the connection to water is even more personal. My father used to tell stories of swimming in the Rhine — already, even then, one of the busiest inland shipping routes in the world. Those stories belong to another time, but they capture something essential: how everyday encounters with water nurture awareness and respect. When you grow up swimming in rivers, you learn to pay attention — to currents, to cleanliness, to the life within the water.

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Preface

Years later, I had the opportunity to swim in the Seine myself during the opening of the site Bercy in the 12th arrondissement in Paris. That experience left a lasting impression. It was not only a dip in the river but a small act of faith — in the idea that we can keep our rivers alive, that the water running through our cities can once again be part of our lives. I was also able to join a passionate surfer-activist on the Canal Saint-Martin, the "Plastic Soup Surfer," raising awarenes for the fight against plastic pollution. Moments like these remind us that personal awareness and public action are inseparable. You cannot protect what you do not know or feel connected to.

Healthy rivers depend on more than infrastructure. They rely on how people see and value them. Understanding water's physical quality, its flow, and its presence in our environment is fundamental to maintaining living systems. It is also essential for fostering what I like to call a *water mindset* — one that inspires the next generation to engage with rivers not as distant resources, but as companions shaping urban life.

The Seine, like so many rivers, serves multiple purposes — transportation, recreation, ecology, heritage. Managing it requires coordination across municipalities, institutions, and communities. But beyond governance, it requires imagination: recognizing that rivers are not boundaries, but connectors. They link neighborhoods, histories and futures.

Reconnecting cities and rivers is about rediscovering that reflection, about ensuring that the waters that run through our heritage also flow toward a sustainable future.

Blue Papers: (Re)Connecting the River and the City: The Seine in Paris and Île-de-France

Jyoti Hosagrahar
Deputy Director for the World Heritage Center at UNESCO

UNESCO was pleased to partner with the UNESCO Chair on Water, Ports and Historic Cities and its Chairholder Prof. Carola Hein, the Institut d'études avancées de Paris, and Sorbonne Université to organize a conference, "(Re)connecting Rivers and Cities" in 2025. It is fitting that the conference was organized in Paris, a city whose identity has been shaped by its river, the Seine. Recognized as a UNESCO World Heritage property, "Paris, the Banks of the Seine" is inscribed on the UNESCO World Heritage List and offers a powerful example of an extraordinary city that has developed around the river, embracing it at its center as an essential aspect of its urban character, its form, its sustenance, its social life and its environmental and visual benefits. This approach is at the heart of the UNESCO 2011 Recommendation on the Historic Urban Landscape (HUL Recommendation), an important instrument that advocates for strengthening the vital connections between the built environment, natural surroundings, and local communities.

In 2011, after six years of development, 194 member states of UNESCO adopted the HUL Recommendation as a way of understanding the built heritage as a landscape, for identifying, conserving and managing heritage. The HUL Recommendation approach proposes the integration of heritage conservation with urban development plans and processes to manage and to protect heritage values. As such, it advocates for reinforcing the connections between built heritage, the natural environment and the local communities, their practices and knowledges in a framework of sustainable development fostering cities where heritage is protected, and all inhabitants can thrive.

Climate change is one of the most significant threats to world heritage properties today, including to their integrity, their authenticity and to their local communities who are limited in their abilities to meet their needs for their economic and social development. The global assessment of UNESCO-designated sites, People and Nature in UNESCO-designated sites, indicates that nearly 90 per cent of World Heritage sites are already exposed to high levels of environmental stress, while the number of sites affected by climate-related hazards has increased by 40 per cent since 2015. Projections further indicate that the number of sites facing additional climate-related pressures could triple by 2050.

UNESCO's efforts to address, avert and minimize climate risks to World Heritage include a wide range of actions, from reinforcing protection with customized local strategies, to emergency

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response, and implementation of the 2023 Policy Document on Climate Action for World Heritage adopted by the General Assembly of States Parties to the Convention. The Policy Document provides an outcome-oriented framework for goals and targets at national and heritage site levels to galvanize urgent action, including the updating of national heritage management tools and action plans, integrating adaptation and mitigation strategies, and facilitating continuous monitoring and assessment.

As we face the growing challenges of climate change, we are reminded that water — whether in excess or scarcity — poses significant threats to these invaluable sites. From rising sea levels to changing rainfall patterns, we must recognize the urgent need to protect our shared heritage through climate adaptation, water management, and sustainable conservation. Throughout history, communities worldwide have developed ingenious hydraulic engineering and sustainable water management practices. UNESCO World Heritage Canopy platform showcases these efforts — from the Water Management System of Augsburg in Germany to ancient aqueducts, cisterns and canals that reflect conservation, reuse, and rainwater harvesting principles. The M'zab Valley in Algeria developed temporary structures for flood-prone areas, emphasizing risk prevention — and the abandonment of such practices has increased vulnerability to flooding.

Water has always been essential to life — sustaining both biological and cultural diversity. Across time, it has played a foundational role in shaping civilizations, guiding settlements, and fostering the cultures that we celebrate today. A large number of properties inscribed on the World Heritage List have hydraulic elements or include water-/river-scapes, reflecting intrinsic linkages between water and culture over thousands of years. The Grand Canal, in China, the world's longest and oldest canal, has supported China's economic prosperity for centuries and continues to play a key role in internal communication. And the Mount Qingcheng and the Dujiangyan Irrigation System on the Minjiang River, the world's only surviving dam-free irrigation system, remains in use after more than 2,250 years as an excellent "nature-positive" model.

Water is a key element to the protection of heritage. A holistic perspective is needed that includes many different levels from planning to people and practice to make a place and its heritage meaningful, with a focus on conditions of authenticity and integrity, on local practices and traditions, and the ordinary built fabric. Protecting heritage from a water perspective, as water-related heritage, or as heritage under threat of water-related climate change requires novel approaches. The World Heritage Center has developed several important tools, the Urban Heritage Atlas, which includes a careful study of the Banks of the Seine, the Canopy, which provides insight into successful examples of heritage protection in the context of sustainable development and the forthcoming publication of a guide on managing heritage in urban contexts.

As many cities around the world seek to reconnect with their own waterways, Paris provides some valuable lessons. Through public spaces that invite people back to the river and initiatives that seek a greener, more pedestrianized Place de la Concorde, the city continues to innovate

while honoring its past. Notre-Dame is a shining example of what the World Heritage Convention represents — Outstanding Universal Value in historical, architectural, spiritual and cultural terms. Its restoration embodies the core of UNESCO's mission to protect and preserve our world's heritage, ensuring that future generations can connect with them and continue to benefit from their connections to the river and to water – helping to counter the challenges posed by climate change and urban pressures. Notre-Dame is a testament to what we can achieve when we work collectively to preserve the past while embracing the future.

This special issue of the open-access peer-reviewed journal *Blue Papers* with a focus on the Seine in Paris and the Île-de-France provides important insights into the multiple dimensions of water heritage and their respective roles by linking water and heritage in a comprehensive way and by providing new tools and insight for protecting heritage.

Editorial Issue 2/2026
Water Heritage: A View from Paris

Carola Hein and Laurence Lestel

Since the 1990s, policy making, water and heritage management and cultural activities along the Seine in Paris and in the Île-de-France region have offered exemplary models of innovative, long-term action and of the successful reactivation of historical places and practices for sustainable living. The riverbanks, quays, monuments and urban vistas of the World Heritage property, together with the imaginary of the Seine, play an important role in this context as demonstrated by the 2024 Olympic Games. In an era of climate change, there is an urgent need to rethink the relationship between people, built heritage and rivers and other bodies of water. Approaches that include socio-ecosystemic thinking and nature-based solutions can help (re)create habitable, sustainable and just spaces that draw on historical practices, while protecting and adapting heritage and learning from history. The narratives we weave, the projects we realize and the heritage we preserve to live with water, both today and in the future, require careful attention. Exploring natural and cultural heritage, as well as intangible practices, can help build new narratives for cities, including riverside World Heritage cities. In these cities, citizens' growing interest in water and aquatic activities challenges paradigms of the modern and industrial era, paving the way for better heritage protection and encouraging the design of a sustainable future.

Central Paris, with the Seine and its quays at the core, offers a valuable case study for exploring both the challenges and opportunities of living with water in a World Heritage site, as argued by Carola Hein, Professor of History of Architecture and Urban Planning at Delft University of Technology, UNESCO Chair "Water, Ports and Historic Cities" and Researcher-in-Residence at the IEA Paris (Sorbonne University Chair) in 2024–2025. In collaboration with Laurence Lestel from Sorbonne University, head of the CNRS' Zone Atelier Seine, with researchers of the PIREN-Seine program and the OPUS institute of Sorbonne University, Hein's research in Paris tested the value case approach she developed as UNESCO Chair Water, Ports and Historic Cities, focusing on multiple and potentially conflicting uses of the Seine. During her stay in Paris, she explored the role of different water values in the transformation of the center of Paris and explored how these different water forms and functions intersect and how a shift in values can lead to a transformation of urban forms, functions and imaginaries. Several research and educational activities complemented Hein's research at the IEA in Paris. Notably, Yvonne van Mil and Léa Kayrouz led research on the UNESCO Urban Heritage Atlas, with Kayrouz also contributing through literature review and cartographic analysis. In collaboration with van Mil and Lukas Hoeller, research for the River Port City Atlas extended the inquiry to regional and metropolitan scales, examining the Seine River as a structuring element of the wider territory. Zuzanna Sliwinska focused on mapping

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water museums, centers and cultural waterscapes across the Seine basin, while students in the Adaptive Design course developed design projects for Bercy Port.

Based on her research, with support from Sorbonne University, IEA Paris and the UNESCO World Heritage Center, Hein organized a major conference, "(Re)Connecting River and City – The Seine in Paris and the Île-de-France: A Model for Nature Positive Approaches in World Heritage Cities for Climate Resilience," at the IEA Paris in March 2025, engaging academic and professional participants from Paris and the world. The conference received support from several academic and professional partners, notably UNESCO, the IEA and the City of Paris, as well as the LDE PortCityFutures Center. This special issue of *Blue Papers* captures key arguments from the conference in revised and reviewed format. Sincere thanks to all institutions, colleagues and students who contributed their time, expertise and creativity to these research and educational activities. Their contributions enriched the research and fostered a collaborative exchange of ideas across different scales and perspectives. The goal of this issue is to share the debates and to contribute to broader discussions on multiple uses of a shared resource, the Seine.

The articles compiled in this issue of *Blue Papers* provide background information on the historical and contemporary development of Paris from various disciplinary perspectives – including anthropology, archaeology, history, planning, heritage management and more. The first group of papers explores the broader context of the Seine and its multiple uses and the second speaks to the four themes selected for the conference: Swimming, Sewage, Shipping and Safety.

Carola Hein begins by setting the context in Part I, describing various coexisting values associated with water in Paris and how these values can be used to improve river governance in Paris. Laurence Lestel shows how Parisians' relationship with the Seine has evolved since the nineteenth century and why drawing on this historical perspective can restore meaning to that relationship. Hélène Noizet describes the evolution of the Seine in Paris since the Middle Ages, breathing new life into its ancient channels, which must regain their rightful place in shaping the relationship between the Seine and Parisians. Raphaël Morera reminds us how the bond between Paris and its river has shaped both the river and the city. Emmanuelle Lallement explores three initiatives to reclaim the banks of the Seine since the 1990s (Paris-Plage, the Voies sur Berge and the redevelopment of the area around Notre-Dame de Paris), each reflecting a different approach, thereby illustrating the potential diversity of efforts to rebuild the connection between residents and their river. Olivier Aïm takes us into the world of the guinguettes, once places of leisure outside the city limits (beyond the city toll gates) and today a symbol of a joyful approach to the riverbanks. Sahima Hamlaoui and Maria Cellamare remind us that the Seine is not merely a backdrop that enhances Paris, but is also the setting for a rich ecosystem, observed here through its phytoplankton.

All decision-makers must take different spatial scales and functions into account. Yvonne van Mil, Carola Hein and Lukas Höller broaden the perspective with a study of the Parisian port city territory, which situates Paris within its river basin and connects the city to international trade.

Olivier Burel illustrates this international dimension of the Seine in Paris using the example of energy, and Jean Debrie explains in detail what this port dimension means for the City of Paris. From a public health perspective, Anita Ravlic reminds us that the Seine, like so many other rivers, once served as an outlet for Paris's sewers and explains how the management of this wastewater has led to a reclaiming of the Seine by city residents. Thomas Thiebault, Catherine Carré and Jérémy Jacob examine the wastewater in greater detail and what it reveals about Parisians' dietary habits and health. Jean-Pierre Tabuchi, Catherine Carré and Jean-Claude Deutsch draw conclusions from this regarding the system's ability to adapt to future global changes. Bruno Gouyette emphasizes that three approaches are necessary for a sustainable river: considering the entire Seine basin, viewing the Seine as a system to be considered as a whole and granting rights to the Seine to make it a visible issue in political debates. Finally, Clément Brun, Léonard Bertrand and Annabelle Nantier explore how the public health challenges associated with swimming have transformed the City of Paris's vision and management of the river.



Carola Hein is Professor of History of Architecture and Urban Planning at Delft University of Technology, Professor at Leiden and Erasmus University, and UNESCO Chair Water, Ports and Historic Cities and serves as director of the PortCityFutures Center. She has published and lectured widely on topics in contemporary and historical architectural, urban and planning history and has tied historical analysis to contemporary development. Among other major grants, she received a Guggenheim and an Alexander von Humboldt fellowship. Her recent books include: *Hustle and Bustle: The Vibrant Cultures of Port Cities* (2024), *Port City Atlas* (2023), *Oil Spaces* (2021), *Urbanisation of the Sea* (2020), *Adaptive Strategies for Water Heritage* (2020), *The Routledge Planning History Handbook* (2018) and *Port Cities: Dynamic Landscapes and Global Networks* (2011).

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(Re)Connecting River and City – The Seine in Paris and the Île-de-France



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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

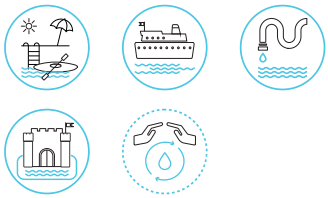
Carola Hein

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 Île de la Cité and the Île 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.

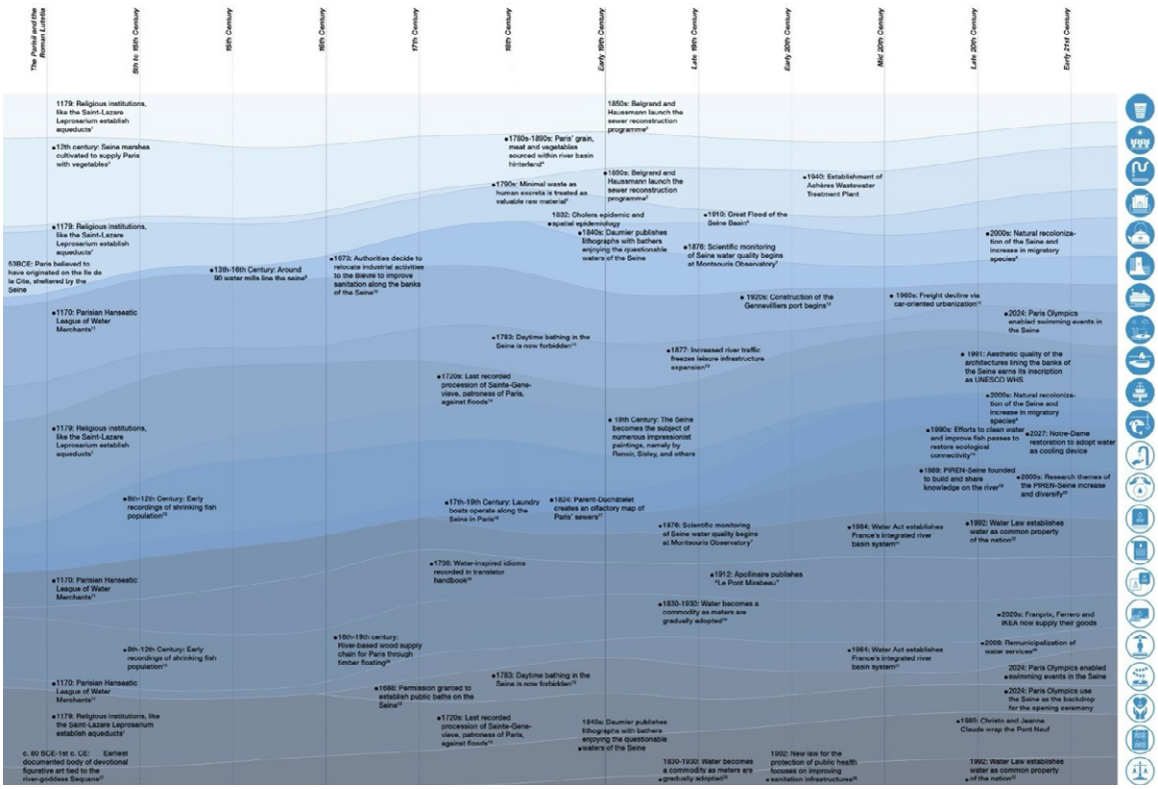
Paris and the Île-de-France

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 Île-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).

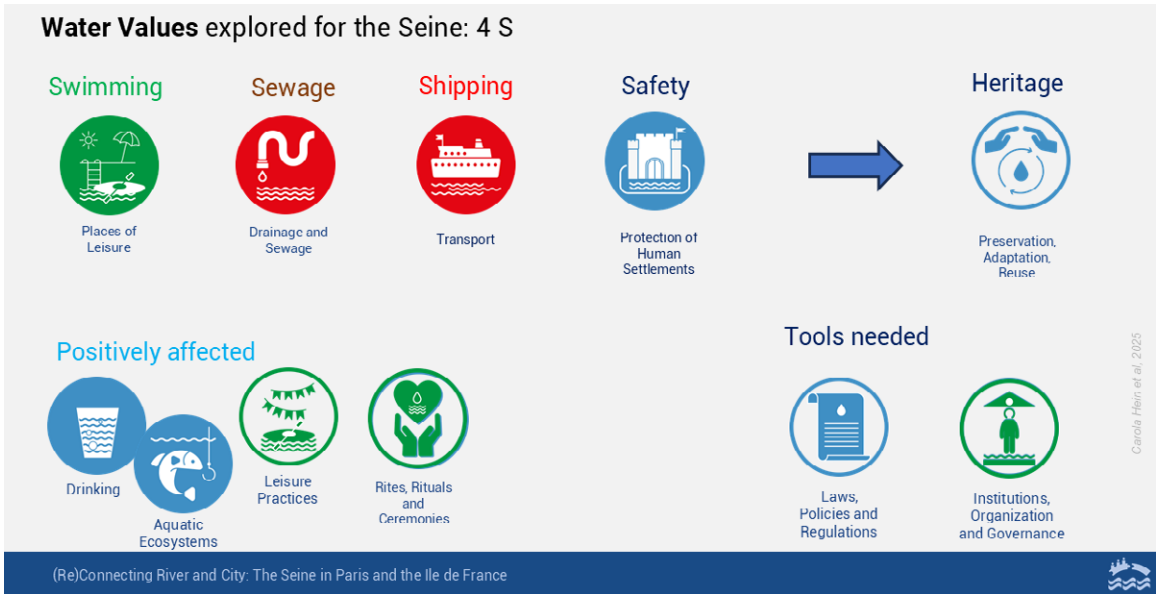
While the Seine River supports a wide range of functions – e.g., energy production, drinking water provision, fishing, rituals, health and recreation (as captured in the *Blue Papers* water icons) – this article focuses on select interconnected water uses that have significantly shaped planned and unplanned 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 forms of integration in planning, design and governance that recognize the port city heritage of Paris.



^ 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).

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 de-

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



^ 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).

liveries 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 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, De Martino and Hanna 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 infrastructure 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.



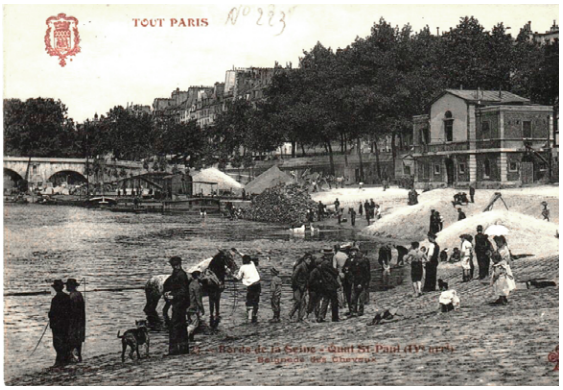
^ Fig. 12 Some underground galleries of different sizes that are part of the sewage system of Paris are accessible as part of the Paris Sewer Museum (Source: Carola Hein, 2025).



^ 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



^ Fig. 14 Prior to the hardening of the quays, the Seine was accessible for multiple activities, including horse bathing (Source: Cartorum, date unknown, CC BY-SA 3.0).



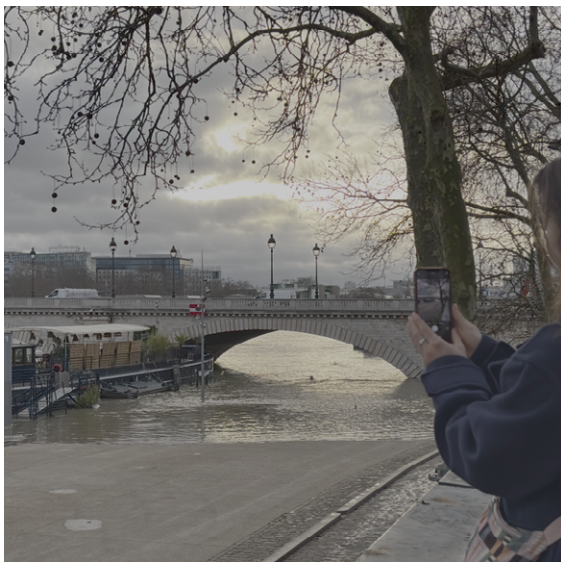
^ Fig. 15 The 1910 flood led to a rethinking of water management and safety in Paris (Source: J. Hauser, 1910; reproduced from Le Fil du Temps).

multiple scales, from local riverbanks to the entire Seine basin, through infrastructures such as dams, dikes, 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 a 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.



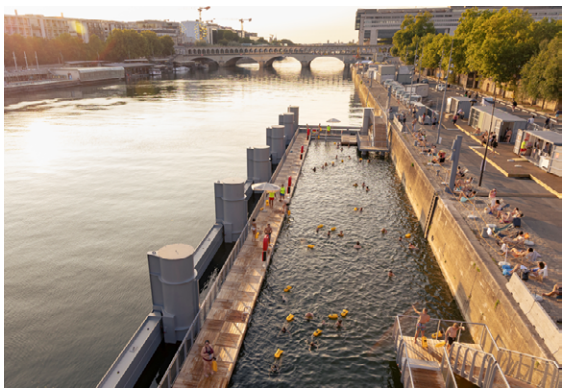
^ Fig. 18 Swimming pool in the Bras Marie near the Île Saint-Louis was made possible by rerouting shipping flows in 2025 (Source: Jean-Baptiste Gurliat / Ville de Paris, 2025).



^ 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

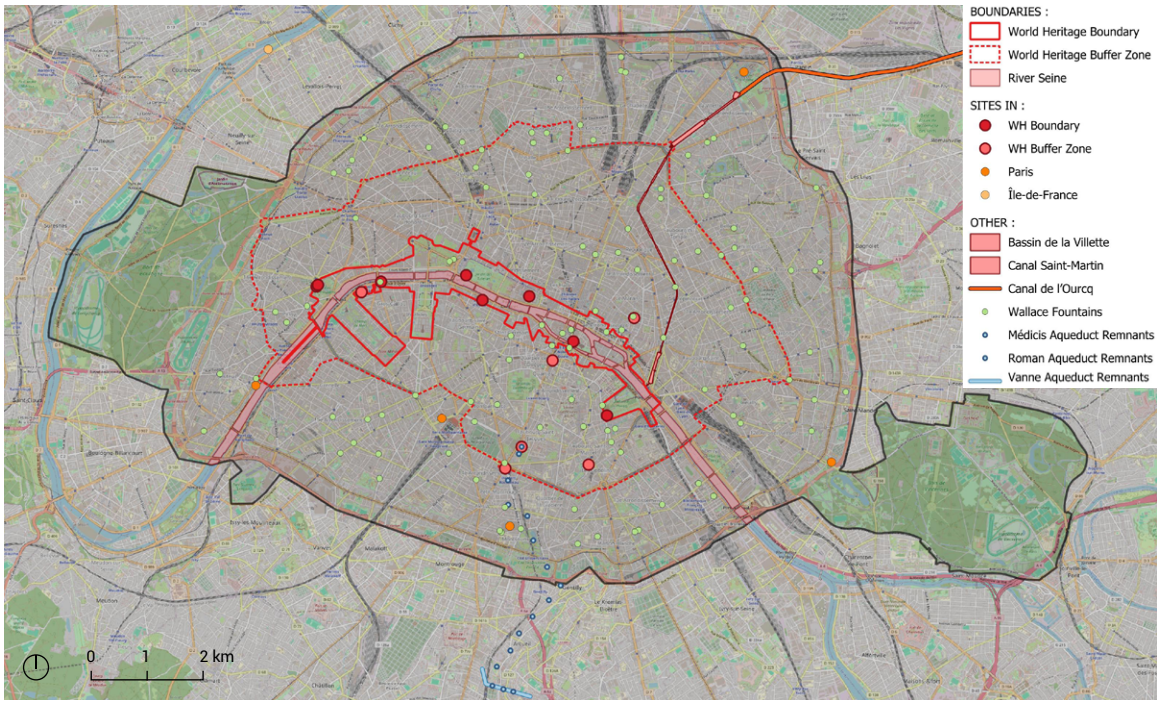
The four forms of engagement with the Seine discussed here – shipping, sewage, water management (safety) and leisure (swimming) – illustrate the entanglement of water uses, infrastructures, values and cultural practices. Together and over time they have shaped the Parisian landscape, particularly the 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.

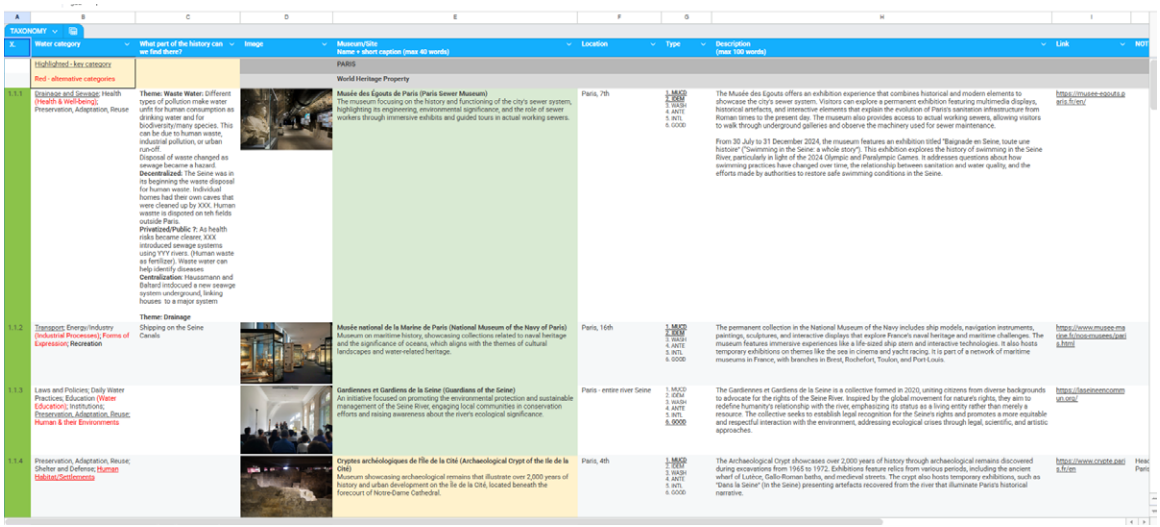
Taken together, these layers form a complex landscape that reflects the long history of Paris and the evolving relationship between people and the river. They anchor historical narratives (think of the recognition of shipping and port activities as a key reason for the construction of the city), reveal 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.

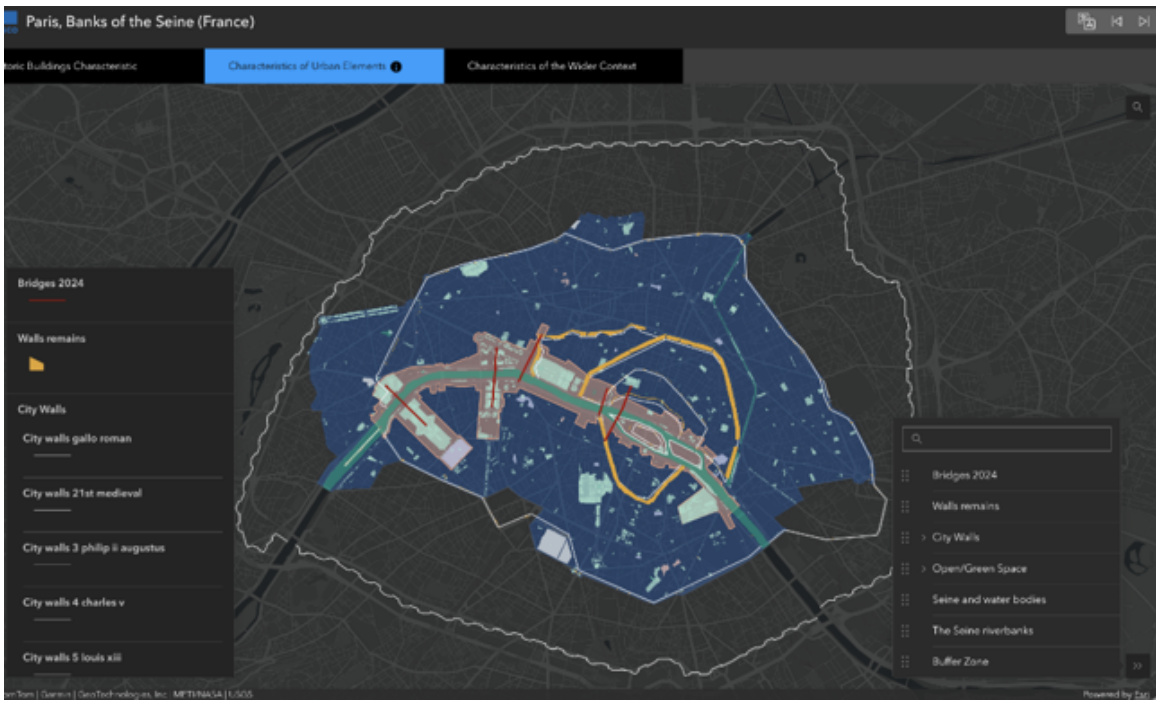
Existing initiatives provide a foundation for such an approach. The Water Museum Network (WAMUNET) has developed a taxonomy of water museums along river systems to

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.

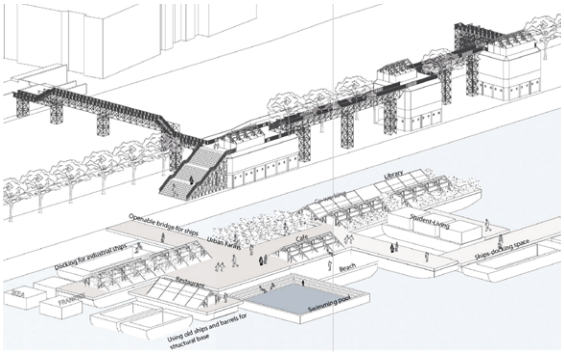
Despite its central role, the characteristics of water – as a flow, a connector and a constantly changing socio-ecological system – remain insufficiently addressed in existing heritage tools (figs. 23 and 24). Application of the UNESCO Urban Heritage Atlas methodology has revealed both its strengths 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

The selection of four key uses and their associated values, what was then called "4S — Shipping, Sewage, Safety/Water Management, Swimming/Leisure," was the result of my fellowship as IEA/Sorbonne Chair Water Heritage. It is based on a literature review and conversations with key researchers and professionals. I then organized a conference at the IEA in March 2025 to which I invited specialists of the Seine in Paris and the Île-de-France to prepare interventions on their relevant fields of study with the goal of transcending the often sectoral approaches of ecologists, geographers, architects and urbanists, of academics and practitioners. On behalf of the UNESCO Chair Water, Ports and Historic Cities, and in collaboration with the World Heritage Center, Léa Kayrouz, Yvonne van Mil and Carola Hein developed the contribution on Paris for the UNESCO Urban Heritage Atlas (https://whc.unesco.org/en/urban-heritage-atlas/). Léa Kayrouz also developed the visual of the timeline presentation. Zuzanna Sliwinska researched the water museums in Paris.

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References

Backouche, Isabelle. 2016. *La trace du fleuve. La Seine et Paris* (1750–1850) [The trace of the river: The Seine and Paris (1750–1850)]. Paris: Éditions de l'EHESS.

Ballestero, Andrea. 2019a. "The Anthropology of Water." *Annual Review of Anthropology* 48: 405–21. https://doi.org/10.1146/annurev-anthro-102218-011428.

Ballestero, Andrea. 2019b. *A Future History of Water*. Durham, NC: Duke University Press. https://doi.org/10.1215/9781478004516.

Cai, Rongzhen, and Satoshi Nasu. 2025. "Adopting the 'Historic Layering' Concept from the Historic Urban Landscape Approach as a Methodological Framework for Urban Heritage Conservation." I*nternational Journal of Heritage Studies* 31 (5): 573–91. https://doi.org/10.1080/13527258.2025.2476450.

Cao, Yixin, Oldrich Navratil, Anne Honegger and Nicolas Rivière. 2026. "Urban River Bathing in Selected European Cities: Evolution, Typology, Management Issues and Sustainability Challenges." *Landscape and Urban Planning* 269: 105596. https://doi.org/10.1016/j.landurbplan.2026.105596.

Carré, Catherine. 2014. "Le transport fluvial de marchandises peut-il cohabiter avec d'autres usages? L'évolution des usages de la Seine dans l'agglomération parisienne" [Can river freight transport coexist with other uses? The evolution of uses of the Seine in the Paris metropolitan area]. In *Les métropoles fluviales. Concilier aménagement et développement logistique pour un développement urbain durable* [River metropolises: Reconciling planning and logistics development for sustainable urban development], edited by Jean Debrie and Antoine Beyer. L'œil d'or. https://www.loeildorenligne.com/product-page/les-m%C3%A9tropoles-fluviales.

Carré, Catherine, and Jean-Claude Deutsch. 2015. *L'eau dans la ville, une amie qui nous fait la guerre* [Water in the city, a friend that wages war on us]. La Tour-d'Aigues: Éditions de l'Aube.

Coeur, Denis. 2024. *Barrages-réservoirs et crues de la Seine: Une histoire de l'hydrologie du XVIIe au XXe siècle* [Reservoir dams and floods of the Seine: A history of hydrology from the seventeenth to the twentieth century]. Versailles: Éditions Quæ.

Couling, Nancy, and Carola Hein, eds. 2020. *Urbanisation of the Sea: From Concepts and Analysis to Design*. Rotterdam: nai010 publishers.

Cunha, Dilip da. 2018. *The Invention of Rivers: Alexander's Eye and Ganga's Descent*. Philadelphia: University of Pennsylvania Press.

D'Agostino, Matteo, and Carola Hein. 2024. "Design-Based Solutions for Water Challenges: The Value Case Approach." *Blue Papers* 3 (1): 80–89. https://doi.org/10.58981/bluepapers.2024.1.06.

Dai, Tianchen, and Carola Hein. 2023. "Exploring the Descriptions of World Heritage Properties through the Perspective of Water Using a Narrative Approach." *International Journal of Heritage Studies* 29 (12): 1315–38. https://doi.org/10.1080/13527258.2023.2252792.

Elicio, Colin. 2011 [1920]. *Le Port de Paris* [The Port of Paris]. Dunod.

Enu, Kirk B., Aude Zingraff-Hamed, Gerd Lupp, Susanne Raum, Eddy Moors and Stephan Pauleit. 2025. "Stakeholder Priorities and Navigating Barriers in Urban River Restoration: Comparative Insights from Germany and Ghana." *Environmental and Sustainability Indicators* 26: 100683. https://doi.org/10.1016/j.indic.2025.100683.

Flipo, Nicolas, Pierre Labadie and Laurence Lestel, eds. 2021. *The Seine River Basin*. Springer. https://doi.org/10.1007/978-3-030-54260-3.

Gandy, Matthew. 1999. "The Paris Sewers and the Rationalization of Urban Space." *Transactions of the Institute of British Geographers* 24 (1): 23–44. https://doi.org/10.1111/j.0020-2754.1999.00023.x.

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Guillerme, André. 1990. "Le testament de la Seine" [The legacy of the Seine]. *Revue de géographie de Lyon* 65 (4): 240–50. https://doi.org/10.3406/geoca.1990.5742.

Hein, Carola, ed. 2020. *Adaptive Strategies for Water Heritage: Past, Present and Future*. Cham: Springer. https://doi.org/10.1007/978-3-030-00268-8.

Hein, Carola. 2025a. "Toward a Value Case Approach for Designing Sustainable Water Systems." *Blue Papers* 4 (1): 30–43. https://doi.org/10.58981/bluepapers.2025.1.01.

Hein, Carola. 2025b. "Water Systems Design: Connecting and Developing Methods for the Value Case Approach." *Blue Papers* 4 (1): 88–99. https://doi.org/10.58981/bluepapers.2025.1.06.

Hein, Carola, Paolo De Martino and John Hanna. Forthcoming. "Space-Society and Culture: Port de Bercy, Paris."

Hein, Carola, Lea Kayrouz, Zuzanna Sliwinska and Matteo D'Agostino. 2025a. "Icons as a Tool to Connect Water Practices, Functions and Values across Space and Time: A Second Attempt." *Blue Papers* 4 (1): 1–5. https://doi.org/10.58981/bluepapers.2025.1.wicon.

Hein, Carola, Lea Kayrouz, Zuzanna Sliwinska and Matteo D'Agostino. 2026. "Icons as a Tool to Connect Water Practices, Functions and Values across Space and Time: A Second Attempt." *Blue Papers* 5 (1): X–5. https://doi.org/10.58981/ng7nyn80.

Hein, Carola, Regina Klinger, Christel Voncken, Prapti Gupta and Vincent Baptist. 2025b. "Amsterdam's Quay Walls: Methods for Connecting Past, Present and Future." *Blue Papers* 4 (2): 197–208. https://doi.org/10.58981/bluepapers.2025.2.16.

Kaika, Maria, and Erik Swyngedouw. 2000. "Fetishizing the Modern City: The Phantasmagoria of Urban Technological Networks." *International Journal of Urban and Regional Research* 24 (1): 120–38. https://doi.org/10.1111/1468-2427.00239.

Krause, Franz, and Veronica Strang. 2013. "Introduction to Special Issue: 'Living Water.'" *Worldviews* 17 (2): 95–102. https://doi.org/10.1163/15685357-01702001.

Krause, Franz, and Veronica Strang. 2016. "Thinking Relationships through Water." *Society & Natural Resources* 29 (6): 633–38. https://doi.org/10.1080/08941920.2016.1151714.

Lestel, Laurence, and Catherine Carré. 2017. *Les rivières urbaines et leur pollution* [Urban rivers and their pollution]. Versailles: Éditions Quæ.

Lestel, Laurence, David Eschbach, Michel Meybeck and Frédéric Gob. 2020. "The Evolution of the Seine Basin Water Bodies Through Historical Maps." In *The Seine River Basin*, edited by Nicolas Flipo, Pierre Labadie and Laurence Lestel, 29–57. Cham: Springer. https://doi.org/10.1007/698_2019_396.

Lestel, Laurence, Michel Meybeck, Catherine Carré and Jérôme Belliard. 2023. "The Seine, the River Dedicated to Paris." In *River Culture: Life as a Dance to the Rhythm of the Waters*, edited by Karl Matthias Wantzen, 673–97. Paris: UNESCO Publishing. https://doi.org/10.54677/CGDX8656.

Linton, Jamie. 2014. "Modern Water and Its Discontents: A History of Hydrosocial Renewal." *WIREs Water* 1 (1): 111–20. https://doi.org/10.1002/wat2.1009.

López-Cuervo, Serafín. 1988. "Water, a Cultural Heritage." *Landscape and Urban Planning* 16 (1–2): 93–103. https://doi.org/10.1016/0169-2046(88)90037-0.

Manzione, Rodrigo Lilla. 2024. "From Landmarks to Watermarks: Water Towers as Hidden Signs of Water through the Value Case of Ourinhos, Brazil." *Blue Papers* 3 (1): 152–63. https://doi.org/10.58981/bluepapers.2024.1.12.

Mulay, Radhika, and Pallavee Gokhale. 2025. "The Peshwa Nahar System: Sustainable Water Management in the Past and for the Future." *Blue Papers* 4 (1): 118–29. https://doi.org/10.58981/bluepapers.2025.1.08.

Pawlowski, Auguste. 1910. *Les Ports de Paris* [The Ports of Paris]. Berger-Levrault & Cie.

Reid, Donald. 1991. *Paris Sewers and Sewermen: Realities and Representations*. Cambridge, MA: Harvard University Press.

Salzinger, Maëlle. 2025a. "Making Sustainability Transitions Appealing: The Need for Alternative Narratives in France." *Blue Papers* 4 (1): 76–87. https://doi.org/10.58981/bluepapers.2025.1.03.

Salzinger, Maëlle. 2025b. "Methodologies for Inspiring, Locally Grounded Sustainability Transitions: The Value Case for Annecy, France." *Blue Papers* 4 (1): 102–17. https://doi.org/10.58981/bluepapers.2025.1.07.

Schubert, Dirk. 2011. "Seaport Cities: Phases of Spatial Restructuring and Types and Dimensions of Redevelopment." In *Port Cities: Dynamic Landscapes and Global Networks*, edited by Carola Hein. London: Routledge.

Strang, Veronica. 2004. *The Meaning of Water*. Routledge.

UNESCO. 2011. *Recommendation on the Historic Urban Landscape*. UNESCO. https://whc.unesco.org/document/160163.

Wantzen, Karl Matthias, Aziz Ballouche, Isabelle Longuet, Ibrahima Bao, Hamady Bocoum, Lassana Cissé, Malavika Chauhan et al. 2016. "River Culture: An Eco-Social Approach to Mitigate the Biological and Cultural Diversity Crisis in Riverscapes." *Ecohydrology & Hydrobiology* 16 (1): 7–18. https://doi.org/10.1016/j.ecohyd.2015.12.003.

Wantzen, Karl M., ed. 2023. *River Culture: Life as a Dance to the Rhythm of the Waters*. UNESCO Publishing.

Xue, Fei, Yue Fan, Ivan Chin Shing Fu, Sunnie Sing Yeung Lau, Jin Zhang and Stephen Siu Yu Lau. 2026. *Water-Oriented Design: Principles and Practices in the Asian Context*. Singapore: Springer. https://doi.org/10.1007/978-981-95-5449-2.

Zingraff-Hamed, Aude, Markus Noack, Sabine Greulich, Kordula Schwarzwälder, Karl Matthias Wantzen and Stephan Pauleit. 2018. "Model-Based Evaluation of Urban River Restoration: Conflicts between Sensitive Fish Species and Recreational Users." *Sustainability* 10 (6): 1747. https://doi.org/10.3390/su10061747.



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Turning to History to Understand the Relationship between Parisians and Their River

Laurence Lestel

Abstract
For centuries, the Seine's relationship with Paris has evolved alongside Parisians' changing expectations – for the river as a source of supplies, as a space for leisure and as a force to be kept in check. Meeting the new challenges of the twenty-first century will require the development of more integrated river management, including an overall plan and better coordination between the various institutions responsible for the river and its functions. Promoting the river's heritage could be one way to enhance its public image and help to shape its future in ways that reflect the diversity of visions and uses it sustains.

KEYWORDS

Seine River
river-system
geohistory
environmental trajectory
heritage

WATER ICONS



Policy Recommendations

- Promote historical studies to have a better understanding of the various uses and decisions that have led to the Seine of today and help build the Seine of tomorrow.
- Promote activities in relation with human well-being, such as the restoration of swimming in the Seine,because it is a good catalyst for best practices and helps to accelerate environmental restoration operations.
- Establish forums for discussion and decision-making shared by all the stakeholders who are currently responsible for the future of the Seine.

< Fig. 1 A barge on the Seine River in Paris (Source: Laurence Lestel, 2025).

Introduction

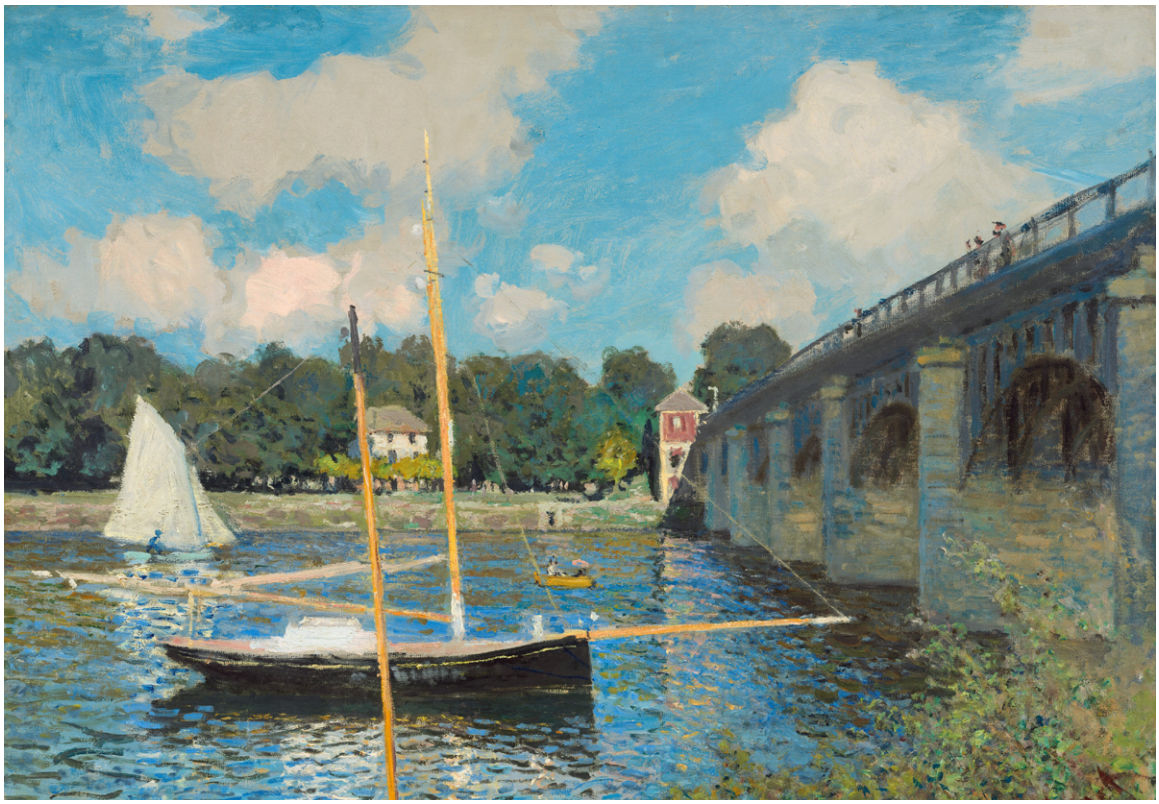
The Seine is a medium-sized river, 607 km in length, with an additional 170 km in its estuarial section. At the center of its watershed lies Paris and its metropolitan area, which today is home to 7 million of the 18 million inhabitants of the basin as a whole. Geography and history tell a similar story: Both present a river inseparable from its capital. This article explores four aspects of that relationship – navigation, which transformed the river in the nineteenth century to ensure a better supply for Paris; the contrasting perceptions of the Seine held by painters and the municipal authorities at the end of the nineteenth century; the control of the river's flow following the 100-year flood of 1910; and finally the reappropriation of the Seine for recreational use in the twenty-first century.

The Major and Irreversible Transformation of the River for Navigation

To facilitate the transport of supplies to Paris, major development works were undertaken along the Seine beginning in the mid-nineteenth century. The construction of a series of locks and weirs transformed the river into a succession of reaches extending over 400 km. The navigable Seine is managed by Voies Navigables de France (VNF) and the ports along the Seine by HAROPA (Le HAvre, ROuen, PAris). These transformations are irreversible (Lestel et al. 2023). The riverbed was dredged to increase navigable depth, and the width of the minor bed was reduced. Approximately 100 islands have been leveled or attached to the banks to remove secondary branches and improve water circulation in the main branch (Lescure et al. 2011). In Paris, the revival of swimming in the Seine has recently led to calls for a rethinking of how the river space is shared, since it is currently dominated by barges and *bateaux-mouches* (fig. 1).

The Impressionist Painters: The Illusion of a Clean Seine

The 1870s were productive years for the Impressionists, who painted a magnificent Seine, magnified by their brushes, with a few sailboats gliding along in a light breeze and groups sitting on the grass enjoying picnics (fig. 2). These idyllic images of the Seine downstream from Paris did not reflect a reality that was well known to the municipal authorities, who were concerned at the time with the negative visual and olfactory impacts of Parisian sewage, which, according to the plan devised by Haussmann and his engineer Belgrand, was collected and then discharged into the Seine downstream from Paris, at Clichy and Asnières. This situation led Auguste Gérardin, an inspector of industrial establishments in the Seine department, to measure the level of dissolved oxygen – that is, oxygen consumed by the organic matter discharged into the river by the city. The river's anoxia (particularly in summer), measured since 1874, lasted for more than 100 years prior to the funding of wastewater treatment plants with sufficient capacity and treatment methods to address it (Meybeck et al. 2018). Other measures, such as the installation of rainwater collectors beginning in the 1990s, have restored the Seine – in terms of this particular parameter – to good quality in summer, and they have brought back fish that had almost completely disappeared from the Seine in the 1960s. The practice of swimming in the Seine, promoted by the Paris City Council, has highlighted this aspect of water quality, which has required extensive work, at a cost of €1.4 billion, mainly to restore the fecal bacteria parameter.



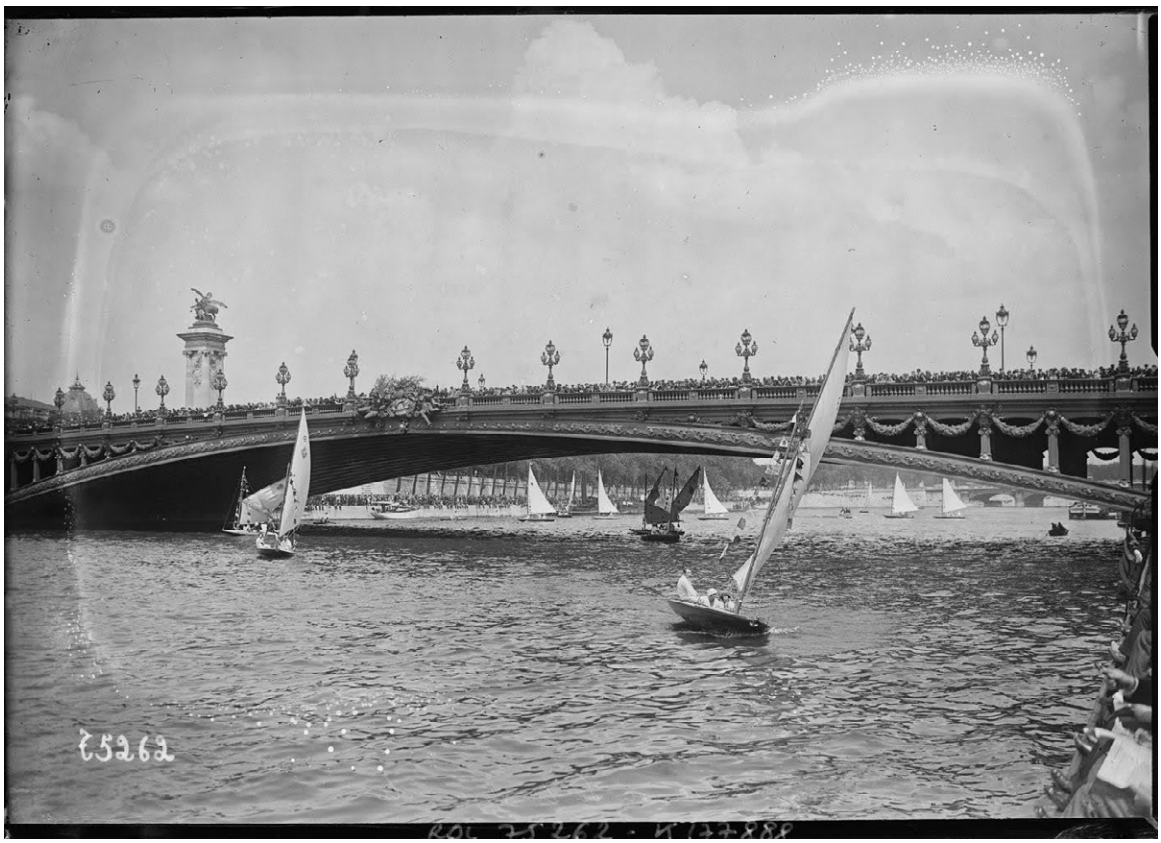
^ Fig. 2 Claude Monet, The Bridge at Argenteuil (Source: Claude Monet, 1874. Public domain, National Gallery of Art, Washington).

Nature Under Control? Controlled Flow Rates

After the great 100-year flood of 1910, which affected the Seine valley and the Paris region, a major project known as the Chabal project, which began in the 1920s, led to the construction of reservoir lakes upstream from Paris to store water diverted from the Seine and Aube Rivers in winter and spring. That reduced flood peak levels, but it also made it possible to release the water in summer and fall, thus preventing excessively low water levels in the Seine (Barles and Guillerme 2014). Nearly 50 per cent of the water flowing through the Seine in Paris in summer comes from these reservoirs (up to 80 per cent during the particularly dry summer of 2022). Now managed by the Seine Grands Lacs institution, these structures ensure sufficient water flow to allow barges and riverboats to circulate, as well as making it possible to swim in water with a controlled flow.

Swimming in the Seine in Paris: Catalyst for Good Practices for the Seine

In the 1920s, recreational activities were still taking place on the Seine in Paris (fig. 3). In "Le testament de la Seine," André Guillerme (1990) emphasized that Parisians had lost their connection with their river in the 1970s, following the opening of the riverside expressways, which were effectively urban highways. The perception of the Seine changed again when



^ Fig. 3 Arrival of sailboats during the Paris Water Sports Day near Pont Alexandre III, 11 June 1922 (Source: Agence Rol, 1922. Public domain, Bibliothèque nationale de France / Gallica).

the quays of the Seine were classified by UNESCO in 1991. Then, the banks were reclaimed in several stages, with cars gradually being excluded from the banks of the Seine beginning in 2002. The reintroduction of swimming in the Seine in Paris in the summer of 2025, "after 100 years of prohibition (since 1923)," (see below) and one year after the Olympic Games, some of whose water sport events took place on the Seine in 2024, has accentuated this rapprochement between Parisians and their river. Major works, focused on reducing pollution in the Seine, have been undertaken to make it clean enough for swimming in summer, thus shifting the political discourse toward issues of water quality.

In doing so, entire chapters of the history of swimming in the Seine in Paris have been ignored. In fact, swimming in the Seine had been prohibited in Paris since at least the seventeenth century (for reasons of decency), and formally banned to make way for navigation since 1840, with the ban renewed every year until 1923, the date of the last official text concerning swimming in the Seine in the former department of the Seine. This shows that reopening the river to swimming today means not only restoring it to a sufficient quality for swimming according to contemporary quality criteria (particularly E. coli levels) but also resolving the issue of how the Seine's public space can be shared with watercraft.

Conclusion

Taking a step back in history allows us to better understand how the uses and relationships of Parisians to their river have evolved over time, leading to irreversible changes to the river. Today, it is a river with controlled flow and quality. As new challenges emerge for the Seine (whether climate change or new societal expectations, such as access to the quays or recreational swimming), meeting these new challenges of the 21st century will require the development of more integrated river management, a comprehensive plan, and better coordination between the various institutions responsible for the river and its functions. Enhancing the river's heritage could be one of the elements that would help to give the river a more positive image and help to shape its future, taking into account the diversity of its visions and uses.

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References

Barles, Sabine, and André Guillerme. 2014. "Paris: A History of Water, Sewers and Urban Development." In *A History of Water, Series 3, Vol. 1: From Jericho to Cities in the Seas: A History of Urbanization and Water Systems*, edited by Terje Tvedt and Terje Oestigaard, 384–409. London: I.B. Tauris.

Guillerme, André. 1990. "Le testament de la Seine" [The legacy of the Seine]. *Revue de géographie de Lyon* 65 (4): 240–50. https://doi.org/10.3406/geoca.1990.5742.

Lescure, Séverine, Gilles Arnaud-Fassetta and Stéphane Cordier. 2011. "Sur quelques modifications hydromorphologiques dans le Val de Seine (Bassin parisien, France) depuis 1830: quelle part accorder aux facteurs hydrologiques et anthropiques?" [On some hydromorphological changes in the Val de Seine (Paris Basin, France) since 1830: How much weight should be given to hydrological and anthropogenic factors?]. *EchoGéo* 18: 15. http://echogeo.revues.org/12658.

Lestel, Laurence, Michel Meybeck, Catherine Carré and Jérôme Belliard. 2023. "The Seine, the River Dedicated to Paris." In *River Culture: Life as a Dance to the Rhythm of the Waters*, edited by Karl M. Wantzen, 673–97. Paris: UNESCO Publishing. https://doi.org/10.54677/CGDX8656.

Meybeck, Michel, Laurence Lestel, Catherine Carré, Gabrielle Bouleau, Josette Garnier and Jean-Marie Mouchel. 2018. "Trajectories of River Chemical Quality Issues over the Longue Durée: The Seine River (1900s–2010)." *Environmental Science and Pollution Research* 25 (24): 23468–84. https://doi.org/10.1007/s11356-016-7124-0.



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The Morphological Resilience of the Seine in Paris: From Ancient Meander to the Contemporary Street Network

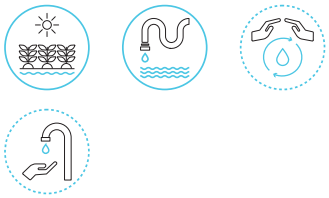
Hélène Noizet

Abstract
This article considers the heritage of river form in the current urban fabric, specifically in relation to an ancient meander of the Seine located on the right bank of Paris. The resilience of the river's shape appears by crossing texts, maps and archaeological data in historical geospatial mapping (GIS). In the ninth century, the Church of Sainte-Opportune in Paris received from the king the wetland left behind by the ancient channel of the Seine and used it as common pasture until 1150. Then, the canons drained the marsh which was converted for vegetable farming and, since the fourteenth century, for a sewer system. Since the nineteenth century, it has influenced the orientation of urban plots and streets. Finally, during the big flood of 1910, the Seine returned to its ancient bed. This is an example of how forms are passed on over time: because functions change.

KEYWORDS

resilience
urban fabric
wetlands
sewers
flood

WATER ICONS



Policy Recommendations

- Identify social practices related to the Seine (for example the new demand for access to the water for baths, and access to the ancient channels and current riverbanks for walkings) and integrate them into legal standards (and not the other way around).

< Fig. 1 View of the Seine, Paris (Source: Gustave Le Gray, 1857. Public domain, Gilman Collection via Met Museum).

Introduction

This article analyzes the long-term influence of the Seine's course on the urban fabric of Paris. It considers how a wetland created by an ancient channel of the Seine, a paleochannel, ceased flowing early in the Holocene but became a structuring morphogenetic element of Paris's urban landscape in a way that continues in the present day.

Before the Roman era, the Seine did not follow its current course but rather flowed along a meander whose semi-circular shape remains perceptible in the Paris street network (Noizet et al. 2013). How did this shape persist over time, given that the Seine abandoned the channel during the Holocene (geological period starting 11,700 years before present, that means before 1950)?

The alluvial plain of Paris contains former several paths of the Seine, of uncertain age – probably Pleistocene – and in any case predating the Gallo-Roman period (Chaussée et al. 2008). The northernmost of these ancient branches forms a large loop stretching from the Arsenal to Chaillot, skirting the foot of the Ménilmontant-Belleville and Montmartre hills. This paleo-meander was 8 to 8.5 km long (3–3.5 km longer than the current course) and 200–300 m wide. The bed of this ancient channel was carved into the substratum at an average altitude of 20 m. In its upstream section, this branch was later bordered by the wall of Charles V, built between 1356–1383. This wall has been rebuilt in the middle of sixteenth century, and this renovation is partially still visible: it is the lower part of the quay wall, running along the Arsenal harbour, on the Boulevard Bourdon side.

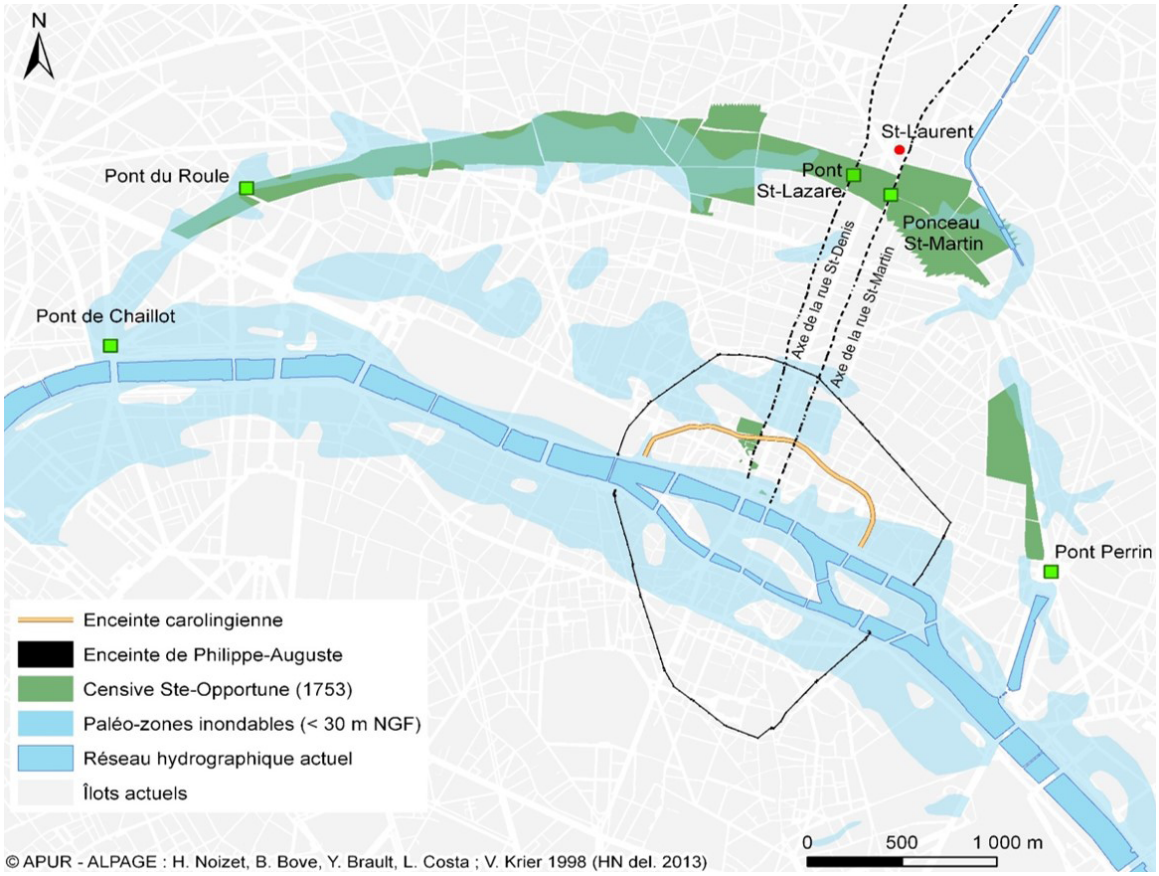
Until the mid-twelfth century, a residual wetland existed at this location and it periodically flooded during high waters, such as in 583. Gregory of Tours recounts that in that year the Seine overflowed its banks and returned to its former bed, flooding the right bank and causing shipwrecks between the Île de la Cité and the Church of Saint-Laurent (fig. 2):

> In the eighth year of King Childebert, on the day before the Kalends of February, … the waters rose beyond their usual level; for by the flooding of the Seine and the Marne around Paris they caused such an inundation that shipwrecks often occurred between the city and the basilica of Saint-Laurent.
>
> [Anno octavo Childeberti regis, pridie calendas februarias … aquae vero extra solitu invaluerunt ; nam tantum inundatione Sygona Matronaque circa Parisius intulerunt ut inter civitatem et basilicam sancti Laurenti naufragia saepe contingerent] (Krusch 1951).

Moreover, small bridges are documented from the ninth to the thirteenth century, which were used to cross the wetland at various points.

From Marsh to Market Garden

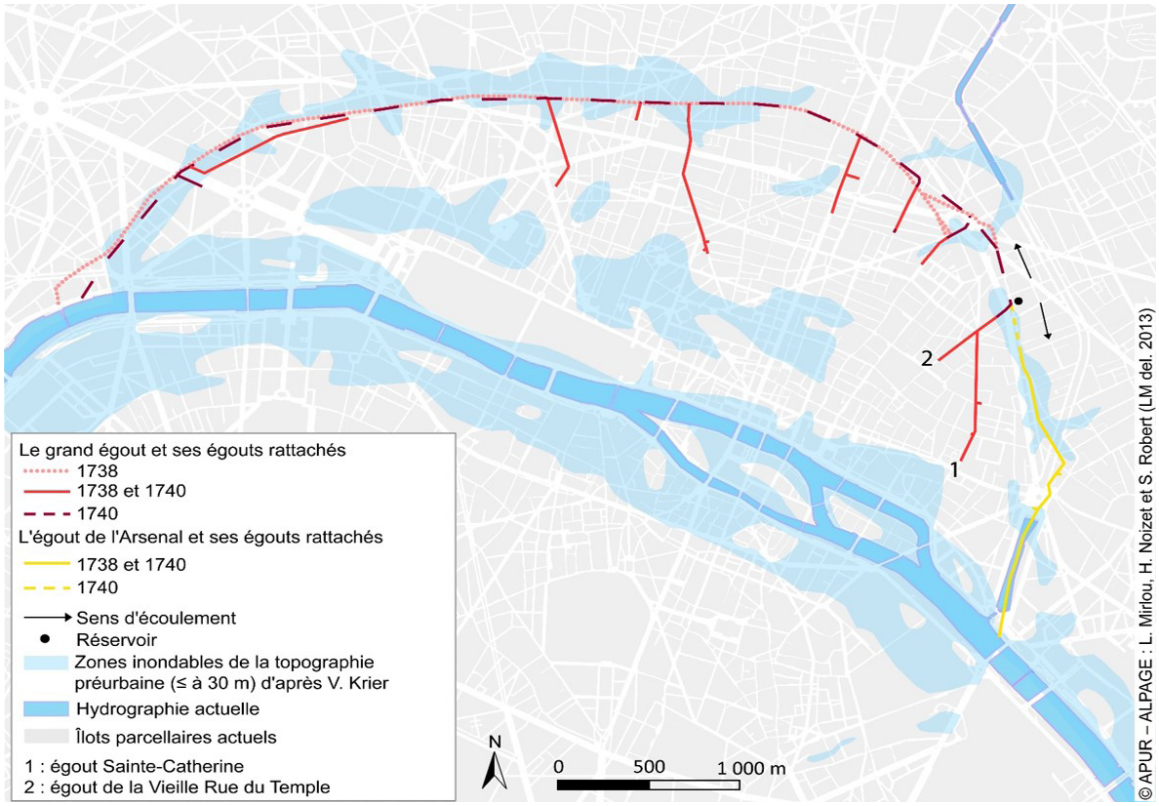
Given to the Church of Sainte-Opportune in the mid-ninth century, the wetland was used as common pasture for livestock grazing until the canons of the church decided to transform the area. After receiving authorization from the king and bishop, they began digging a network of ditches to drain the marsh starting around 1150. By 1232 they had made an agreement with some 60 farmers to grow wheat, the most profitable crop at the time. However, the soil proved too wet and the effort failed. Facing this difficulty, around 1250 the land users shifted focus and began growing vegetables in the area, turning it into a vast market garden. It



^ Fig. 2 Drainage of the wetland inherited from the paleomeander by the Church of Sainte-Opportune (Source: APUR ©ALPAGE: Hélène Noizet, 2013).

was in the thirteenth century that the meaning of the word *marais* evolved: Previously meaning "swamp" ("watery land"), it came to mean "market garden" (Kleindienst 1963). The drainage of this ancient meander ultimately created Paris's green belt, which supplied the city with fresh vegetables from the thirteenth to the seventeenth century.

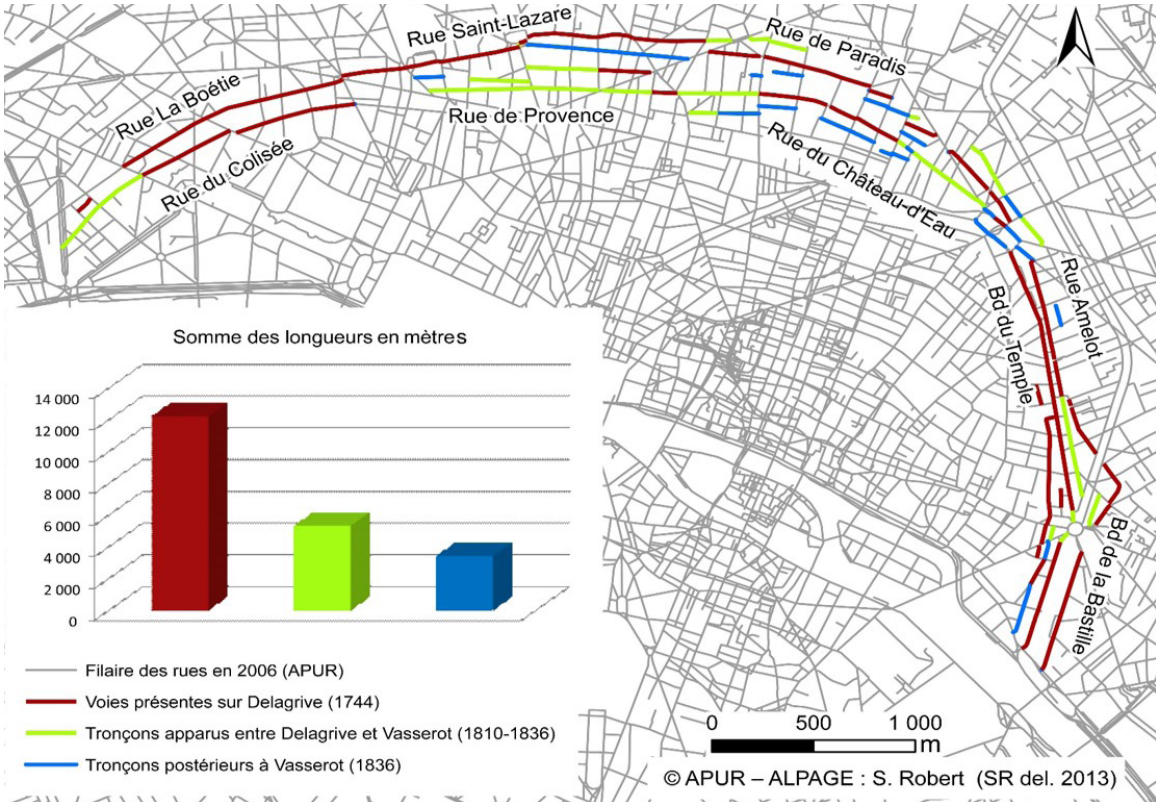
The creation of drainage ditches also prompted the development of a sewer network in the late Middle Ages, with the central collector corresponding to the paleochannel. Beginning in the fourteenth century, the central ditch – earthen and regularly cleaned by residents – was used as the main sewer for the right bank. *The Chronicle of the Monk of Saint-Denis*, written by Michel Pintoin about the reign of Charles VI (1380–1422), describes the actions of Hugues Aubriot, provost of Paris from 1367 to 1381: "He had skilled workers build underground conduits and sewers in the low-lying areas of the city, intended to carry away rainwater which, in turn, would sweep away the accumulated waste and transport it to the surrounding meadows." The chronology is significant because at the same time, in property records, the royal ditch network – which served as boundary markers for land sales in the area – underwent a name change: between 1380



^ Fig. 3 The sewers of the right bank before and after the works of 1738–1740 (Source: APUR ©ALPAGE: Laurent Mirlou, 2010).

and 1403, the term *fossés-le-roi*, attested since the thirteenth century, disappeared in favor of *égouts de Paris*. At the time, this sewer was still an earthen ditch, which gradually silted up over time. Its blockage prompted authorities to create a canal and line it with masonry, a project completed in 1740 (fig. 3).

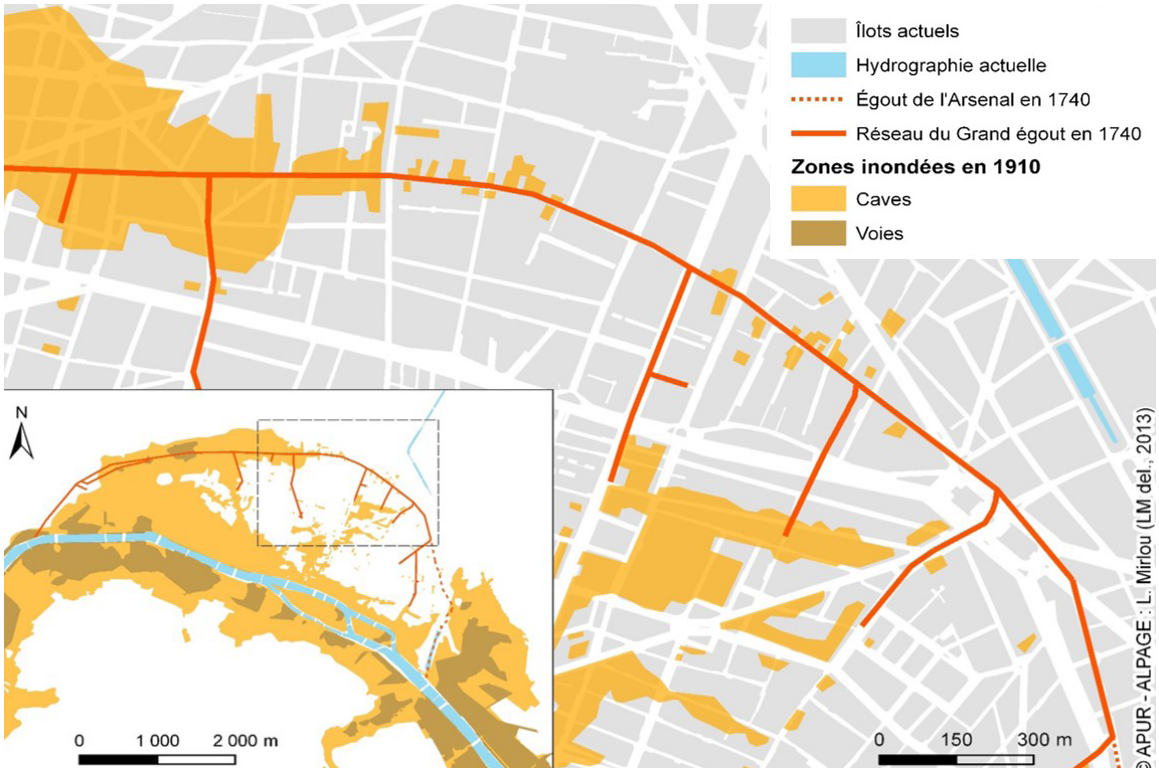
Starting in the seventeenth century, apartment rentals became more profitable than vegetable cultivation (Kleindienst 1963), and the garden plots were gradually replaced by streets and buildings, in the context of uncoordinated private developments constrained by the existing environment. This tension between agricultural heritage and new urban use is evident in Jean Delagrive's 1730 map of Paris: the market gardening belt, with its clearly identifiable ring shape, is beginning to become urbanized, particularly in the Chaussée d'Antin area. Each landowner sought authorization from the City to build and develop their lot to benefit from rental income, as for example Jean de Laborde. In 1771, this landowner between rue Neuve-Grange-Batelière and Chaussée-d'Antin had covered the sewer at his own expense between Chaussée-d'Antin and rue du Faubourg-Montmartre. He had opened rue de Provence on the site of the former canal, as well as rue d'Artois (Lazare 1844). The main sewer was eventually covered, but a series of streets were laid out following the orientation of the semi-circular shape inherited from the ancient channel, which in this way was transmitted to the present urban morphology – independent of any surface water flow (fig. 4).



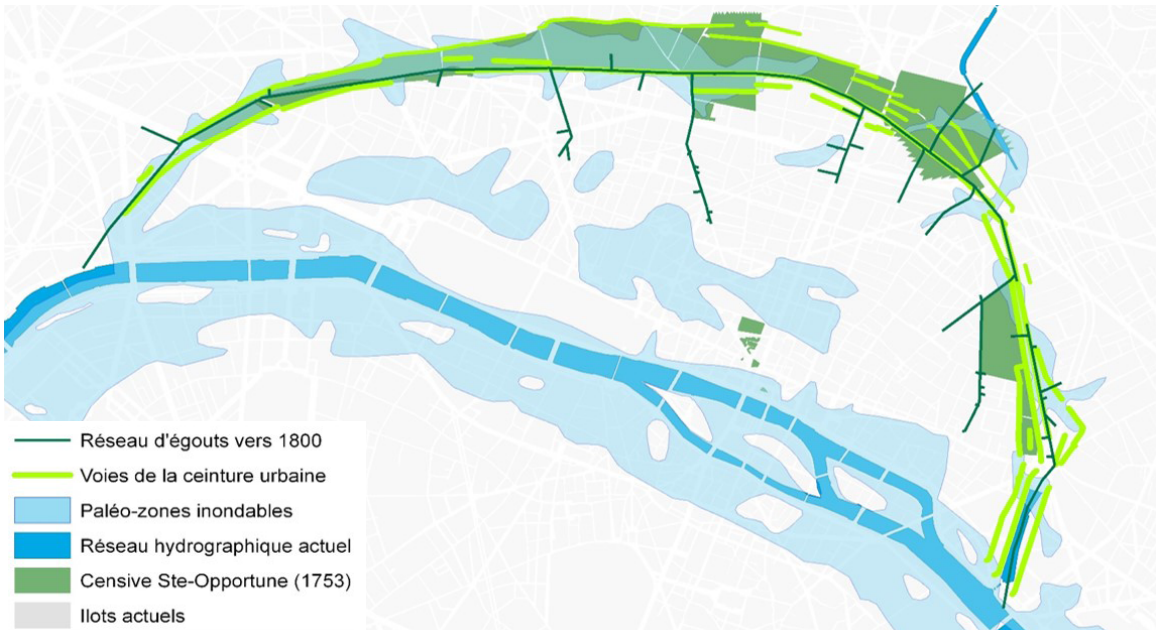
^ Fig. 4 Reactivation of the original fluvial form in the current street network (Source: APUR ©ALPAGE: Sandrine Robert, 2013).

In total, 21 km of street segments in Paris are still directly influenced today by the shape of the vast peri-urban belt. These include today's rue La Boétie, rue Marbeuf, rue de Penthièvre, rue Roquépine, rue Saint-Lazare, rue de Paradis, rue de la Victoire, rue de Provence, rue Richer, rue des Petites-Écuries and rue du Château-d'Eau. However, the transmission of the original form did not occur through a coherent layout precisely aligned with the covered canal's route or systematically following alongside it. Instead, it emerged as a pattern that spread around the paleochannel through a process of self-structuring, developing over several decades and ultimately forming a consistent shape that preserved the memory of the sewer long after its disappearance. In fact, no fewer than 8.75 km of streets that follow the semi-circular form (i.e., 41 per cent of the total) were laid out between 1744 and today, well after the social configurations linked to market gardening and the reconstruction of the main sewer; 25 per cent were built between 1744 and 1836, and 16 per cent after that date. These streets thus transmitted the form of the main sewer – originally shaped by the market gardening activities of a previous configuration – at a time when the sewer was no longer visible.

To complete this spatiotemporal evolution, we can recall the physical reactivation of the original fluvial form during the centennial flood of 1910. Mapping the various areas flooded at that time – whether directly by the Seine's overflow or indirectly through water rising into



^ Fig. 5 Reoccupation of the former Seine riverbed during the 1910 flood (Source: APUR ©ALPAGE: Laurent Mirlou, 2013).



^ Fig. 6 Fluviaire corridor inherited from the Seine's paleomeander (Source: APUR ©ALPAGE: Hélène Noizet, 2018).

basements – clearly shows that, in times of flooding, the Seine tends to return to its former bed (Noizet et al. 2011). The overlap between the flooded basements and the old main sewer is particularly revealing in the area of rue du Château-d'Eau and rue des Petites-Écuries (fig. 5). The 1910 flood reactivated this ancient watercourse, which had completely disappeared from the surface but continues to shape the urban plan and to drain the subsoil during high water events.

Since this morphologic transmission evolved from the initial water flow into the current street network, the resulting feature can be referred to as a "fluviaire corridor," combining the words fluvial and viaire, which means road/street-related (fig. 6) (Chouquer 2003, 234).

Conclusion

To answer the initial question: If the current urban fabric is marked by the form of an ancient channel of the Seine, it is because uses of the space continually shifted. This ongoing transformation allowed for the shape to be preserved in the urban plan. What is crucial to understand is the structuring capacity of societal practices dealing with inherited spatial forms. It is precisely because this former river-branch-turned-wetland was continually reappropriated and reused by successive societies, from antiquity to the present day, that we can observe the reemergence of its shape today. People often assume that respecting heritage means avoiding change, but in fact there can be a complex relationship between persistence and change: The two are not only not mutually exclusive but can be mutually supportive.

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References

Chaussée, Christine, Chantal Leroyer, Olivier Girard-clos, Gisèle Allenet, Patrick Pion and Pascal Raymond. 2008. "Holocene History of the River Seine, Paris, France: Bio-chronostratigraphic and Geomorphological Evidence from the Quai Branly." *The Holocene* 18 (6): 967–80.

Chouquer, Gérard. 2003. "Crise et recomposition des objets: les enjeux de l'archéogéographie" [Crisis and recomposition of objects: The challenges of archaeo-geography]. *Études rurales* 167–68: 13–31.

Kleindienst, Thérèse. 1963. "La topographie et l'exploitation des 'Marais de Paris', du XII^{e} au XVII^{e} siècle" [The topography and exploitation of the Paris marshes, from the twelfth to the seventeenth century]. *Paris et Île-de-France-Mémoires* (14): 7–167.

Krusch, Bruno, and Wilhelm Levison. 1951. *Grégoire de Tours, Historiarum libri X* [Gregory of Tours, ten books of histories]. 2nd ed. Vol. 1. Hanover: MGH.

Lazare, Félix, and Louis Lazare. 1844. *Dictionnaire administratif et historique des rues de Paris et de ses monuments* [Administrative and historical dictionary of the streets of Paris and its monuments]. Paris: Éditions F. Lazare.

Noizet, Hélène, Sandrine Robert and Laurent Mirlou. 2011. "Cartographie des crues centennales à Paris (1740, 1910)" [Mapping of centennial floods in Paris (1740, 1910)]. *Revue du Nord* 26: 91–104.

Noizet, Hélène, Sandrine Robert and Laurent Mirlou. 2013. "La résilience des formes. La ceinture urbaine de la rive droite à Paris" [The resilience of forms: The urban belt of the right bank in Paris]. *Études rurales* (191): 193–220.

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The Seine for Paris: A Centuries-Old Link

Raphaël Morera

Abstract
The image of Paris is closely linked to that of the Seine, the river that flows through it and around which the city developed. The opening ceremony of the 2024 Olympic Games clearly highlighted this association. This article traces the history of this relationship over the centuries. It first describes the role of the Seine and its watershed in the growth of the city, then unravels the history of the river in the city itself before showing how, ultimately, Paris shaped the history of the Seine.

Policy Recommendations
- Engage diverse communities, including schoolchildren, in the region's cultural and environmental history.
- Raise awareness of the river's former uses through displays in public spaces.
- Develop deliberative practices in water management at all institutional levels.
- Promote easy access to the Seine and provide historical information along its banks.

KEYWORDS

Seine River
water governance
inland navigation
urban history
water management

WATER ICONS



< Fig. 1 Women's 10 km open water swimming event at the 2024 Summer Olympics on the Seine, Paris (Source: Chabe01, 2024. CC BY-SA 4.0, via Wikimedia Commons).

Introduction

Paris is the daughter of the Seine: It was built thanks to the river, both materially and politically. Its islands and the marshes of its floodplain provided shelter and food for prehistoric populations. By making Lutetia the first urban center of northern Gaul, the Romans took advantage of the Seine's benefits. Thanks to the river, goods and foodstuffs from the Paris basin could be gathered there to be consumed, processed and traded. This intrinsic link between Paris and its river was only undermined by the development of industrial modes of transport: first the train, then the road. Navigation, still present on the city's coat of arms, has undergone a process of invisibilization since flood protection became a priority for developers.

The current ecological crisis and the new needs expressed by city dwellers are significantly changing the stakes: Renewing the connection between Paris and the Seine is now a key political objective. In that perspective, this article aims to explain how this connection was established. How, in concrete terms, did the Seine create Paris?

The Seine, a Basin for Paris

Since Gallo-Roman times, the Seine has been the city's main artery (In the Seine 2024). Only the Vikings used it as an invasion route, launching attacks in the eighth and ninth centuries. In the twelfth century, Paris's expansion drew resources from across the Seine basin, particularly building materials. The cut stones used to build Notre-Dame came from the Oise and were transported by boat to Paris (Gély 2014). Similarly, river navigation made possible the city's supply of food and wine.

The river's role as a transport artery continued to grow over the centuries. In the mid-sixteenth century, Paris experienced a major crisis in its supply of firewood, as the forests closest to the city had been heavily exploited and hunting in the forests was very important to the king. To overcome this crisis, a merchant named Gilles Deffroissiz proposed to the municipality that wood cut in the forests of the Morvan massif, located 200 km east of the capital, be floated down the river (Lyon-Caen 2020). From 1549 until the end of the nineteenth century, this practice ensured that Parisians could bake bread and heat their homes, thereby maintaining the political stability of the city.

Between the seventeenth and nineteenth centuries, the Seine's importance was reinforced by the development of navigation canals connecting the Seine basin to that of the Loire, then the Rhône. The idea of extending the French capital's sphere of influence through waterways took hold at the end of the sixteenth century and became a reality during the reign of Henry IV with the launch of the construction of the Briare Canal, connecting the Loire and Seine basins (Pinsseau 1943). Completed in 1642, the Briare Canal was rapidly rivaled by the Canal d'Orléans, which opened in 1691, before being supplemented in the nineteenth century by the Canal de Bourgogne, connecting the Seine to the Rhône via the Loire and the Saône. Before the advent of railways and road transport, the Seine served as the primary means of supplying Paris, allowing its hinterland to extend beyond its own catchment area.

The Seine in Paris

The ground in medieval and modern cities is not impermeable: City dwellers live to the rhythm of the water table of their nourishing

river (Lyon-Caen 2020). The streets are muddy during the wettest periods and, conversely, very dusty, even unbreathable, when the water recedes. This close link between the Seine and Paris poses specific challenges in terms of urban policy. The streets must be cleaned and scrubbed regularly to remove the mud that forms. When the Seine swells too much and during periods of flooding, cellars fill with water and expel feces stored in pits. Conversely, during dry periods, it is necessary to spray the streets to keep the dust on the ground and then collect it. Since the end of the Middle Ages, Parisians have developed specific practices to organize life with the Seine.

The shape of the city also bears the mark of the central role played by navigation in Parisian life. From east to west, the banks of the Seine are equipped to receive and handle goods arriving in the city (Benoit 2000). The Place de Grève, now the forecourt of the Hôtel de Ville, is the heart of this economy. Located in the immediate vicinity of Les Halles, it is situated on the right bank of the river, along the widest and most easily navigable branch. The areas for unloading, storing and handling imported goods and foodstuffs were gradually moved elsewhere as the city grew and a process of socio-spatial specialization took place.

Eastern Paris specialized in receiving the heaviest and most voluminous materials (Backouche 2000). Wine and timber from Burgundy were stored on arrival on the right bank of the river, near the Quai de la Rapée and Bercy domain. The ports in the center of Paris were more likely to receive food products. To facilitate navigation and to control river flooding, the city regularly financed port development and the construction of quays, especially those that could be used to facilitate the mooring of boats. The monomialization of the city through the enlargement of the royal palaces, especially from the seventeenth century onward, accompanied this process of constraining the river within the city.

Access to the water of the Seine played a fundamental role in the city's economy (Font-Réaulx 2019). Thanks to concessions granted by the municipality, washerwomen were able to set up barrels to wash laundry entrusted to them (Le Roux 2018). Similarly, river water was regularly drunk by the poorest Parisians and by draught horses. In this sense, the discharge of pollutants was regulated by controlling the times of emissions, on the one hand, and the location of polluting activities on the other. Dumping toxic substances at night gave the river current time to carry them away, while locating tanners and slaughterhouses downstream from the city protected the watercourse.

Paris is the Seine

In medieval France, the nobility owned the land and the rights to it, as well as the men and women who worked it. The urban bourgeoisie relied on their expertise, commercial networks and control of the river. Beginning in the eleventh century, supervision of the Seine was entrusted to the Hanse League of Water Merchants (Le Maresquier-Kesteloot 2000). Their position as the main users of the river enhanced their importance, as the monarchy did not have enough agents or officers. Beginning in 1214, the League of Water Merchants collected duties on goods and foodstuffs entering the capital. The division of responsibilities changed in the thirteenth century, during the reign of Saint Louis. The centralization and strengthening of the monarchy was manifested in Paris in two developments: the creation of the Provostship of Paris to represent the king in the city, and by

the transformation of the Hanse League of Water Merchants into the Provostship of the Merchants, which was responsible for administering the city and its urban space. The practices devised and implemented by the bourgeoisie for managing the river thus formed the basis of the Parisian municipal government.

From this point on, the link between the municipal government and the river never weakened. The king's institutional creations always preserved the powers of the aldermen. In the fifteenth century, the creation of the civil and criminal lieutenancies did not encroach on these powers.

Similarly, in 1665, the creation of the general police lieutenancy preserved the aldermen's authority. Since the end of the Middle Ages, the king had nevertheless continually sought to encroach on the river jurisdiction of the Provost of Merchants by promoting urban projects and new actors, efforts which had repeatedly met with resolute and organized resistance. Engineering projects aimed at diverting the Marne or the Seine to prevent flooding or help clean up the city were continually blocked by the city authorities, who were keen to preserve their power and income (Lyon-Caen 2020).

Over the years, the city extended its authority over almost the entire course of the Seine, from Burgundy to the border of then Normandy. Limited to a few leagues around Paris in the Middle Ages, the aldermen strengthened their positions from the sixteenth century onward. The development of timber floating prompted them to intervene as far as Burgundy. The maintenance of infrastructure also led them to monitor structures far upstream on the Seine and its tributaries, including the Marne. This power was asserted in the eighteenth century with the launch of an exceptional cartographic campaign. In the 1730s, Abbé Delagrive was commissioned to draw up an atlas of the course of the Seine, focusing not only on the river itself but also, and above all, on the facilities that enabled navigation and land trade, such as ports and bridges (Delagrive 1736). Delagrive's work covered an area stretching from Mantes to the borders of Burgundy and Champagne, signifying the extent of the city's authority. The aldermen worked constantly to extend this authority without ever relinquishing their prerogatives within Paris. The supervision of the riverbanks was certainly shared for a time with the officers of the Water and Forestry Department, but by the eighteenth century, the city's monopoly was well established. The same was true for the management of wastewater and the main Parisian sewers, which remained firmly in the hands of the aldermen, who developed expertise and knowledge in this area that at the time was unrivaled.

Conclusion

The link between Paris and the Seine is not simply the product of nature or a chance encounter. The natural course and force of the river certainly made it possible to supply and grow one of the two largest European cities, but the Seine has nevertheless been continually transformed, developed and managed in order to make it useful and give it a fundamental social role. The river is thus akin to a product of the city, enabling it to extend its hinterland to its entire catchment area.

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References

Backouche, Isabelle. 2000. *La trace du fleuve: La Seine et Paris, 1750–1850* [The trace of the river: The Seine and Paris, 1750–1850]. Paris: Éditions de l'EHESS.

Benoit, Paul. 2000. "Ports et quais" [Ports and quays]. In *La Seine et Paris* [The Seine and Paris], edited by Béatrice de Andia. Action artistique de la Ville de Paris.

In the Seine: Objects Found From Préhistory to the Present Day. 2024. Archaeological Crypt of Paris.

Delagrive, Jean. 1736. *Description du cours de la Seine & des rivières et ruisseaux y affluans dont les cartes ont été levées sur les lieux par ordre de M. Le Président Turgot Prévot des marchands* [Description of the course of the Seine and its tributary rivers and streams, whose maps were surveyed on site by order of M. le Président Turgot, Provost of the Merchants]. Paris.

Font-Réaulx, Constance de. 2019. "From Water Carrier to Water Consumer." *Histoire & Mesure* 34 (2): 31–66.

Gély, Jean-Pierre. 2014. "Du centre carrier au centre urbain, stratégie d'approvisionnement en pierres d'appareil des chantiers de construction: l'exemple du Bassin parisien" [From quarrying center to urban center: Building-stone supply strategies for construction sites: The example of the Paris Basin]. In *Construire la ville: Histoire urbaine de la pierre à bâtir* [Building the city: An urban history of building stone], edited by François Blary and Jean-Pierre Gély. Paris: Éditions du CTHS.

Le Maresquier-Kesteloot, Yvonne-Hélène. 2000. "La Hanse des marchands de l'eau" [The Hanse of water merchants]. In *La Seine et Paris* [The Seine and Paris], edited by Béatrice de Andia. Action artistique de la Ville de Paris.

Le Roux, Thomas, and Raphaël Morera. 2018. "Blanchisseuses du propre, blanchisseurs du pur: Les mutations genrées de l'art du linge à l'âge des révolutions textiles et chimiques, 1750–1820" [Washerwomen of cleanliness, washers of purity: Gendered transformations in the art of laundry in the age of textile and chemical revolutions, 1750–1820]. *Genre et histoire* 22.

Lyon-Caen, Nicolas, and Raphaël Morera. 2020. *À vos poubelles citoyens! Environnement urbain, salubrité publique et investissement civique* [To your bins, citizens! Urban environment, public health and civic investment]. Champ Vallon.

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Paris and the Seine: An Anthropological Approach

Emmanuelle Lallement

Abstract
Based on urban and political anthropology research centered on Paris, I have developed an approach focusing on the dynamics of "heritagization," that is, the use of spaces, metropolitan transformations and their relationship with globalization, particularly as seen through the lens of tourism. The Seine, considered as a public space, constitutes a privileged entry point for thinking about the systems that reorganize the relationship between city dwellers and the city. The relationship between Parisians and the river is shaped by historical representations, everyday use and planning policies, which continuously reconfigure this urban space. My analysis focuses on three emblematic projects that reconfigure the relationship between Paris and the Seine in different ways: Paris Plage, Voies sur Berge and the redevelopment of the area around Notre-Dame. These cases reveal the political logics underlying the production of public space, balancing event-based gestures with lasting transformations, "heritagization" with accessibility and urban memory with future experimentation. The analysis highlights the tension between urban planning, political representations of the river and social practices in a city where public space is a stage, a resource and a symbol.

KEYWORDS

Paris
Seine
waterfront
public spaces
urban ethnography

WATER ICONS





Policy Recommendations

- A social science approach grounded in close, empirical fieldwork makes it possible to understand the many issues involved in reconnecting a city with its water.

< Fig. 1 Paris-Plage in Paris, one of the first edition (Source: Emmanuelle Lallement, 2003).

Introduction

My research is situated within contemporary and urban anthropology, as well as the anthropology of Paris and political anthropology. From these perspectives, I have conducted ethnographic fieldwork and analyses of the city, focusing primarily on Paris and its processes of "heritagization," that is, the use of places and urban events, metropolitan transformations and their relationship with globalization, particularly through tourism.

As Walter Benjamin's famously stated in *Images de pensée* (2011):

> If [...] human beings experience their greatest sense of freedom while strolling along a river, then the most refined form of flânerie — and consequently the most joyful — leads us back to the book and into it." For centuries, the ivy of learned pages has clung to the quays of the Seine. Paris is the great reading room of a library through which the Seine flows.

France is one of the most attractive city thanks to its French heritage.

Although I consider public swimming, my object of study is not swimming, but rather, the relationship to the Seine – understood as an issue of public space, design, and use, as well as an issue of social gathering and, consequently, of urban forms.

From an ethnographic standpoint and within a pragmatist perspective, I have examined various urban situations, such as planning operations, festive events and policies of urban reappropriation in public space. It is in this sense that the flagship summer operation Paris Plage might be understood – as an initiative that led to permanent developments such as the public space now known as Voies sur Berge, as well as heritage management within the city, such as the emblematic redevelopment project of the surroundings of Notre-Dame following the huge 2019 fire at the cathedral.

Within this framework, I examine three operations that reconfigure the relationship between Paris and the Seine, each according to a different modality. First, Paris Plage illustrates an event-based, festive and temporary approach to urban space, in which the river becomes a stage for the inversion of ordinary uses. I will argue that the project marks a turning point in municipal policy. I consider a development that partly resulted from Paris Plage, known as Voies sur Berge, which reflects a lasting transformation and a reconfiguration of mobility in favor of pedestrians and leisure. Finally, I focus on the redevelopment of the surroundings of Notre-Dame, which takes place in a context of strong constraints related to heritage projection and to issues of reappropriation of a highly symbolic urban space.

The trajectory I am concerned with begins with an ephemeral event that is repeated annually and presented as playful and summery. It then moves on to a heritage-centered and permanent project that transforms the heart of the capital. Finally, it concludes with an urban planning project that contributes to the transformation of Paris's river banks into leisure spaces. The proposed hypothesis is that each case sheds light on a way of reconnecting the city with the river. Through these three cases, I aim to examine the mechanisms of urban space production. How does the city negotiate its relationship with the river, whether direct or indirect, material or symbolic? How does the city balance the logics of celebration and conservation, event and permanence, rupture and



^ Fig. 2 First edition of Paris Plage (Source : Emmanuelle Lallement, 2002).

historical continuity? The analysis highlights the appropriation of public spaces and the tensions between urban planning, social uses and political representations of the river.

Paris Plage: Between Political Gesture, Urban Performance and the Creation of Public Space

Is Paris Plage a Political Beach?

From its inception, Paris Plage has been a local political project. Inspired by a similar initiative implemented in Saint-Quentin-en-Picardie in 2000, Paris Plage is an act of urban reconquest that aims to reclaim a space previously dominated by automobile traffic. It was the emblematic summer operation of Bertrand Delanoë's first term in 2001 as mayor of Paris. The decision to entrust the project's organization to the communications department rather than the urban planning or culture department clearly reveals its strategic scope. Paris Plage is as much a public event as it is a tool for transforming the city's image (fig. 1).

As early as 2002, the city commissioned a team of young scenographers to design an "urban beach" along the banks of the Seine. The chosen location for this transformation was highly symbolic: the Georges Pompidou expressway. Built in 1967 under President Pompidou, the expressway reflected a modernist vision of the city in which automobiles reigned supreme. Each summer since 2002, from mid-July to mid-August, municipal teams set up an impressive display: sand, palm trees, lawns, deck chairs, open-air cafés, climbing walls, a swimming pool, misting systems, a water maze, trampolines and a pétanque court.



^ Fig. 3 Paris Plage, children's activities (Source : Emmanuelle Lallement, 2003).

From its first edition, Paris Plage was presented as a democratic, inclusive space intended for Parisians, suburban residents and tourists. The question of inclusivity, accessibility and security for women in urban public spaces emerged during the first Paris Plage. Bertrand Delanoë defined it as a "convivial, popular, festive and civic" place, emphasizing its purpose of restoring universal access to the Seine. Over the years, the event has evolved. Having become an annual rendezvous, it is now an urban practice rather than an event in itself. This in no way precludes the controversies that accompany each edition of this significant media and political event. Critiques of Paris Plage have focused on the allocated budget, the promotional dimension of municipal policy and the symbol of an artificially designed city "drawn with colored pencils," as Rachida Dati once stated during a municipal council meeting.

Since 2002, Paris has hosted not one, but several Paris Plages. Each summer, the event extends to the Bassin de la Villette, on the Canal Saint-Martin in Paris, and unfolds as multiple beach scenes across the city. Each edition introduces novelties, such as a new theme, new locations and new activities. However, the founding principle no longer surprises. Media coverage of Paris Plages reflects this shift. Whereas the early editions made headlines, the event is now simply commented upon, illustrating its progressive banalization within the Parisian landscape. Beyond its festive nature, Paris Plages has always been conceived as a project to reappropriate public spaces. From the first edition, Bertrand Delanoë claimed the reconquest of the riverbanks, articulating a discourse rooted in Paris's historical memory and prospective urban vision.

The reference to the past is explicit: Reopening the riverbanks to pedestrians and leisure activities reconnects Parisians with a time when the Seine was fully integrated into their daily lives, whether in relation to work, transportation or



^ Fig. 4 Water games at Paris Plage (Source : Emmanuelle Lallement, 2005).

recreation. This initiative also aligns with the contemporary trend of temporary urban space appropriation, including impromptu picnics on Parisian bridges, weekend closures of the quays to cars for cyclists and rollerbladers, concerts during Fête de la Musique and artistic installations in unusual locations during Nuit Blanche.

However, Paris Plage is not limited to a nostalgic reading of the city's past. It also sparks reflection on the future of mobility and urban space usage. From the beginning, some have suggested that this temporary project may foreshadow a more permanent and radical transformation of the Seine's banks. These speculations were confirmed in 2012–2013 when the Voies sur Berge project definitively pedestrianized the riverbanks. The idea of removing automobile traffic from this central area sparked intense political and economic debate. After being voted on in May 2012 by the Paris City Council, the measure was initially suspended by the Fillon government, but then reinstated under President François Hollande. Despite resistance from several economic actors, such as MEDEF Île-de-France, which filed legal appeals denouncing the impact on traffic flow and accessibility for businesses and employees, it was ultimately inaugurated in June 2013.

Thus, Paris Plage retrospectively appears as a full-scale test of Paris's policy of pedestrianization. It is not merely a festive, temporary space, but rather a laboratory for urban experimentation preparing the city for a permanent transformation of its public spaces.

Paris Plage as a Work of Scenographic Creation

Reducing Paris Plage to a mere political gesture would be inadequate. The originality of this project lies in its creation context: It was not entrusted to urban planners or landscape

architects, but rather to scenographers from the fields of visual arts and theater. Since its very first edition, the agency Nez-Haut has designed the event, engaging in a genuine work of staging. The objective was not to produce a simple urban layout, but rather to invent the concept of an "urban beach." Furthermore, this beach does not resemble any existing model. As Jean-Didier Urbain has demonstrated, beaches are always abstractions, spaces composed of signs and symbols. Yet, nothing is more artificial than Paris Plage. It is not a Mediterranean beach, despite the presence of potted olive trees. Nor is it a Normandy beach, despite the striped cabins reminiscent of Deauville. It is not a seaside resort either, since it offers no direct access to the river.

The designers assembled a seaside landscape using the most emblematic stereotypes: sand, deck chairs, palm trees, pétanque and colorful huts. The goal is not to recreate an existing beach but to create an environment that immediately conjures the idea of a beach. Water plays a unique role in this setup: It is central, yet swimming is not possible. Unlike at a conventional seaside resort, where access to the sea is essential, water here was long presented in diverted forms, such as giant misting systems, water games and floating swimming pools. Until recently, no one swam directly in the Seine. However, the issue of swimming returned to the forefront with the developments linked to the Paris 2024 Olympic and Paralympic Games, which promised Parisians a highly symbolic legacy – the possibility of swimming in the Seine. Nevertheless, water remains an element of staging, a symbolic presence charged with political meaning rather than a genuine bathing space.

Paradoxically, the absence of the sea is precisely what makes Paris Plage work. The event is based on a playful inversion; it consists of creating a beach without a sea in a place that could never be a beach. This impossibility gives the event its full strength. Visitors are not merely passive users: they participate in a collective performance. The event only functions because everyone agrees to "play at the beach" without the sea. Thus, Paris Plage is not merely a temporary leisure space but rather a genuine urban performance in which everyone – consciously or not – becomes an actor within this scenography. This performative dimension undoubtedly explains the success and longevity of Paris Plage, extending far beyond its political and urban planning aspects.

Voies sur Berge: From Urban Highway to Reinvented, Playful Public Space

A Major Transformation of the Parisian Urban Landscape

Since 2012, Parisians and tourists alike have witnessed a profound and lasting transformation in the heart of the capital. After decades in which automobiles dominated urban planning, the Voies sur Berge have gradually transformed into spaces for strolling, leisure, and rediscovering the river. The Berges de Seine project was one of Bertrand Delanoë's last major undertakings before the end of his second and final term as mayor.

From the moment it was announced, the Socialist former mayor emphasized the project's revolutionary scope: "This is the face of Paris, offering a new way of experiencing the city and fulfilling the expectations of a great capital: dynamism, attractiveness and influence." This statement clearly expresses the ambition to make the riverbanks a central component of twenty-first century Paris. The riverbanks will

simultaneously serve as public space, an urban showcase and a symbol of the city's becoming less dependent on automobiles. The project targets the Voies sur Berges, a paradoxical space described as an "urban highway at the very heart of the city." Regarded by some as an emblematic piece of modern Parisian infrastructure and by others as an urban anomaly – a rupture in the city's fabric, a "scar" inherited from the triumph of automobile-centered modernity – they have long been seen as a form of heritage. Their transformation therefore goes beyond a simple planning operation. It constitutes a societal choice that reveals tensions surrounding new urban models. More broadly, the future of this space raises questions about the trajectory of contemporary metropolises engaged in transitioning to less congested, more livable urban centers.

A Political Battle: Between Urban Utopia and Social Resistance

The Voies sur Berges became the site of an intense political and ideological confrontation after their examination by the Paris City Council on February 8, 2011.The session during which the measure was put to a vote offers a unique opportunity to observe the creation of the city in both its material (infrastructure and transformation of public spaces) and symbolic (discourses, representations, and political struggles) dimensions. The debates reveal multiple, conflicting visions of the city. One vision is of a sustainable and "pacified city" (that is, a Paris without car traffic). Supporters of the project argue that it aligns with a logic of urban "renaturation," promoting a greener and more accessible city. However, ecologist representatives have regretted the lack of boldness and called for a more ambitious integration of biodiversity and ecological infrastructures.

The theme of the exclusionary city also appears. Right-wing opposition figures have accused the municipal government of promoting an elitist vision of Paris that neglects the needs of suburban commuters who rely on these roads for their daily travel. One elected official denounced a project that, in her view, creates a Paris that thrives along the Seine while more distant streets are overrun with rerouted traffic. Some described the project as an unrealistic utopia. An opposition councilor criticized the municipal government for promoting an idealized vision that is disconnected from social and economic realities: "Is the mayor of a global city meant to make people dream or be realistic? Paris must not become a leisure center." The intensity of these criticisms attests to the project's political significance. As the 2014 municipal elections approached, it was perceived not only as an urban planning issue but also as a political one. Yet, despite the controversy, the project was ultimately approved and began implementation in 2012.

Notably, the Voies sur Berge project was approved by the Paris Prefecture only on the condition that the development be reversible, after numerous political reversals that took place throughout Anne Hidalgo's first term and up until 2018. Reappropriation and reversibility appear to go hand in hand, as seen with the opening and requalification of Paris's former railway line, the Petite Ceinture. The decision to permanently close the quays to automobile traffic and transform them into spaces designated for strolling and leisure is based on the idea that they could revert to their initial state at any moment, or rather, with any change in political majority. This is a particularly illuminating metaphor for contemporary conceptions of time and how time is used in the city. Here, we are no longer dealing with the ephemeral, but rather, a form that claims to be "reversible."

Ultimately, the Voies sur Berges extend the logic of Paris Plage, turning a temporary, festive diversion into a permanent urban project. This raises a central question: How can a city reappropriate its river sustainably? The Paris 2024 Olympic and Paralympic Games represent the culmination of this process. The Seine is the central character of the opening ceremony, which was conceived by Thomas Jolly, one of the leading figures of French live performance. From a sporting perspective, the Games further highlight the river with events such as open-water swimming competitions. The river is now swimmable, and local authorities have succeeded in making it that way, a landmark achievement in the city's history.

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The Redevelopment of the Surroundings of Notre-Dame: Between Heritage Crisis, Appeal to Tourists and the Reinvention of Public Space

Heritage Crisis as Accelerator of an Urban Project

The project to redevelop the area surrounding Notre-Dame did not begin with the 2019 fire. In fact, the transformation of the Île de la Cité district was first discussed in 2016 in the Perrault–Belaval report, which was commissioned by François Hollande. The report proposed a comprehensive redefinition of public spaces, raising the question of how to balance heritage preservation, attractiveness to tourists and the daily practices of citizens. The objective was to redevelop the area by reestablishing connections with the Seine. However, the cathedral fire radically disrupted this trajectory. The urgency of restoration precipitated a project revision and generated strong political tension between the French state and the City of Paris. While Notre-Dame itself belongs to the state, its surroundings, particularly the parvis (the square in front of the cathedral), adjacent squares and Seine riverbanks, fall under the City of Paris's responsibility. Furthermore, this area is located within a UNESCO World Heritage Site, which complicates the arbitration process.

Therefore, the redevelopment must address multiple, overlapping challenges. First, there is a historical and heritage challenge: The site is emblematic, so its transformation must be inscribed in Parisian history. Second, it is a political and institutional challenge, given the tensions between the state, municipal authorities and international heritage protection bodies. Third, the tourism-related and economic challenges are considerable since Notre-Dame is one of the most visited sites in the world and a key driver of Paris's cultural attractiveness. Fourth, there is an urban and social challenge: The need to reintegrate this space into the daily lives of Parisians at a time when mass tourism tends to monopolize it. Finally, an ecological challenge has become central since the place in front of Notre-Dame is one of the city areas with the most pronounced urban heat-island effect. The parvis's impermeability, lack of vegetation and high concentration of people, especially in the summer, make it an intense heat zone that raises public health concerns.

A Multi-Stakeholder Urban Project: Between Heritage, Ecology and Social Adaptation

On April 15, 2021, the Paris City Council approved funding for a major transformation with a budget of €50 million. The project aims to restore a protective "setting" (*écrin*) for Notre-Dame. The project encompasses several areas, including the parvis and its underground spaces (such as the archaeological crypt and a two-level parking facility), the Jean XXIII and Île-de-France squares (extending to the tip of the island), the upper and lower Seine quays and the surrounding streets (including rue du Cloître-Notre-Dame, rue de la Cité and quai de l'Archevêché). The stated objective is to "completely rethink the site's reception, the



^ Fig. 5 The cathedral forcourt in construction, Notre Dame de Paris (Source: Emmanuelle Lallement, 2022).

management of flows, continuity with the Seine and vegetation."

As with the Perrault–Belaval project, the redevelopment plan is structured around two main objectives: "Bringing Parisians back to the cradle of Paris" and "welcoming large numbers of visitors (12 million each year) under improved conditions." One of the project's major challenges is transforming the hardscape parvis into a space more resilient to climatic challenges. Since the current parvis is a vast stone surface that functions as a heat island, the redevelopment must incorporate solutions involving vegetation and access to water. On 27 June 2022, the selected project was made public by a jury chaired by the mayor of Paris and including representatives from the public body responsible for the conservation and restoration of Notre-Dame Cathedral (EPRNDP) and the Diocese of Paris. The Bas Smets office designed the landscape component, the GRAU agency designed the architectural and urban planning aspects, and the Neufville-Gayet architecture firm designed the heritage dimension.

Similar to the Perrault–Belaval project, the award-winning Bas Smets proposal incorporates the objective of establishing a relationship with the Seine, enhancing the cathedral's façade, developing a pathway beneath the parvis, and revitalizing the surrounding public spaces, particularly the Jean XXIII square. Despite the similarity of objectives and challenges, the Bas Smets approach "stands out for its sobriety and prudence, thus offering a more restrained yet equally effective vision for enhancing this emblematic site." One of the project's most notable elements is a shallow water feature – a linear body of water – intended to cool the parvis and potentially accommodate uses that are not specified. The references to these uses remain ambiguous. It is unclear whether this feature is reminiscent of the water mirrors introduced along the Garonne riverbanks in Bordeaux in 2006 or the one installed on Place de la République in Paris following its redevelopment in 2013.

Conclusion

In conclusion, reconnecting the city with its river is an anthropological question concerning the relationship to water in urban environments. It sheds light on the political, social, economic and symbolic dimensions specific to contemporary urban production. The three projects analyzed here reveal different approaches to reappropriating the river. First, Paris Plage presents water in a form evocative of the sea and practices associated with seaside leisure; however, it remains inaccessible. This corresponds to the logic of urban "eventification," which is experienced each year as a celebration of the present. However, it has also become a recurring moment in which the city encounters itself.

Second, the Voies sur Berge redevelopment restores water's place within the urban experience without altering its accessibility. Here, we encounter the tension between permanence and reversibility in urban space. Finally, the water feature at Notre-Dame reintroduces water as a landscaped, sensory element, reinscribing the river within the heritage space. Here, the climatic challenge engages with the heritage crisis triggered by the Notre-Dame fire, creating a sense of permanence, or even eternity, within a sense of urgency.

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References

Backouche, Isabelle. 2016. *La trace du fleuve: La Seine et Paris* (1750–1850) [The trace of the river: the Seine and Paris (1750–1850)]. Paris: Éditions de l'EHESS.

de La Pradelle, Michèle, and Emmanuelle Lallement. 2007. "Paris Plage: célébrer un objet absent" [Paris Plage: celebrating an absent object]. In *Objets et mémoires*, edited by Octave Debary and Laurier Turgeon, 197–209. Paris: Éditions de la MSH.

Iosa, Ioana and Cosme Vallet. 2021. "Mises en lumière et zones d'ombre dans l'ouverture au public de la Petite Ceinture ferroviaire de Paris" [Highlights and blind spots in opening the Paris Petite Ceinture railway to the public]. *Les Cahiers de la recherche architecturale, urbaine et paysagère*. January 21. https://doi.org/10.4000/craup.6381.

Lallement, Emmanuelle. 2007. "Evénements en ville, événements de ville: vers de nouvelles ritualités urbaines ?" [Events in the city, events of the city: toward new urban ritualities?] *Communication & Organisation* 32: 26–38. https://doi.org/10.4000/communication-organisation.275.

Urbain, Jean-Didier. 2002 [1994]. *Sur la plage: Mœurs et coutumes balnéaires (XIXe–XXe siècles)* [On the beach: seaside customs and practices (nineteenth–twentieth centuries)]. Paris: Payot.

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Heritage Spaces and River Imageries: The Case of the *Guinguette*

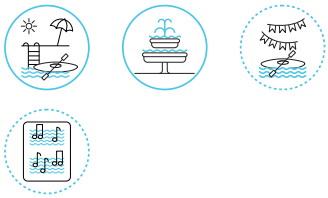
Olivier Aïm

Abstract
This article explores the "*guinguette*", a river heritage that is both rich and discreet. The *guinguette* has a long history of cultural practices associated with its peculiar location. In collective memory, the *guinguette* is a lively place of leisure, entertainment and popular conviviality. The history of the *guinguette* is tied to the varied trajectories shaping the cultural and economic development of urban river spaces. Numerous stakeholders in riverine culture have exploited this cultural imagery of an *art de vivre* by the water and have contributed in re-enchanting it in order to create new brands and new sites.

Policy Recommendations
- Public authorities at all levels (departments, regions, municipalities) should promote a rich cultural and popular heritage that remains undervalued in current cultural and public policies — namely the river heritage, in particular the ways of life associated with historical riverside practices such as open-air cafés and *guinguettes*.
- New forms of mediation, events, and cultural venues should be developed in order to revive these activities at accessible prices, reintegrating them into spaces that are increasingly shaped by contemporary and future environmental and social contexts.

KEYWORDS
guinguette
heritage
remediation
art de vivre
hospitality

WATER ICONS



< Fig. 1 The Flow disco and the Rosa Bonheur sur Seine guinguette on the Port des Invalides (Source: Bretwa, 2022. CC BY-SA 4.0, via Wikimedia Commons).

Introduction

The French language makes a logical distinction between the two terms "*rivière*" and "*fleuve*", rooted in geographical rhetoric: a "*rivière*" flows into another watercourse, which may be a "*fleuve*"; a "*fleuve*" flows into the sea. The images associated with the terms are very different, the words themselves tracing their origins back to two symbolic sources: "*fleuve*" comes from "flow" and "flood" ("*flumen*" in Latin), while "*rivière*" includes its banks and surroundings ("*ripa*" in Latin). Consequently, the meaning of "*fleuve*" is more abstract. The French poets have widely designated the abstract connotation of the term "*fleuve*" as the Rimbaldian principle of "impassibility," which the French poet Victor Segalen expands to the "lyrical quality *par excellence*, which is the voluble expression of oneself," in the sense that the "*fleuve*" is the "only one of the great natural elements that is never opposed or fought by its brothers" (Equipée 1915). In French, the adjective "fluvial" applies to both "*rivière*" and "*fleuve*", and thus seems to neutralize the opposition between these two types of watercourses. This blurring of boundaries between the flow and the banks opens up the imaginative possibilities in the discourse, toward a generally "enchanted" topography. The description of new urban development projects will borrow extensively from such discourses, according to Fanny Romain (2014).

Fluvial Imaginaries and Cultural Heritage

In the framework of this article, it seems possible to understand the meanderings of this imaginary world from the perspective of the heritage of the "*guinguette*", specifically the activities which have become associated with it in collective and cultural memory since the nineteenth century. Whether on the banks of the Seine, the Marne or the Oise, the *fleuve*/*rivière* difference has lost its relevance. What rather matters is a set of artistic and expressive productions linked together by values associated with the peaceful time spent next to the water and the leisure activities allowed by its proximity. From the mid-nineteenth century through to the mid-twentieth century, the river experience became a recurrent motif in painting, music, and subsequently in film, in forms that are both classical (the *locus amoenus*) and popular (the ball, the song, white wine, swimming, etc.). A metonymic expansion of practices, objects and discourses further reinforces the imagery associated with the *guinguette*: the waltz-musette and its accordions, the little white wine and its songs, swimming and its pontoons.

But a contemporary examination of the trajectories, circulations and evolutions of this fluvial imagery offers a more surprising and perhaps even more complex history of its ongoing appropriation. The *guinguette* as a "way of life" constitutes a truly paradigmatic case for the cultural and heritage theory of remediation (Bolter and Grusin 1998).

First, although intimately associated with the idea of a "*fleuve*" or "*rivière*", the *guinguette* was an establishment that came from a different urban legacy: that of the city's border. Directly linked to the expansion of Paris in the mid-nineteenth century, the *guinguette* was a space of opposition that defined itself as "other," or rather "against" the norm that the city represented. Rebelling against the requirement of the "*octroi*" – a municipal tax on the passage of goods within the metropolis – which weighed heavily on the circulation of wine, the *guinguette* was above all a cabaret built against the boundaries of the city, the official economic

borders erected to control the proper payment of this tax. Askew and makeshift, the early *guinguette* attached itself to the city almost on the sly, allowing the population to drink the cheaper wine that had escaped the municipal tax. Then, the expansion of railways and new modes of travel to the suburbs gradually relocated the *guinguettes* to other suburban spaces, before choosing the banks of the Seine and the Marne, thanks to the activities these two rivers allowed, starting with the joys of boating (Csergo 2004). Pre-existing boats, called "*coches d'eau*," were used to transport drinkers and dancegoers to these riverside water houses. The rise of the Popular Front, paid holidays and leisure activities only consolidated and expanded this practice of Sunday travels to the waterfront.

Thus, social, economic and cultural determinants forcefully intersected to construct a new landscape where the river symbolically replaced the barrier as the limits against which popular leisure spaces were erected. These determinations operated as mediations that, in Walter Benjamin's terms, "expressed themselves" (Benjamin 1989), by producing representations and imaginaries that take root in the remembrance of cultural practices.

During the 1960s, however, when the Marne and the Seine stopped being possible spaces for swimming and frolicking, the era of the *guinguettes* seemed to come to an end and to sink into the silts of the past. Small lost dance halls and now-closed or ghostly establishments are evoked as memories or walked through like so many ruins.

Fast forward to today, the time of remediations. And it is above all the riverine imagery of the *guinguette* that is revived as part of a local and touristic strategy of territorial development. Since the 1980s, the Marne in particular has been remembering the time of its "little white wine" and its musette balls. Cities are naming their promenades and squares after figures from this past, recast as cultural heritage. Nogent-sur-Marne, Joinville Le Pont, Champigny-sur-Marne establish strategies of revalorization of their Marne banks. Establishments are reborn in the form of a simple remediation, a restoration, or a renewal under a new guise. Since the 2000s, an acceleration of this process of remediation has been observed on the Seine, with a number of restaurants occupying new strategic locations near the river. These are mainly barges that have adopted the name "*guinguette*" so that they can open in the hearts of cities now that the municipal tax system of the *octroi* is no longer in place. This is the case with the restaurant Rosa Bonheur, which opened in 2008 in Paris in the Parc des Buttes Chaumont, then in Asnières-sur-Seine and Vincennes. These are "four joyful and modern *guinguettes*" that claim to be "worthy heirs to the Marne riverside *guinguettes* with their *Déjeuner sur l'herbe atmosphere*" in order to "modernize this tradition."

The imaginary unfolds, reinvents itself, and takes new shape as the water — and time — continue to flow. The "*guinguette*" is symbolically reinvented and becomes part of a "labelling effect," a common occurrence in today's cultural industries devoted to the *art de vivre*. This means that new unfoldings take place, away from rivers and streams, and back to the traces of the first barriers. The aim is to restore Parisian cafés to the transmuted value of popular culture. But the movement is not only centripetal. The name "*guinguette*" and its fluvial imagery are leaving the banks of Parisian suburban towns to invest in other metropolises. More surprisingly, the *guinguette* and its remediated imagery are gaining new territorial

spaces: the citadel of Ajaccio in the heart of the capital of Corsica, the vineyards of Bordeaux, the small villages of France.

Conclusion

Territories are not only geographical, but also commercial: highly rated department stores such as Le Bon Marché are acquiring their own *guinguettes*, while the food industry displays *guinguette* iconography on the labels of new sparkling drinks. The *guinguette* itself is thus becoming a symbolic territory likely to be captured by retailers and brands. Returning to the initial semantic approach, one could say that the *guinguette* carries a heritage imagery that is not simply remediated but constantly undergoes derivations, in the grammatical sense, drifting from one symbolic bank to another.

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References

Argyriadis, Kali, and Sara Le Menestrel. 2003. *Vivre la guinguette*. Paris: Presses Universitaires de France.

Benjamin, Walter. 1989. *Paris, capitale du XIXe siècle: le livre des passages*. Edited by Rolf Tiedemann. Translated by Jean Lacoste. Paris: Éditions du Cerf.

Bolter, Jay David, and Richard Grusin. 1998. *Remediation: Understanding New Media*. Cambridge, MA: MIT Press.

Csergo, Julia. 2004. "Parties de campagne: Loisirs périurbains et représentations de la banlieue parisienne, fin XVIIIe–XIXe siècles" [Country outings: Peri-urban leisure and representations of the Paris suburbs, late eighteenth to nineteenth centuries]. *Sociétés & Représentations* 17 (1): 15–50.

Romain, Fanny. 2014. "L'imaginaire fluvial contemporain: un antidote urbain?" *Projets de paysage* 10. https://doi.org/10.4000/paysage.11836.

Segalen, Victor. 1983 [1929]. *Equipée*. Paris: Gallimard.

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The Place of Nature in Preserving Cultural Heritage and Reconnecting Citizens with their Environment: A Microscopic Approach

Sahima Hamlaoui & Maria Cellamare

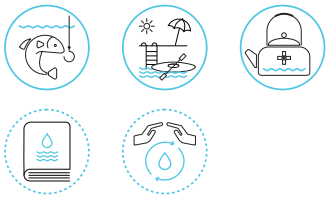
Abstract

Because of their historical and architectural richness, since 1991 the banks of the Seine in Paris have been listed as a UNESCO World Heritage Site. According to UNESCO, the definition of the historic urban landscape (HUL) emphasizes the interdependence between cultural heritage, the natural environment, and the evolution of urban life. However, underwater, the Seine River abounds of microscopic life constituted by phytoplankton organisms that are essential to aquatic ecosystems. Revealing this invisible life can help raise public awareness of the importance of the living as a natural heritage – similar to cultural heritage. The HUL approach should recognize the value of these autotrophic (self-feeding) microorganisms and the ecosystem services they provide. Several activities within a citizen science project offer the possibility to raise public awareness through plankton observation workshops. This approach also engages citizens in the protection of natural heritage for future generations.

KEYWORDS

Seine River
natural heritage
phytoplankton
biodiversity
citizen science

WATER ICONS



Policy Recommendations

- Integrating phytoplankton into the HUL approach is key to respond to current environmental challenges. The invisible biodiversity of the Seine provides an emblematic case study, positioning Paris as a living HUL laboratory where heritage and ecological dynamics overlap.
- A multidisciplinary framework, supported by reliable institutional resources and appropriate infrastructure, is essential for effectively engaging stakeholders and citizens in participatory aquatic biodiversity projects. Strategic investment and funding support are crucial to generate valuable conservation data, enhance scientific impact, and strengthen the resilience of both natural and urban ecosystems.

< Fig. 1 Moss-covered masonry along the Canal St Martin (Source: Carola Hein, 2025).

Introduction

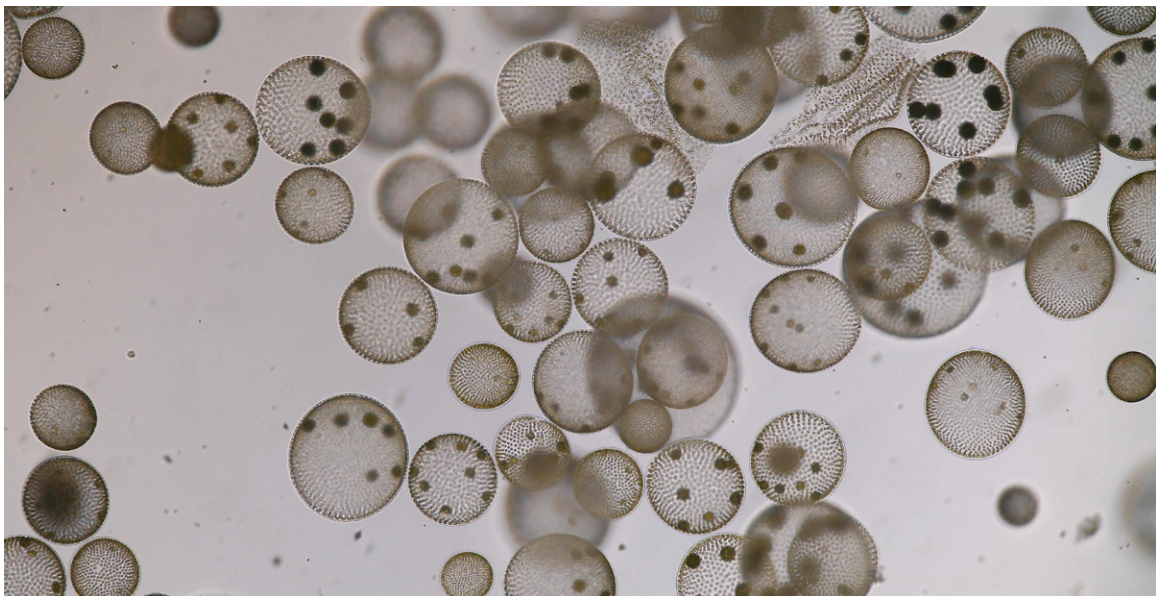
The heritage urban landscape (HUL) is a holistic approach to the management and conservation of historic urban landscapes, integrating cultural, natural and social values (UNESCO 2011). Especially in "water cities," HUL provides crucial support to cope with the consequences of human activities, including pollution, habitat modification and climate change. These environmental pressures have a considerable impact on biodiversity and must encourage citizens to reconnect with their environment and rethink their relationship with urban heritage (Hein et al. 2020). In this way, it is essential to reveal the value of ecosystems and the services they provide to society (Bull et al. 2016; Ferreira et al. 2023), raising citizen awareness about the need for protection.

Due to their historical and architectural richness, since 1991 UNESCO has classified the banks of the Seine as World Heritage. Yet, in addition to the beauty of the landscape that encompasses the Seine, the river is home to many interacting organisms that range from macroscopic to microscopic. Within this last group, photosynthetic microorganisms represented by the phytoplankton provide essential ecosystem services (e.g., base of the food web, oxygen producer, water quality bioindicator) and contribute significantly to the aquatic biodiversity (Naselli-Flores and Padisák 2023). Besides its ecological importance, the phytoplankton is also beautiful – and this beauty can evoke an emotional response that enhances awareness of our connection to our environment, both urban or natural.

Several authors have developed an experiential and affective approach (approche sensible) to environmental education programs (Planche 2018; Tavormina and Jackiewicz 2023), recognizing the potential of emotions to give meaning to action. This approach may be especially helpful when dealing with visible biodiversity. When dealing with biodiversity that is not visible to the naked eye, we can use tools to apprehend it and allow participants to feel immersed in what would otherwise be an invisible world.
Through the citizen science project "Planktonautes d'Île-de-France" (PiF), we are implementing the Plankton Planet program (De Vargas et al. 2020, 2022) in collaboration with the French National Museum of Natural History in Paris. This program, initially designed to study marine plankton, consists in the use of simple tools and protocols to train citizens to collect, observe and identify plankton. We use the same methodology in the PiF project to inventory freshwater plankton in Île-de-France, the region of France that contains Paris.

Before launching the PiF project described above, the first step is to raise public awareness of invisible biodiversity through plankton observation workshops. Through a sensory and experiential approach, citizens discover the invisible life they encounter every day. Gaining knowledge of biodiversity can help citizens reconnect with their environment, eliciting a strong sense of belonging and connection with nature, as well as changing behavior and attitudes (Booij and Shearer 2025). Thanks to the innovative and easy-to-handle Curiosity microscope (SeaLabX®, Plankton Planet), we can introduce plankton to audiences in diverse locations. In addition, following the observations, the workshop concludes with art-based activities to make tangible the connection between participants and the microscopic world.

The phytoplankton of the Seine offers an important opportunity to reconnect local communities to their environment through citizen science and to promote the role of nature in the



^ Fig. 2 Green freshwater microalgae *Volvox* collected from an outdoor pond at the Tropical Aquarium of the Palais de la Porte Dorée in Paris. *Volvox* colonies mesure 170-850 µm. Image taken with the Curiosity microscope, SeaLabX® (Source: Sahima Hamlaoui and Maria Cellamare, 2025).

HUL approach. Here we present various actions we have taken to raise public awareness during the preliminary stage of the PiF project. We also propose a framework integrating phytoplankton as a connecting element within the HUL context.

Methodology

The PiF project sets up plankton observation techniques using easy-to-use tools: plankton nets and the Curiosity microscope (SeaLabX®, Plankton Planet). The Curiosity is an ultra-compact and highly intuitive digital microscope. It was developed by the French company SeaLabX® for Plankton Planet program and Tara Ocean expeditions (de Vargas et al. 2020). It is specifically designed for citizens sciences and is very easily accessible to the general public. Its small size and ease of use make it a practical tool for observations during outdoor excursions. Plankton samples can be observed on the screen using the camera app on the connected device. The average cost of a kit is €1,500 (ex. VAT), though multiple configuration options are available.[1]

In our plankton workshops, field trips are proposed to the public to collect plankton and make microscopic observations (fig. 2). The observations are uploaded on the website iNaturalist that allows the sharing of data and contributes to knowledge of biodiversity (Mason et al. 2025).

Know-how transmission

Thanks to easy-to-use tools and the simplification of scientific concepts and knowledge

1. Visit for details: https://curiositymicroscope.org/en/get-a-quote/.

is possible to make them accessible to participants and audiences who are unfamiliar with science. Thus, during the workshops we use the following approaches to raise public awareness about the importance of phytoplankton in ecosystems:

- Phytoplankton produces more than 50 per cent of the oxygen we breathe (the rest is produced by terrestrial plants, macroalgae, etc.) through photosynthesis (Field et al. 1998; Mondal et al. 2022). This means that one of every two breaths is possible thanks to these microscopic organisms. Taking a breath in and out is a simple gesture that helps participants understand the importance of phytoplankton in everyday life.
- Phytoplankton organisms, known as primary producers, are the basis of food webs. With a brief role play performed by three groups from the audience representing each of the different biological compartments (phytoplankton, zooplankton, fishes), we explain how important phytoplankton is in aquatic ecosystems and how the slightest change in its structure has repercussions on the dynamics of the upper levels (zooplankton, benthic fauna, fish, birds) (Hulot et al. 2000).
- Phytoplankton is also an excellent bioindicator as it reacts rapidly to changes in the environment. Due to its short generation time, this element is among the first to respond to water quality changes (Cellamare et al. 2011). Given that some species show preferences for clean or polluted environments, our observations during the workshop can provide information about a site's water quality.
- Participants also have the opportunity



^ Fig. 3 Phytoplankton sampling in the Seine, below the IEA at Quai d'Anjou (a), microscopic observation (b, c) and screen-printing workshop (d). (Source: Sahima Hamlaoui and Maria Cellamare, 2025).

to handle the Curiosity microscope. This gives them confidence and the ability to use the tool independently.

These workshop exercises allow participants to understand that life on earth depends essentially on organisms invisible to the naked eye – even if many participants have never heard about phytoplankton before the workshop. After the microscopic observations, we offer a variety of art-based activities, including screen printing using ancient plates, drawing, origami, vegetal compositions and plays.

We have been able to vary our methods to fit different occasions and audiences, including specialists, schoolchildren and general public:

1. Following the conference (Re)Connecting River and City – The Seine in Paris and Île-de-France, held in March 2025, we proposed a plankton workshop to the organizer, Carola Hein (fig. 3). This involved taking a water sample from the Seine, below the Institute for Advanced Study (IEA, Paris) and observing the phytoplankton using the Curiosity microscope. This experience was a trigger in our reflection about the importance of living organisms such as phytoplankton in the HUL approach. To mark the occasion, we offered a screen-printing workshop with a plate used on a publication on cyanobacteria from the Seine (Couté 1979) – a little nod to the beauty and artistic potential of phytoplankton (fig. 4).
2. As part of the environmental awareness and education component of the PiF project, in May 2025, we offered a presentation on plankton's essential role on the planet for schoolchildren at a school near the Seine. Then, using the Curiosity microscope, students were able to discover the plankton that we collected from the river near to the Eiffel tower (fig. 5a, b). They took turns handling the microscope and taking a closer look at the microscopic life that thrives in the Seine and performed a role play about the aquatic food web.
3. In the context of the 47th Session of the UNESCO World Heritage Committee in July 2025, we gave a presentation entitled "The Place of Nature for Preserving Cultural Heritage: A Microscopic Approach" to a multidisciplinary audience constituted by historical heritage specialists such as architects, urban planners, archivists, among others (fig. 6a, b). Our contribution dealt with the ecosystem's services provided by photosynthetic microorganisms (MEA 2003, 2005) including phytoplankton (in the water column) and phytobenthos



^ Fig. 4 Screen-printing made with the original plates used on the article (Source: Alain Couté, 1979).



^ Fig. 5 Phytoplankton sampling in the Seine near to the Eiffel tower at Port Debilly (a) and plankton workshop for primary school students (b) (Source: Sahima Hamlaoui and Maria Cellamare, 2025).

(associated with the substrate). After the working session, participants were invited to collect plankton in the Seine and observe the microscopic life of the river (fig. 6c, d).

4. At the Goethe-Institut France in Paris, we organized in September 2025 an event for the general public (employees or members of the institute and retirees) entitled "Living with Water: Heritage, Biodiversity, and Nature-Based Solutions." It consisted of a guided walk along the Seine (fig. 7a, b), followed by a discussion with Carola Hein. We, in turn, made a presentation to the participants about the importance of life in the river, particularly plankton. We collected plankton and observed it during a discovery workshop at the Goethe-Institut (fig. 7c, d).

Discovering the Seine's Invisible Biodiversity and Investigating Water Quality

Previous studies have showed that the phytoplankton in the Seine River is highly diversified (at least 209 species) and dominated by green (Chlorophyta) and blue-green algae (Cyanobacteria) (Lefèvre 1943; Tuffery 1971; Cardinal 1979; Couté 1979). In the workshops we observed samples from three stations in the river. Generally, phytoplankton diversity was high and dominated by the diatoms *Melosira varians*, *Nitzschia sigmoidea* and *Aulacoseira ambigua* (fig. 8). Most of the species observed in the Seine are common in nutrient-rich environments. Long-term sampling and several stations along the river are needed to better describe the system's water quality.



^ Fig. 6 UNESCO meeting as part of the 47th Session of the UNESCO World Heritage Committee Session (a, b) and plankton workshop at Port de la Bourdonnais (c, d) (Source: Sahima Hamlaoui and Maria Cellamare, 2025).

From Citizen Science to the Protection of Heritage Urban Landscapes (HUL)

The various activities we have conducted have allowed us to share scientific knowledge with participants and help them appreciate the Seine's invisible biodiversity. In this first phase of the PiF project, by integrating "sensitive" and microscopic approaches, we were able to capture the public's attention and connect them with nature.

The Curiosity microscope, with its user-friendly and ergonomic design, allows participants not only to discover the microscopic world, but also to feel confident using the tool. This gives them a sense of belonging and allows them to become fully involved in the action. Changing scale through the microscopic approach helps people change their perspectives, better understand invisible biodiversity and become more aware of the need for protection.

Citizen engagement to protect biodiversity

The PiF project seeks to engage and train students and teachers at Paris schools located near the river, developing their knowledge of freshwater plankton. Our plan is to label the schools participating in the PiF project as "École Sentinelle de la Seine" (Seine Sentinel School). The young "Parisian planktonauts" will participate in the ecological monitoring of the river and will be able to act as guardians of their heritage. This initiative will contribute to the ongoing process of rehabilitating the Seine that



^ Fig. 7 Event at Goethe-Institut France in Paris, which included a guided walk and plankton sampling along the Seine at Port de la Bourdonnais (a, b) and workshop at the institute (c, d) (Source: Sahima Hamlaoui and Maria Cellamare, 2025).

was initiated before the 2024 Olympic Games. That rehabilitation process and the subsequent opening of public bathing sites along the Seine have created a swell of interest in public health and river water quality. We hope to build on this momentum and develop greater interest in river ecology.

Enlarging the HUL approach

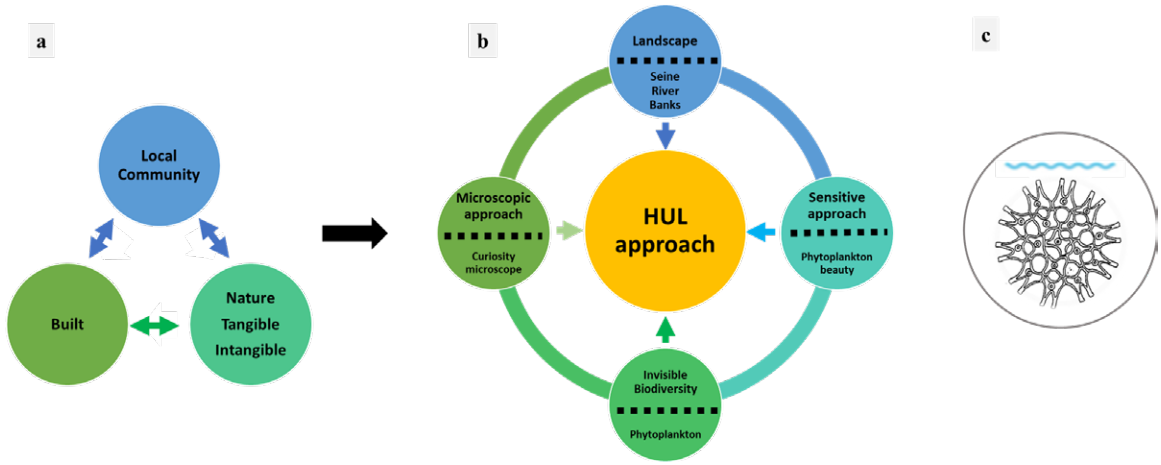
According to the recommendation on the HUL approach (UNESCO 2011), the conservation of historic urban landscapes should take into account the interactions between the built environment, the natural environment, and the local community (Hosagrahar 2021) (fig. 9a).

This recommendation marked a shift away from exclusive attention to preserving the physical environment and emphasized the importance of the entire human environment with all of its tangible and intangible qualities (UNESCO 2011). Phytoplankton can be considered intangible because it is invisible to the naked eye.

Tools such as a microscope are needed to see it. As long as we cannot see it, it does not exist. In fact, most people are unaware of its existence. Given the ecosystem services phytoplankton provides to society, as an intangible element, it offers an opportunity to enlarge the HUL approach. Our experience has enabled us to highlight plankton's potential to reconnect



^ Fig. 8 Most representative phytoplankton taxa of the Seine River, sampled on July 12, 2025 at Port de la Bourdonnais: *Nitzschia* (a, f), *Desmodesmus* (b), *Amphora* (c), *Closterium* (d), *Gyrosigma* (e), *Surirella* (g, y), *Staurastrum* (h), *Micractinium* (i), *Actinocyclus* (j), *Phacus* (k), *Pandorina* (l), *Ulnaria* (m), *Cymbella* (n), *Cocconeis* (o), *Aulacoseira* (p, u), *Eudorina* (q), *Monactinus* (r), *Fragilaria* (s), *Tetradesmus* (t), *Oscillatoria* (v), *Melosira* (w) and *Iconella* (x) (size between 5 µm and 500 µm) (Source: Sahima Hamlaoui and Maria Cellamare, 2025).



^ Fig. 9 HUL diagram according to Hosagrahar (2021) (a), proposal including the phytoplankton in the HUL approach (b) and icon representing the phytoplankton (c) (Source: Sahima Hamlaoui and Maria Cellamare, 2025).

citizens with nature. In our view, taking invisible biodiversity into account makes the intangible aspect concrete and contributes to the development of a more holistic HUL approach (fig. 9b, c).

It is difficult to imagine Paris without the Seine, or the Seine without all the monuments that line its banks. In the same way, it would be reductive to consider Paris and the Seine as just a collection of buildings and a channel of water in the heart of the city. The built environment, monuments and the natural ecosystems they contain constitute a model in constant evolution. This heritage must be transmitted to future generations, not as museum relics but as living, changing models of adaptability (Hosagrahar et al. 2016). This idea echoes that of Booij and Shearer (2025), who describe cultural heritage as a process rather than a finished, unmoving product. This is how we can better respond to the Sustainable Development Goals for 2030 (Hosagrahar et al. 2016), which aim to make cities more resilient and sustainable by enhancing efforts to preserve and protect our common cultural and natural heritage.

Ecology, Architecture, and History

Through an in-and-out perspective, the microscopic approach reveals an analogy between the urban heritage of Paris and the living natural heritage of the Seine. While the urban heritage, through architecture, displays successive and superposed layers of history, photosynthetic microorganisms constitute a living heritage in perpetual motion. Phytoplankton, because of its dynamic nature, provides information on the current ecological state of the river as well as on conditions encountered along its course. In addition, the built environment (facades, foundations, statues) is often colonized by biofilms (phytobenthos) that develop on damp surfaces (Hoffmann 1989). Owing to its fixed nature, this other photosynthetic group records layers of local biodiversity over time. For example, benthic diatoms play a key role in paleolimnology (Dixit et al. 1992; Stoermer and Smol 1999; Griffiths et al. 2022), as they allow the study of the historical local evolution of aquatic ecosystems, including ecological status assessment and the effects of climate change. Together, these two ecological compartments – the mobile phytoplankton and the surface-attached phytobenthos – constitute veritable living archives and can also serve as predictive models for studying the evolution of aquatic ecosystems. This invisible biodiversity of the Seine River is a common good and a heritage that must be protected for future generations.

Conclusion

While the world of water is mainly associated with science, engineering, and management, urban heritage is directly linked to culture, preservation, and architecture. An interdisciplinary approach is needed to address contemporary challenges. It is essential to integrate these disciplines in order to better coexist with nature and urban heritage (Hein et al. 2020).

More than ever, scientists and civil society must work together through citizen science to protect and conserve the natural heritage of the Seine River. We need interdisciplinary efforts (involving architects, artists, historians, philosophers, politicians, economists, etc.) with the support of institutions to recognize the importance of ecosystems and the services they provide. Awareness-raising projects like the “Planktonautes d’Île-de-France” deserve the support of foundations, research institutes, public organizations, and non-governmental organizations.

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Partnership & Useful Links

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https://planktonplanet.org/
https://planktonplanet.org/2025/06/29/pif/
https://curiositymicroscope.org/

Planktonautes d'Île-de-France (PiF) · iNaturalist:
https://www.inaturalist.org/projects/planktonautes-d-ile-de-france-pif

PHABB project: https://mcam.mnhn.fr/fr/node/6680



References

Booij, Hanneke, and Ingrid Shearer. 2025. "Creating Narratives of Resilience and Connection through Histories of Urban Environmental Decline and Recovery: The West Boathouse Project." *Scottish Historical Review* 104 (2): 323–47. https://doi.org/10.3366/shr.2025.0724.

Bull, Joseph William, Niels Jobstvogt, Anne Böhnke-Henrichs, Alexandra Mascarenhas, Niki Sitas, Catherine Baulcomb, Claire K. Lambini et al. 2016. "Strengths, Weaknesses, Opportunities and Threats: A SWOT Analysis of the Ecosystem Services Framework." *Ecosystem Services* 17: 99–111. https://doi.org/10.1016/j.ecoser.2015.11.012.

Cardinal, Catherine. 1979. "Algues planctoniques du bassin de la Seine (à l'exception des Cyanophycées et des Diatomées)." *Bulletin du Muséum national d'histoire naturelle* Paris, 4e série, 1, section B, n° 4: 285–327.

Cellamare, Maria, Soizic Morin, Michel Coste and Jacques Haury. 2011. "Ecological Assessment of French Atlantic Lakes based on Phytoplankton, Phytobenthos and Macrophytes." *Environmental Monitoring and Assessment*, 184: 4685–4708. https://doi.org/10.1007/s10661-011-2295-0.

Couté, Alain. 1979. "Cyanophycées planctoniques du bassin de la Seine." *Bulletin du Muséum national d'histoire naturelle*, Paris, 4e série, 1, section B, n° 4: 267–83.

de Vargas, Colomban, Noan Le Bescot, Thibaut Pollina, Nicolas Henry, Sarah Romac, Sébastien Colin, Nils Haëntjens et al. 2022. "Plankton Planet: A Frugal, Cooperative Measure of Aquatic Life at the Planetary Scale." *Frontiers in Marine Science* 9: 936972. https://doi.org/10.3389/fmars.2022.936972.

de Vargas, Colomban, Thibaut Pollina, Sarah Romac et al. 2020. "Plankton Planet: 'Seatizen' Oceanography to Assess Open Ocean Life at the Planetary Scale." *bioRxiv*. https://doi.org/10.1101/2020.08.31.263442.

Dixit, Sushil S., John P. Smol and John C. Kingston. 1992. "Diatoms Are Powerful Indicators of Environmental Change." *Environmental Science & Technology* 26 (1): 22–33. https://doi.org/10.1021/es00025a002.

Ferreira, Verónica, Ricardo Albariño, Aitor Larrañaga, Carri J. Leroy, Frank O. Masese and Marcelo S. Moretti. 2023. "Ecosystem Services Provided by Small Streams: An Overview." *Hydrobiologia* 850 (12): 2501–35. https://doi.org/10.1007/s10750-022-05095-1.

Field, Christopher B., Michael J. Behrenfeld, James T. Randerson and Paul Falkowski. 1998. "Primary Production of the Biosphere: Integrating Terrestrial and Oceanic Components." *Science* 281 (5374): 237–40. https://doi.org/10.1126/science.281.5374.237.

Griffiths, Katherine, Adam Jeziorski, Dermot Antoniades, Marieke Beaulieu, John P. Smol and Irene Gregory-Eaves. 2022. "Pervasive Changes in Algal Indicators since Pre-Industrial Times: A Paleolimnological Study of Changes in Primary Production and Diatom Assemblages from ~200 Canadian Lakes." *Science of The Total Environment* 838, part 2 (10 September): 155938. https://doi.org/10.1016/j.scitotenv.2022.155938.

Hein, Carola, Henk van Schaik, Diederik Six, Tino Mager, Jan J. C. A. Kolen, Maurits Ertsen, Steffen Nijhuis and Gerdy Verschuure-Stuip. 2020. "Introduction: Connecting Water and Heritage for the Future." In *Adaptive Strategies for Water Heritage: Past, Present and Future*, edited by Carola Hein, 1–18. Cham: Springer. https://doi.org/10.1007/978-3-030-00268-8_1.

Hoffmann, Lucien. 1989. "Algae of Terrestrial Habitats." *Botanical Review* 55: 77–105.

Hosagrahar, Jyoti. 2021. "Water, Ports and UNESCO's Historic Urban Landscape Approach." YouTube video, December 2021. https://www.youtube.com/watch?v=Jc5d8Mk47RE.

Hosagrahar, Jyoti, Jeffrey Soule, Luigi Fusco Girard and Andrew Potts. 2016. "Cultural Heritage, the UN Sustainable Development Goals, and the New Urban Agenda." *Bollettino del Centro Calza Bini - Università degli Studi di Napoli Federico II*, 16 (1): 37–54.

Hulot, Florence, Gérard Lacroix, Françoise

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Lescher-Moutoué and Michel Loreau. 2000. "Functional Diversity Governs Ecosystem Response to Nutrient Enrichment. *Nature*, 405: 340–44. https://www.nature.com/articles/35012591.

Lefèvre, Maurice. 1943. "Contribution à la connaissance du phytoplancton du Bassin de la Seine." *Extrait des Cahiers de la Commission du Bassin de la Seine*, Cahier n° 3.

Mason, Brittany M., Thomas Mesaglio, Jackson Barratt Heitmann, Mark Chandler, Shawan Chowdhury, Simon B. Z. Gorta, Florencia Grattarola et al. 2025. "iNaturalist Accelerates Biodiversity Research." *BioScience* 75 (11): 953–65. https://doi.org/10.1093/biosci/biaf104.

Millennium Ecosystem Assessment (MEA). 2003. *Ecosystems and Human Well-Being: A Framework for Assessment*. Washington, DC: Island Press.

Millennium Ecosystem Assessment (MEA). 2005. *Ecosystems and Human Well-Being: Synthesis*. Washington, DC: Island Press.

Mondal, Sudeshna, Guruprasad Samanta and Manuel De la Sen. 2022. "Dynamics of Oxygen-Plankton Model with Variable Zooplankton Search Rate in Deterministic and Fluctuating Environments." *Mathematics* 10 (10): 1641. https://doi.org/10.3390/math10101641.

Naselli-Flores, Luigi, and Judit Padisák. 2023. "Ecosystem Services Provided by Marine and Freshwater Phytoplankton." *Hydrobiologia* 850 (12–13): 2691–2706. https://doi.org/10.1007/s10750-022-04795-y.

Planche, Édith. 2018. *Éduquer à l'environnement par l'approche sensible. Art, ethnologie et écologie*. Chronique Sociale. https://hal.science/hal-02090644.

Tavormina, Patrizia, and Agata Jackiewicz. 2023. "Explorons la pédagogie "tête-corps-cœur" avec les sciences participatives sensibles." Paper presented at Questions de Pédagogies dans L'enseignement Supérieur (QPES), Université de Lausanne, Lausanne, Switzerland. https://hal.science/hal-04441980v1.

Stoermer, Eugene F., and John P. Smol, eds. 1999. *The Diatoms: Applications for the Environmental and Earth Sciences*. Cambridge: Cambridge University Press.

Tufféry, Guy, M. Rogger and M. Savary. 1971. "Étude des communautés planctoniques de la Seine à l'aval de Paris: Campagnes du bateau laboratoire 'Mécanicien Mahoux.'" *Bulletin français de pisciculture* 243: 51–68. https://doi.org/10.1051/kmae:1971001.

UNESCO. 2011. *Recommendation on the Historic Urban Landscape, Including a Glossary of Definitions*. Paris: UNESCO. https://whc.unesco.org/en/hul/.



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A Holistic Mapping Approach to the Seine River Basin and the Port City Territory of Paris: Developing Historically Informed Awareness for Future Designs

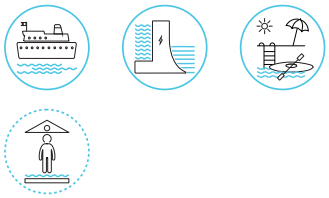
Yvonne van Mil, Carola Hein & Lukas Höller

Abstract
Rivers and ports have historically shaped European cities, yet their wider territorial and spatial relationships remain insufficiently understood. This article proposes a multi-scalar, holistic and historically informed mapping approach to examine river port city territories as interconnected systems linking hydrology, logistics, urban form, governance and heritage. Building on the methodology developed for the *Port City Atlas* and refined for the *River Port City Atlas*, it investigates the Seine basin between Paris and Le Havre, revealing how inherited infrastructures and institutional fragmentation shape contemporary spatial challenges. By visualizing relationships across basin and metropolitan scales, the study argues that integrated mapping can support more adaptive territorial governance, sustainable logistics, climate resilience and heritage preservation in Europe's changing river landscapes.

Policy Recommendations
- Academics/mapping specialists should provide research approaches and data that foreground the regional/territorial/water dimension of European spatial development.
- European institutions should establish water basin–scale policy guidance.
- European decision-makers should provide policy guidance that positions ports in their river systems across the continent.

KEYWORDS
River Port Cities
GIS-mapping
river basins
river networks
planning

WATER ICONS



< Fig. 1 *Fluctuat nec mergitur*, by Adolphe Martial Potémont (Source: Musée Carnavalet / Ville de Paris, 1871. CC0 1.0 Universal Public Domain, via Wikimedia Commons).

Reactivating River Ports

Rivers have shaped Europe's cities and landscapes for millennia. Most major European cities, including many capitals, are located on a river and many are home to ports that have served as places of transshipment, where goods and people are transferred between water and land, facilitating urban growth and regional development. Shipping has long linked the cities of Europe, and river port cities have emerged as critical interfaces between waterborne and land-based transport, connecting inland territories to regional and global networks of commerce far beyond administrative and political boundaries. The importance of rivers to Europe's historical development is reflected in Sebastian Münster's sixteenth-century depiction of *Europa Regina* (Europe as Queen), in which the continent's major rivers – notably the Danube – feature prominently. These historic developments have led to the emergence of some of Europe's most iconic tourist destinations, think of Budapest and Vienna on the Danube, London on the Thames or Paris on the Seine (EEA 2016).

Despite the historical importance of ports, their relation to cities and their heritage remains understudied. While port and infrastructure developments are well documented in economic and logistics studies, their spatial and morphological implications remain comparatively underexplored. As early as 1985, historian Frank Broeze (1985) observed that historians, geographers and planners rarely examined port cities as urban formations shaped by their distinctive maritime and fluvial functions. The historical role of rivers and ports in urban development – even in well-known European cities – has often been addressed through case studies of cities such as Budapest, Prague, London or Hamburg, rather than comparative or territorial perspectives. Collectively, these studies illuminate the historical evolution of individual rivers and cities, but rarely examine the wider territorial relationships linking rivers, ports, cities and hinterlands across European river basins.

Renewed attention to the role of river ports in shaping cities and landscapes is needed today to address several pressing challenges, particularly climate-change related ones that are concentrated in port cities and their territories. Changing societal values and environmental transformations are fundamentally altering the relationship between cities and their rivers, introducing new economic, social and environmental risks. In response, we need approaches that accommodate human activities while working with hydrological and ecological processes – approaches that can also help historic cities, infrastructures and heritage landscapes adapt to changing hydrological conditions, while fostering more sustainable logistics and circular practices. This shift bears particularly on (river) port city territories, which we conceptualize as a layered, interconnected system in which waterbodies, ports and cities evolved together across borders, scales and jurisdictions (Hein, van Mil and Ažman-Momirski 2023). Yet despite their shared hydrological systems, governance and planning of these territories remain fragmented across administrative boundaries and sectoral responsibilities.

In the summer of 2026, climate-related water extremes affected shipping on major European rivers through drought and flooding, highlighting the need for a comprehensive spatial approach. Low river water levels have had a major impact on inland shipping and ports. Some politicians argue for deepening some of the rivers; however, this will not solve the issue of an overall lack of water. In July, historically low



^ Fig. 2 *Europa Regina*, by Sebastian Münster (Source: Sebastian Münster, *Cosmographia*, 1598. Public Domain Mark 1.0, via Wikimedia Commons).

water levels forced the closure of the port of Deventer on the IJssel due to low water levels (NL Times 2026; Dutch News 2026). Meanwhile the construction of new canals continues, such as the Seine–Nord Europe Canal, designed to connect the Oise River to the Dunkirk-Scheldt Canal and which could ultimately connect the Rhine and Seine basins.[1]

We posit that greater recognition is needed of river port cities and other cities along waterways as interconnected, dynamic urban systems that extend far beyond their administrative boundaries. Such an understanding provides the foundation for research that acknowledges both the changing hydrological conditions of Europe's rivers and the impact on cities and landscapes, highlighting insights for the planning of future mobility, production and heritage. We argue that multiscalar mapping of geospatial data captures the current state of these territories and provides a framework for interscalar and multi-stakeholder analysis as the result of long-term processes. Such mapping also reveals the historic construction of the region's shipping network and ports, showing how past decisions on infrastructure, land use and connectivity continue to shape current spatial realities. Mapping thus offers a time-aware spatial tool for strengthening territorial governance and recognizing river systems as connective, living infrastructures.

Building on the methodology developed in the *Port City Atlas* and the *River Port City Atlas* (Hein et al. 2023; Hein, van Mil and Höller 2026), we argue that such a mapping approach provides integrated perspectives that offer novel insights on spatial conditions, starting with water flows and emphasizing the role of ports. Understanding and planning the complex spaces of port city territories as historically evolved can help reveal – and act on – the interdependencies between their spatial structures, functional systems and institutional arrangements and historic development. To demonstrate the analytical potential of this approach, we analyze the case of the Seine River basin between Paris and Le Havre and the river port city territory of the Paris metropolitan region.

1. "C'est l'empereur Napoléon qui l'a dit: Paris, Rouen, Le Havre sont une même ville dont la Seine est la grande rue." Jules Janin, *Voyage de Paris à la mer* (Paris, 1847), 13.

Mapping the Seine Basin: Understanding the Present as a Result of Historic Processes

The Seine River basin serves as a compelling case study for our mapping approach and for understanding the challenges and opportunities of the river port city territory[2] of Paris, based on its historic development. The city's role as a port, captured in the motto "*fluctuat nec mergitur*" (as shown in fig. 1), has long driven urban development and water management. However, both the historic and the contemporary port functions are underdeveloped in contemporary planning – even though Paris is the largest fluvial port in France, and not sufficiently recognized as a tool for sustainable development and heritage preservation. Infrastructures designed to facilitate port activities shape contemporary and future relationships between the river, the ports, the city and their wider territories.

Mapping of the Seine River basin and its port system exemplifies the complex links among hydrological features, urban structures, societal values, cultural heritage and port systems. The Seine basin covers a large area of northern France, with Paris as its center, and it extends westward to link the regional capital port city Rouen and the maritime port city of Le Havre, France's second-largest commercial port, creating a hierarchical polycentric port system. The national capital has always been linked to other cities along the river. As early as 1802, Napoléon Bonaparte characterized this spatial continuity when he said, "Paris, Rouen, Le Havre – a single city with the Seine as Main Street." The street metaphor, later echoed by historian Jules Michelet, underscores the historical perception of the Seine basin as a single, functional and cultural corridor, rather than three isolated cities – an image that still resonates with planners and policymakers today (Brennetot 2019). From source to sea, the Seine River is now managed to regulate water levels, facilitate shipping and prevent drought and flooding, with limited integration across these efforts.

Cities, regions, national bodies and other entities such as HAROPA (the authority established in 2021 that governs the ports of Le Havre, Rouen and Paris) and Voies Navigables de France (VNF, the national waterway authority) manage specific locations according to their distinct mandates. This fragmented system is the outcome of economic developments, especially over the past century. Multiple stakeholders have used the Seine for specific purposes – drinking, washing, energy generation, shipping and sewage disposal – hindering the development of more integrated approaches. Water constitutes a fundamental matrix of metropolitan organization, structuring spatial relationships across scales rather than functioning as a separate technical policy field (Secchi and Viganò 2011). As illustrated by the 2013 strategic plan for the Seine, which aimed to coordinate development across the Île-de-France and Normandy regions, achieving basin-wide integration remains an ongoing political and spatial challenge (Brennetot 2019), one that also affects the city of Paris and its heritage.

Renewed attention to ports and shipping, along with ongoing discussions of the role of inland ports in Europe's multimodal logistics networks, would benefit from a comprehensive spatial visualization. According to the European Environment Agency (EEA 2024), inland waterways (i.e., non-maritime freight) accounted

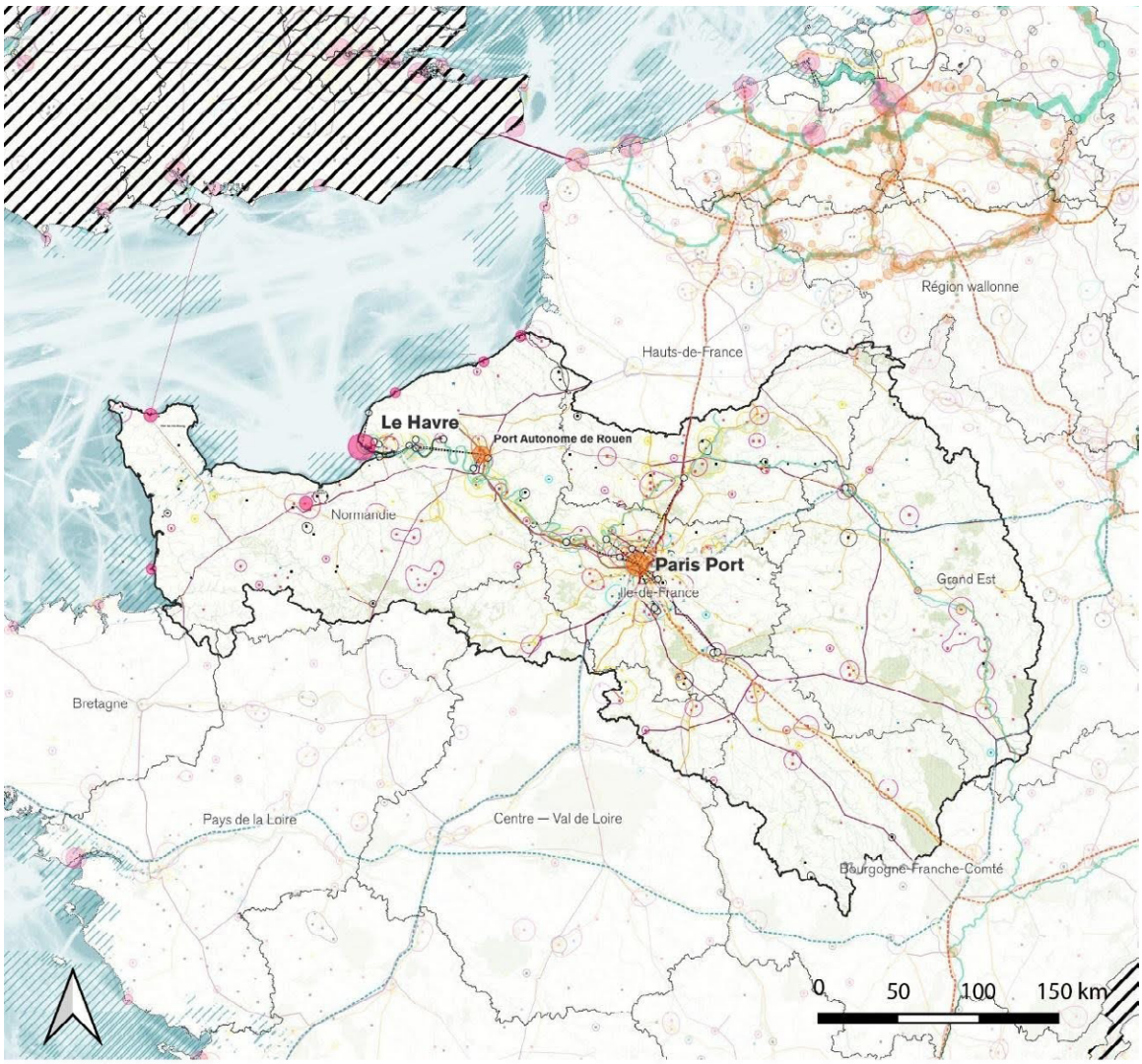
2. We have abbreviated this in the *River Port City Atlas* as RPCT (Hein et al. 2026).

for only 3.5 per cent of total freight transport (ton-kilometers) across all modes of transport in the EU-27 in 2022. In France, this figure is even lower, at 1.92 per cent. Despite these relatively low figures, inland waterway transport remains the most sustainable option compared with road and rail. It is therefore supported by multiple levels of government – EU, national, regional and municipal – as a strategic tool to advance a sustainable urban freight transport system (e.g., UNECE 2020; European Commission 2021).

Mapping inland port activities in the Seine basin, starting with flows of goods along the river, provides a foundation for renewed attention to the role of shipping. Infrastructural systems in France are traditionally oriented toward the capital, and this is also the case for water transport. The Seine, as a national river, has been governed by the capital city from source to sea. The City of Paris owns the river's sources and depends largely on the import of goods through Le Havre and via Rouen. The map (fig. 3) shows the Seine basin within Northwestern Europe and illustrates the importance of shipping on rivers and canals in serving the French capital, exposing a pattern that has evolved over centuries, as road, rail and canal infrastructure have been expanded to serve Paris. It also shows the role of Le Havre as the main maritime gateway to Paris, along with connections with the river network of the Scheldt to the north and the Meuse, Rhine and Rhône to the east.

The Seine basin spans multiple regional jurisdictions (NUTS 2), including the Île-de-France, Normandy and Grand Est Regions, forming a network of economic and ecological interdependencies. The map of the Seine basin (fig. 3) captures the hierarchical structure of the basin and the role of Paris as the dominant central urban node for trade and mobility, both by road and rail – along the north–south axis (linking Paris with Lille, Antwerp and Brussels and Bordeaux, Lyon and Marseille) and the east–west axis (from Le Havre to Strasbourg) – as part of the TEN-T Atlantic and North Sea–Mediterranean corridors. These motorways and railways run parallel to the inland waterways, particularly along the Paris–Le Havre river axis (the Seine), connecting the Port of Le Havre with the Port of Paris and extending from the Channel to the capital. This inland waterway network also links to Belgium's port cities via the Oise, the Canal du Nord and the Canal de la Somme. Both north–south and east–west connections are part of the same TEN-T corridors, a planned network of nine corridors, roads, railways, airports and water infrastructure, in the EU. The Seine–Nord Europe Canal will extend this network further, as it is designed to connect the Seine and Scheldt basins directly, and could ultimately link the Seine basin to the Rhine basin. The new canal can reinforce the Seine's position within a wider, cross-basin European inland waterway network, while potentially diminishing the role of Le Havre as entrance gate to Paris and the Île-de-France.

While the Seine basin's physical infrastructure forms an increasingly integrated cross-border network, its institutional landscape remains fragmented. For instance, the Seine-Normandy Water Agency is responsible for managing water resources across the basin. However, it must coordinate with numerous regional and local authorities, inter-municipal entities (EPTs) and independent port administrations – such as Haropa Port – but operates under distinct governance structures (OECD 2017). For example, flood risk management in the Paris region requires coordination not only among cities upstream and downstream but also between actors with differing priorities,



^ Fig. 3 Map of the Seine basin showing the overlapping functional, morphological and institutional dimensions within natural river basin boundaries (Source: Yvonne van Mil, Carola Hein and Lukas Höller, 2025).

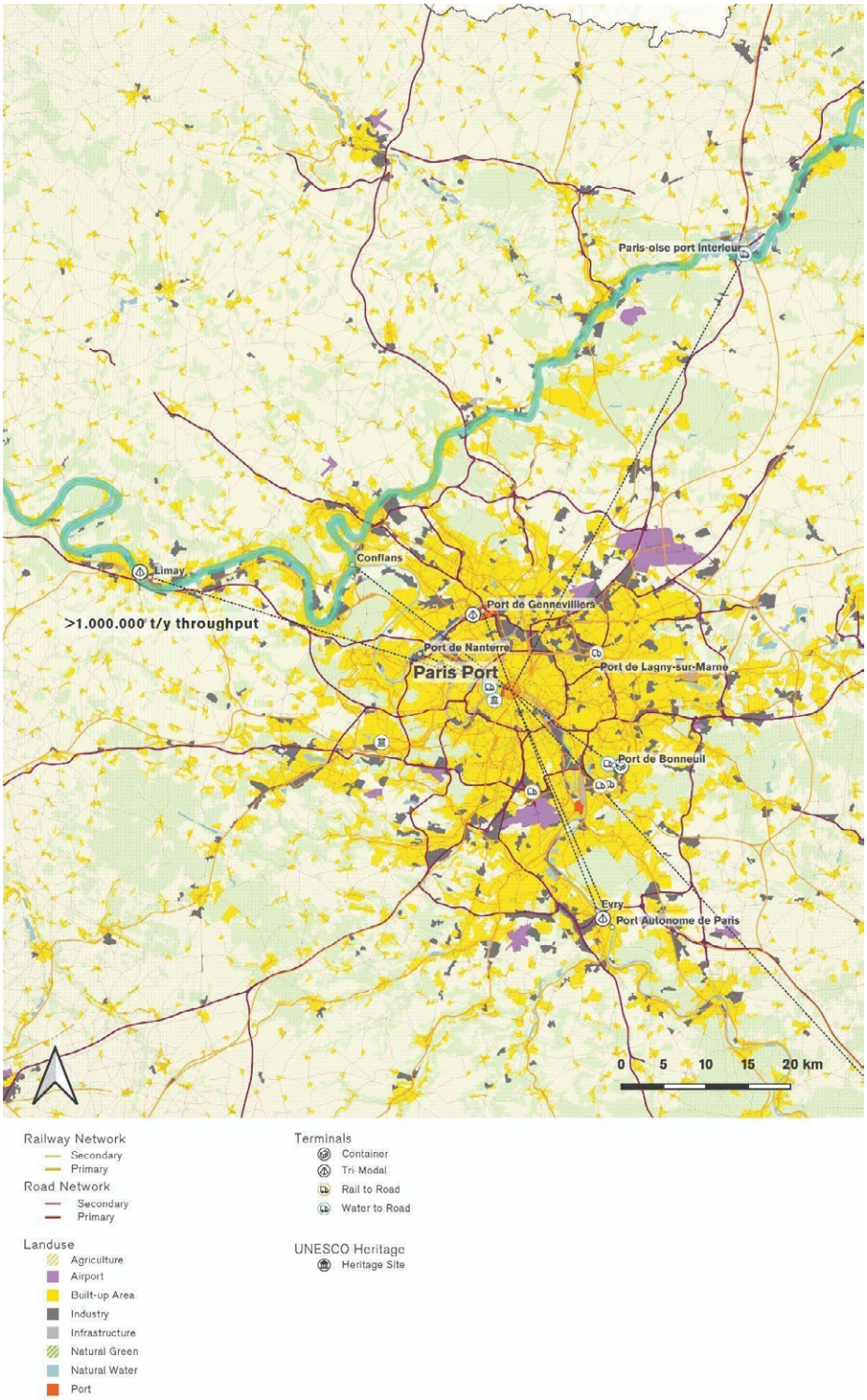
including urban planners in the Île-de-France, navigation authorities on the Seine and port operators in Le Havre. Efforts such as the Seine Grands Lacs reservoir system, designed to regulate water levels and reduce flood risk, illustrate how cooperation across administrative borders is both necessary and challenging to achieve in practice (European Commission 2021; PIREN-Seine Programme 2020). Balancing these competing priorities – economic, environmental and social – remains a constant challenge, particularly in densely regulated areas like Paris, including the city's World Heritage property.

Mapping for the River Port City Territory of Paris

Basin-scale mapping provides insights into comprehensive regional dimensions. Further zooming in is required to understand how these networks engage the scale of the river port city territory (fig. 4). Although the Seine remains navigable to the center of Paris, most long-distance traffic is not routed through the city; it passes through the major seaports of Le Havre and Rouen to Conflans-Sainte-Honorine, located at the confluence of the Seine and the Oise rivers, approximately 30 kilometers northwest of Paris. From there, most goods are shipped northward to smaller ports, such as Compiègne and Creil, via the Oise River, or they are transported through connecting canals, such as the Canal de Saint-Quentin and the Canal du Nord, toward key European ports, including Antwerp. As a result, shipping activity within Paris is predominantly local or regional. Peripheral cities around Paris are increasingly leveraging logistics to drive regional economic development, a trend especially pronounced in Le Havre, a major port competing with Antwerp and Rotterdam.

On the scale of the territory, the Parisian river port city appears as a single block within regional logistics flows; zooming into the river port city territory shows that the port system is distinctly polycentric (fig. 4). Ports de Paris comprises approximately 70 (smaller) port sites across the Île-de-France region, including the city center – where every area between two bridges is called a port – to larger sites further out, such as Gennevilliers and Bonneuil-sur-Marne. Together these sites form the second-largest inland port complex in Europe, after Duisburg. The spatial polycentricity, however, is not mirrored institutionally: HAROPA governs the entire network as a single authority, from Le Havre to Paris and in the Paris metropolitan area, concentrating decision-making power in a way the port system's physical distribution may not suggest. This tension between a polycentric territory and centralized governance raises a key question for further research: does institutional centralization under HAROPA constrain the advantages (smaller scale, locally embedded port sites) that polycentric organizations would otherwise offer? One such advantage worth investigating further is the potential for smaller, distributed port sites to integrate more readily into the urban fabric than a single large port complex, potentially generating less environmental and socio-economic impact per site and opening opportunities for local co-creation, public engagement and the protection of adjacent historic and heritage sites.

A historical example illustrates this potential for integrating smaller port functions into the urban fabric. In 2006, the Paris City Council took several initiatives to introduce a new freight transport policy, with the primary objectives being to reduce noise pollution and emissions, improve traffic flow in densely populated urban areas and strengthen the position of Paris within the trans-European freight corridors.



^ Fig. 4 Map of Greater Paris showing the overlapping functional and morphological dimensions at the territorial level (Source: Yvonne van Mil, Carola Hein and Lukas Höller, 2025).

To support these ambitions, several "part-time transit ports" (Dablanc and Frémont 2013) were designated along the Seine. These multifunctional sites allow goods to be unloaded directly from vessels onto trucks, after which the space returns to its usual urban use – e.g., as a promenade or plaza – for the remainder of the day. This approach supports sustainable distribution while minimizing urban disruption. These sites also provide opportunities for heritage preservation. However, the initiative's locally embedded, small-scale nature also exposes the underlying tension identified above: fragmented, site-specific solutions such as these still depend on coordination through a single, centralized authority, underscoring the need for closer collaboration between HAROPA, logistics companies and urban planners.

This tension between fragmented, site-specific coordination and the need for a more comprehensive governance framework extends beyond the scale of individual port sites to the Seine basin as a whole. The historical focus on Paris as the heart of the Seine basin and the Paris–Rouen–Le Havre shipping axis continues to shape projects. A notable example is Antoine Grumbach's vision in 2008 to extend Greater Paris along a unified metropolitan axis reaching Le Havre, building upon existing port and shipping structures and reflecting ongoing efforts to conceptualize the Seine basin as a coherent development corridor (Brennetot 2019) – however, one that is driven by the needs of Paris. Since 2022, under the name Entente Axe Seine, 16 institutions of various sizes and power – including the Métropole du Grand Paris, the City of Paris, the Métropole Rouen Normandie, the Community of Le Havre Seine Métropole and other Établissements Publics de Coopération Intercommunale (EPCI) – are collaborating to focus on comprehensive development and provoke a change in the discourse on spatial development, governance and the role of the watershed in the collective imagination, from the capital city to the coast (Eau de Paris n.d.; Métropole du Grand Paris n.d.). Together, these entities are undertaking projects relevant to the ecological, energy and industrial transitions. Paris and its partners are taking an innovative position in urban and territorial development and governance, focusing on common interests, new river strategies and urban logistics, sustainable agriculture, new forms of tourism, heritage and culture, energy and the governance of water spaces and flood protection and biodiversity. New interventions such as bike paths are being developed, but they do not appear to be part of a comprehensive approach. How to govern the current transition and what spatial and social tools and methods to use remains undecided. Meanwhile, similar attempts to create overarching governance systems in the context of the energy transition occur in other river basins, such as the Loire (Duval and Bahers 2023; Duval 2024).

Future Opportunities for Territorial Development from a Water and Port Perspective: Activating Heritage

Napoléon Bonaparte's 1802 description of Paris, Rouen and Le Havre as "one city, of which the Seine is the great street" reflects the historical, infrastructure-driven understanding of territorial unity that has long shaped the Seine basin. Our holistic, multi-scale mapping approach captures the current state of these territories and their function across scales. It makes the layered institutional fragmentation beneath this apparent unity visible, as well as the largely overlooked interdependencies across hydrology, logistics, governance and heritage that are shaped by inherited infrastructures today. It offers a comprehensive visualization of the

multiple flows and forces that are active in the Seine River basin and the Paris river port city territory.

River port cities are essentially networked: their character depends on their position on the river, or "street," its crossings and their position relative to other river port cities along the same network. This sets them fundamentally apart from seaports, which face the open ocean and can, in principle, function as an endpoint in themselves. Comprehensive management of the Seine River network as a single, integrated entity can enable the sustainable operation of shipping in Paris while also addressing ecological restoration, flood risk mitigation, recreational use, heritage preservation and improvements in water quality. Initiatives such as HAROPA and the Entente Axe Seine demonstrate the potential of coordinated, multi-temporal and multifunctional strategies. They also demonstrate the need to balance the interests and needs of the Paris metropolitan region with those of other port cities on the Seine and beyond. As spatial scales continue to expand while the urgency of climate and energy transitions grows, integrated mapping of this kind offers a tool for adaptive territorial governance – connecting local, place-based understanding with basin-wide coordination, not only along the Seine but in river territories elsewhere.

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References

Brennetot, Arnaud. 2019. *Atlas de la vallée de la Seine: De Paris à la mer.* Preface by François Philizot. Autrement.

Broeze, Frank. 1985. "Port Cities: The Search for an Identity." *Journal of Urban History* 11 (2): 209–25. https://doi.org/10.1177/009614428501100204.

Dablanc, Laetitia, and Antoine Frémont. 2013. "The Paris Region: Operating and Planning Freight at Multiple Scales in a European City." In *Cities, Regions and Flows*, edited by Peter Hall and Markus Hesse, 95–113. London: Routledge.

Dutch News. 2026. "Rhine's Water Flow Drops to Near 80-Year Low: Shipping Curbed." August 10, 2026. https://www.dutchnews.nl/2026/08/rhines-water-flow-drops-to-near-80-year-low-shipping-curbed/.

Duval, Annabelle, and Jean-Baptiste Bahers. 2023. "Flows as Makers and Breakers of Port-Territory Metabolic Relations: The Case of the Loire Estuary." *Urban Planning* 8 (3): 319–29. https://doi.org/10.17645/up.v8i3.6757.

Duval, Annabelle. 2024. "Choisir sa transition : modernisation écologique et gouvernance multi-niveaux dans l'estuaire de la Loire [Choosing your transition: Ecological modernisation and multi-level governance in the Loire estuary]." *Développement durable et territoires* 15 (3). https://doi.org/10.4000/13cqh.

Eau de Paris. 2024. "Protecting Water Upstream: Only Benefits!" December 6, 2024. https://www.eaudeparis.fr/en/thematic-files/Protecting-water-upstream-only-benefits.

European Commission. 2021. *Assessment of the Second River Basin Management Plans under the Water Framework Directive*. SWD(2019) 30 final. https://ec.europa.eu/environment/water/water-framework/impl_reports.htm.

European Environment Agency (EEA). 2016. *Rivers and Lakes in European Cities: Past and Future Challenges*. EEA Report No. 26/2016. Publications Office of the European Union. https://www.eea.europa.eu/en/analysis/publications/rivers-and-lakes-in-cities.

European Environment Agency (EEA). 2024. *Sustainability of Europe's Mobility Systems*. Web Report No. 01/2024. EEA. https://doi.org/10.2800/8560026.

Hein, Carola, Yvonne van Mil and Lucija Ažman-Momirski. 2023. *Port City Atlas: Mapping European Port City Territories: From Understanding to Design*. Rotterdam: nai010 publishers.

Hein, Carola, Yvonne van Mil and Lukas Höller. Forthcoming. *River Port City Atlas: Mapping European Inland Port City Territories in their Natural Basins*. Rotterdam: nai010 publishers.

OECD. 2017. *Multi-level Governance Reforms: Overview of OECD Country Experiences*. OECD Multi-level Governance Studies. Paris: OECD Publishing. https://doi.org/10.1787/9789264272866-en.

Métropole du Grand Paris. n.d. *Paris Seine*. Accessed February 18, 2026. https://www.metropolegrandparis.fr/fr/axe-seine.

NL Times. 2026. "Low Water Level: Deventer Port Closed From Saturday; Twente Asks for Gov't Support." July 29, 2026. https://nltimes.nl/2026/07/29/low-water-level-deventer-port-closed-saturday-twente-asks-govt-support.

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PIREN-Seine Programme. 2020. *Scientific Report: Integrated River Basin Management in the Seine*. CNRS and Université Paris Sciences et Lettres. https://www.piren-seine.fr.

Secchi, Bernardo and Paola Viganò. 2011. *La ville poreuse: Un projet pour le Grand Paris et la métropole de l'après-Kyoto* [The porous city: A project for Greater Paris and the post-Kyoto metropolis]. Geneva: Métis-Presses.

United Nations Economic Commission for Europe. 2020. *White Paper on the Progress, Accomplishments and Future of Sustainable Inland Water Transport*. New York and Geneva: United Nations. https://unece.org/DAM/trans/main/sc3/publications/IWW_WhitePaper_ECE_TRANS_279.pdf.



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The Seine and Energy Transition: Historical Lessons for a Sustainable Future

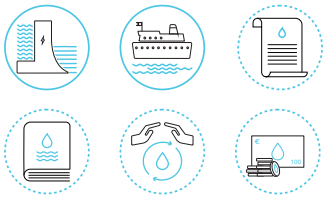
Olivier Burel

Abstract
The history of navigation on the Seine offers a unique laboratory for examining how energy transitions transform the systems that support river transport. This case study explores how the historical management of energy on the Seine – particularly as documented in Bernard Le Sueur's work on the history of French river navigation – can inform contemporary energy transition strategies for river transport. The Seine illustrates a fundamental principle: service always precedes integration. From the organization of hauliers in Conflans-Sainte-Honorine in the 19th century to the current challenges of ensuring low-carbon energy in the Seine Valley, the sector's organizational evolution shows that new energy technologies first appear as external services before being integrated into transport units. This historical analysis contributes directly to the Sustainable Development Goals (SDG 7: Clean Energy, SDG 9: Innovation and Infrastructure, and SDG 13: Climate Action) by proposing innovative organizational models to accelerate the energy transition in European river transport.

KEYWORDS

energy transitions
Seine River transport heritage
energy-as-a-service model
fleet decarbonization
multi-energy ports

WATER ICONS



Policy Recommendations

- The European Commission is expected to implement Energy-as-a-Service pilot programs along the Seine–Northern Europe corridor by 2032.
- France is expected to establish a fleet modernization fund by late 2028, prioritizing vessels exceeding 30 years of age, with mandatory hybrid propulsion systems.
- Infrastructure managers are expected to deploy containerized energy exchange facilities at strategic nodes by late 2028.
- A unified framework for multi-energy port infrastructure is expected to be established by 2030, drawing upon the historical towage rights model.

< Fig. 1 Barge on the Seine near Pont Neuf, Paris (Source: Pline, 2009. CC BY-SA 3.0, via Wikimedia Commons).

Introduction

The Seine, a life-giving artery of the Île-de-France since Gallo-Roman times, constitutes a remarkable laboratory for observing energy transformations in river transport. As Bernard Le Sueur (1999, 2001) documented in his works on the history of Seine navigation, this waterway has been the theater of three major energy revolutions that shed light on contemporary decarbonization challenges (Le Sueur 2005).

From Rouen to Paris, the Seine first experienced the era of human and animal towage, immortalized in eighteenth-century engravings showing teams of towmen pulling water coaches along paths still visible at Bougival and Saint-Germain-en-Laye. This organization reveals a clear separation between boat owners and so-called "energy providers": the towmen's guilds of Conflans-Sainte-Honorine – the historic capital of French inland waterway shipping – who provided their services to mariners.

The introduction of steam in the nineteenth century maintained this logic of external service. The first paddle-wheel tugboats, such as the *Napoléon*, launched in 1823 for the Paris–Melun route, were operated by specialized companies like the Compagnie Générale de Navigation de Paris à la Mer, founded in 1855. Only with the democratization of diesel engines during the interwar period did the model of energy autonomy that still characterizes inland waterway transport today become established. Diesel power radically transformed the profession of mariners, who were now responsible not only for the transport of goods (on behalf of third parties) but also for the management of energy (refueling and storage) required to carry out their work.

Evolution of Organizational Practices and Contemporary Lessons

Today, the Seine displays many of the energy transition challenges facing French river transport. With its 777 navigable kilometers from Nogent-sur-Seine to Tancarville, it accounts for 40 per cent of national river traffic and forms an essential link in the emerging Seine-North Europe corridor. The river's contemporary management is organized around Voies Navigables de France (VNF), which is gradually integrating decarbonization objectives into its traditional infrastructure management roles, and HAROPA PORT, which oversees numerous river and maritime port facilities in the Seine Valley.[1]

While equipment from the past – historic locks, former towpaths, paddle-wheel boats – have naturally found their place in tourism and museum contexts as demonstrations of technological heritage, the organizational practices associated with these earlier systems have evolved differently. Unlike some obsolete technologies, these organizational models remain remarkably relevant. While wooden boats and steam tugboats are no longer competitive, the logics of specialization and energy pooling that once characterized the Seine's navigation system offer keys to addressing today's energy transition challenges.

The historical organization of Conflans-Sainte-Honorine illustrates this organiza-

1. Voies Navigables de France (VNF) is a government agency that manages inland waterway navigation infrastructure in France (including the Seine) and supports the energy transition of the river transport sector; HAROPA PORT is the agency created from the merger of two major maritime ports (Le Havre and Rouen) and the Port of Paris.

tional richness. The coexistence of boat owners, specialized energy suppliers, shipyards and traders created an ecosystem where each actor developed distinct expertise. This division of labor enabled optimized investment and rapid adaptation to technical innovations: a principle directly applicable today in the energy-as-a-service business model (Fouquet 2016).

From an economic standpoint, the Seine fleet faces a major challenge. The average age of self-propelled vessels exceeds 35 years (VNF data), with hulls depreciated over 30–40 years, propulsion systems over 15–20 years, while new energy technologies – such as battery or hydrogen storage – operate on much shorter cycles of 5–10 years, often at more than triple the initial cost. This is exemplified by the ZULU 06 (CFT SOGESTRAN), a boat intended for hybrid electric/hydrogen urban logistics.

Current electrification initiatives, stimulated by preparations for the 2024 Olympic Games, have led some companies to install fast charging stations. Yet these projects largely perpetuate the energy autonomy model inherited from the petroleum era: each operator remains individually responsible for financing and implementing their own energy transition, without shared investment mechanisms or collective expertise.

Current and Future Challenges of this Water System

The Seine, like most major rivers, faces a conjunction of climatic and energy challenges reminiscent of earlier historical transitions, contributing to growing operational uncertainty for the 20 million tons transported annually on the river.

At the same time, the drive to reduce emissions is expected to bring about a profound transformation of propulsion systems. Unlike the transition to petroleum fuels, which offered clear and immediate benefits, current alternatives each present significant constraints: Electric batteries lack the energy density required for long routes along the Seine–Oise–Marne corridor, hydrogen poses storage and supply problems, and the reliability of biofuel availability for the river sector remains uncertain.

The current structure of the French inland navigation sector – particularly on the Seine – continues to be dominated by artisan boatmen whose limited investment capacity hinders the adoption of costly new technologies. The model of energy autonomy, once a source of resilience, now paradoxically acts as a brake on innovation. This is especially problematic in regions where air quality requirements may soon necessitate a rapid transition to "low emission" navigation mode in densely populated urban areas.

Moreover, the increasing intermittency of renewable electricity production introduces synchronization challenges that the river transport sector could help address, thanks to its regular traffic between major ports (Le Havre, Rouen, Gennevilliers, Bonneuil-sur-Marne) and its potential to serve as a mobile energy storage network.[2]

2. Renewable electricity means electricity produced from sources that naturally and rapidly renew themselves on a human timescale, such as solar, wind, hydraulic, geothermal, and biomass. They contrast with fossil fuel sources (oil, coal, gas), which are depleted and produce CO_2 emissions.



^ Fig. 2 River lock of La Cave in Bois-le-Roi on the Seine; river tug with barges (Source: Pline, 2010. CC BY-SA 3.0, via Wikimedia Commons).

A further concern lies in the risk of premature specialization of port infrastructure. Faced with technological uncertainty, there is strong pressure to invest heavily in specialized facilities – hydrogen stations, high-power electrical networks or battery storage areas. Yet land along the Seine is a scarce and highly constrained resource, particularly in dense urban areas. Such early specialization carries two main risks: immobilizing strategic sites for technologies that may soon become obsolete and diverting capital from the sector's foremost need – the modernization of an aging fleet that increasingly fails to meet emerging standards. Indeed, the history of energy transitions on the Seine shows that the most profitable investments have always focused on modernizing transport vessels rather than prematurely locking in fixed infrastructure.

Conclusion and Future Approaches

Historical analysis of energy organization on the Seine reveals that the principle whereby "service always precedes integration" offers a valuable pathway for innovation in the contemporary energy transition. This approach could take the form of an energy-as-a-service model tailored to the specific conditions of the Seine.

In practical terms, specialized operators could manage standardized, containerized battery exchange sites or racks of biogas or hydrogen cylinders at strategic points: Rouen for the maritime interface, Conflans for distribution to the Oise and Marne, Montereau for access to the Yonne. This logic is inspired by the historical organization that developed around Conflans-Sainte-Honorine, where boat owners, energy suppliers and shipyards coexisted within a specialized and efficient ecosystem.

In this sense, the current rollout of electric charging stations by VNF and HAROPA PORT at the main stops between Le Havre and Paris may be seen as a precursor to such evolution. By developing a unified billing system inspired by the old "towage rights," this initiative revives the longstanding principle of external energy service that characterized the Seine for centuries.

Such an approach would decouple investment in propulsion systems from that in vessel hulls, lowering entry barriers for independent boatmen while fostering the growth of a specialized sector in energy storage technologies. By rediscovering the organizational principles that once made the Seine's ecosystem so dynamic, it becomes possible to design innovative models for the decarbonization of river transport, making the Seine once again a laboratory of innovation, both inspired by its history and able to establish itself as the backbone of a powerful industrial, logistical and energy network.

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References

Fouquet, Roger. 2016. "Historical Energy Transitions: Speed, Prices and System Transformation." Energy Research & Social Science 22: 7–12. https://doi.org/10.1016/j.erss.2016.08.014.

Le Sueur, Bernard. 1999. *La Seine et les hommes* [The Seine and its people]. Paris: Éditions de l'Amateur.

Le Sueur, Bernard. 2001. *Conflans-Sainte-Honorine, mémoire de Seine* [Conflans-Sainte-Honorine, memory of the Seine]. Saint-Cyr-sur-Loire: Éditions Alan Sutton.

Le Sueur, Bernard. 2005. *Histoire de la navigation sur la Seine* [History of navigation on the Seine]. Rennes: Éditions Ouest-France.

Voies Navigables de France (VNF). 2024. *Rapport d'activité: La Seine au cœur de la transition énergétique* [Activity report: The Seine at the heart of the energy transition]. Béthune: VNF.



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The Port–City–River Relationship in Paris: The Challenge of Mixed-Use Development

Jean Debrie

Abstract
The relationship between Paris and the Seine has been undergoing a process of reconnection. Since the first decade of the twenty-first century, the development of new public spaces along the river has been a central focus of municipal policy. This shift marks a recreational and ecological turning point in the city–river dynamic, characteristic of the postindustrial river city. Nevertheless, a few urban ports remain in operation, managed by a port authority that negotiates with the municipality and industrial stakeholders to better integrate these sites into the urban fabric. Based on selected examples, this article considers the challenges of integrating these ports within the city and the coexistence of economic and urban functions in light of sustainability objectives.

KEYWORDS
port
city
Paris
transport
sustainability

WATER ICONS



Policy Recommendations

- City governments should provide greater support for mixed-use urban planning measures based on waterways in light of congestion and pollution issues.
- Port authority and City governments should cooperate more strongly through city–port charters that improve the landscape and architectural features of this integration.
- Residents and associations should be more involved in partnership charters for urban integration in ports. Such charters already exist, but they should be strengthened, generalized and discussed by participatory committees involving residents and associations.
- Port authorities and City government should give greater consideration to combining logistics and port activities with other social and economic functions. This combination requires the support of public policy.

< Fig. 1 The city–river relationship in Paris shifting toward recreation (Source: Jean Debrie, 2025).

Introduction: The Evolution of the City–River Relationship in Paris

In Paris, the history of the relationship between city and river resembles that of other major river cities in Europe. Although Paris was born from its connection to the Seine, this connection was severed in the eighteenth century by major public works and the gradual industrialization of the riverbanks (Backouche 2000; Guillerme 1990), separating Parisians from the river. The development of road infrastructure along the Seine that began in the 1950s further reinforced the separation. But since the early 2000s, city leaders have made reconnecting the city with the river a priority (APUR 2010). The riverbanks, both right and left, have been redeveloped, signaling a recreational turn in the city–river relationship. The closure of roadways has enabled new public spaces to emerge, including sports venues, bike lanes, restaurants and bars, floating gardens, cultural spaces and a beach. Although flood risks require these facilities to be impermanent, they do not prevent the development of public spaces as part of the Parc Rives-de-Seine project launched by the Paris municipality (fig. 1). However, most riverbanks in Paris still fall under the responsibility of the port authority (HAROPA), which is committed to maintaining small port sites in Paris for productive and logistical activities. This raises the question of how port activities can be integrated within urban space.

Ports as Drivers of Sustainability? The Challenge of Port Integration in Central Paris

Port functions are not very visible in central Paris. Yet these functions exist and are essential for certain economic sectors, particularly construction and building. Major port platforms like those at Gennevilliers and Bonneuil-sur-Marne are located on the outskirts of the city. However, several small port sites are maintained in the city center along the Seine, the Canal de l'Ourcq and the Canal Saint-Denis, to supply Parisian construction sites and stores (e.g., cement plants and logistics centers). In a context of urban congestion and pollution, these small river ports contribute to sustainability objectives by reducing road traffic and offering available sites for managing urban supply chains (waste, construction materials, goods). However, these port spaces raise integration issues within the urban environment to ensure their acceptability. The port authority has progressively implemented a charter to improve ports and a set of architectural and landscaping guidelines (HAROPA 2021). This charter is the subject of negotiations between the port authority, municipalities and industrial companies operating within the port domain for various economic activities. The objectives of the Port Improvement Charter are to implement measures to reduce port-related nuisances, secure port sites and temporarily open quays to shared uses. A port audit method enables assessments and action plans to be drawn up to promote the urban, architectural and landscape integration of ports and aid public information and participation.

The example of the Port of Tolbiac in the 13th arrondissement of Paris illustrates this attempt at port integration (fig. 2). The port developments result from negotiations between the port authority and the cement company CEMEX and discussions with a local committee of residents and municipal officials. The agreement allows for use of the riverbanks to be shared between productive activities during the day and urban promenades outside the cement plant's operating hours. They improve the port's integration both aesthetically (with an unobstructed view of the Seine, nighttime



^ Fig. 2 Urban port integration at the Port of Tolbiac (Source: Jean Debrie, 2025).

lighting design and green walls) and in terms of accessibility (cement tanks on stilts, secured access, lighting). A certification process was also carried out, resulting in the first concrete plant certified for high environmental quality. While the case of the Port of Tolbiac is exemplary – it won the 2008 Grand Prix for Environment in the Urban Planning, Heritage and Sustainable Development category – similar urban integration efforts are now being implemented at most port sites in the Paris region. Photos of cement plants in Paris and the suburbs illustrate this effort at port integration. This integration requires a participatory process to maintain these port sites, which contribute to reducing CO_2 emissions and congestion through the use of river transport, which for the Port of Tolbiac involves 280,000 tons of cement per year.



^ Fig. 3 Magasins Généraux (Source: Jean Debrie, 2025).

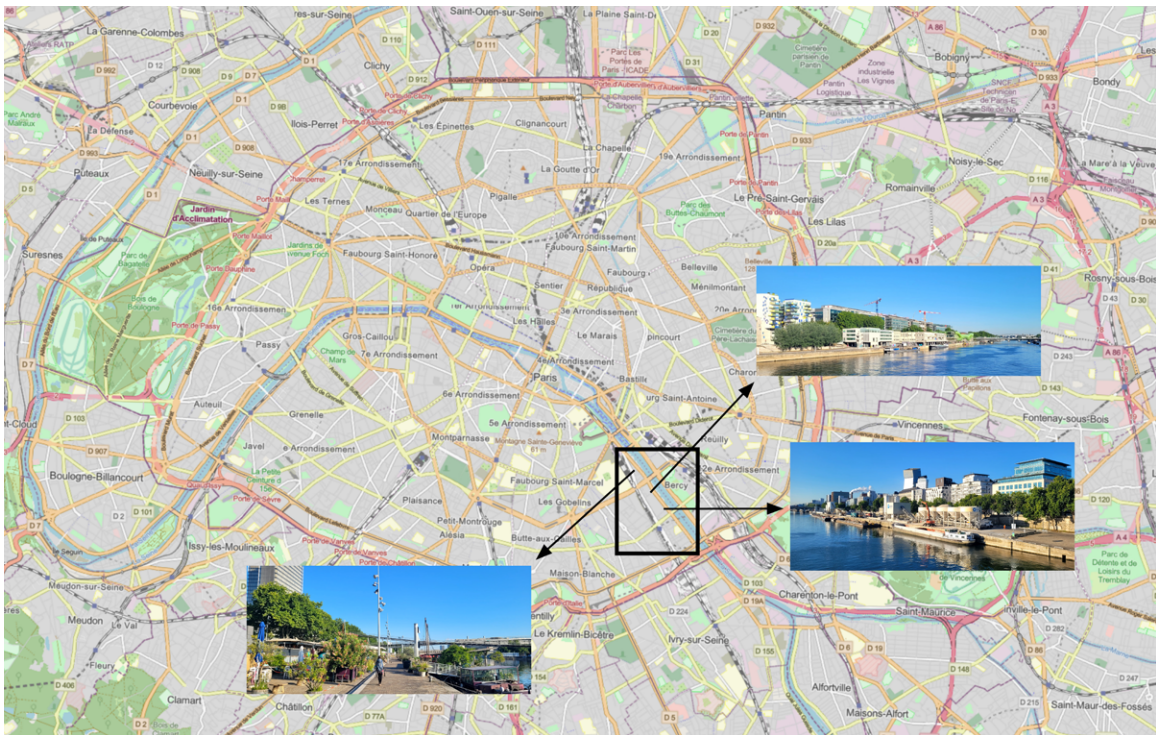
Toward a Mix of Urban Functions?

The question of port–urban integration calls for a broader reflection on the shared use of riverbanks. In a context of intense land pressure in central Paris – marked by high population density and concentrated economic activity – the inclusion of port functions within mixed-use urban development has become a central issue in debates concerning the "productive city." The riverbanks have increasingly become the setting for residents to reconnect with the Seine, primarily through recreational uses that define riverbanks as public spaces. Yet maintaining productive river activities remains essential for achieving environmental sustainability (by reducing CO_2 emissions and urban congestion) as well as economic objectives (notably in relation to employment).

The challenge for the productive city is not unique to Paris and is shared by other European urban ports. The city–port relationship requires renewed forms of negotiation to preserve productive functions such as logistics, transport, construction and waste management. Research by Kristel Mazy (2021) on city–port relations in Brussels and Lille, along with the AIVP (2015) guide to best practices in port–city relationships, illustrate this new agenda.

These broader European trends can be seen in Paris in recent experiments that seek to reconcile productive and recreational river uses. An example is the Magasins Généraux (General Warehouses). This historic port site, a reinforced-concrete structure built in 1907 to handle freight linked to the Austerlitz train station (fig. 3), was a major economic hub until it gradually lost its function beginning in the 1970s, as central Paris underwent deindustrialization. The righthand section of the Magasins Généraux was redeveloped in the first decade of the twenty-first century as part of a large urban project known as "Les Docks." These former freight warehouses were transformed into an institute of fashion and design and now also house bars and restaurants.

However, the lefthand section of the warehouses remains to be redeveloped, and a new project there signals renewed interest in maintaining productive activities along the river. In 2021,



^ Fig. 4 Case study locations (Source: Jean Debrie, 2025. Basemap © Esri and © OpenStreetMap contributors, 2025, licensed under the Open Database License [ODbL]).

the port authority (HAROPA), in partnership with the City of Paris, launched a call for proposals to redevelop this section of the Magasins Généraux (pavilions 1 and 2) for river logistics. The company Sogaris won the tender with a project called "Les Amarres" which combines a variety of urban functions across the building's levels: logistics activity on the quay and ground floor, shelter for vulnerable populations on the first floor, office space on the second floor, and recreational uses (bars and restaurant) on the top floor. This "logistics hotel" concept is supported by a semi-public company (Sogaris), with public capital (including from the City of Paris) in partnership with a social and solidarity association (Aurore) and a logistics firm (Fluidis). Although the project is set to open in 2027 and it is too early to assess its outcomes, it represents a pursuit of economic diversity that allows logistics activities to remain in central Paris while integrating them with other social and economic functions. It also demonstrates strong public-sector support through investment and subsidies.

Conclusion: Urban Ports as a Political Agenda

The city–river relationship in Paris is undergoing a process of reconnection. Since the 2000s, riverbanks have once again become accessible to residents, and the creation of new public spaces has responded to strong social demand. At the same time, sustainability objectives call for reducing pollution and urban congestion, and the river can play a key role in achieving these goals. The Seine's contribution to achieving Sustainable Development Goals

is relevant for several economic sectors, including construction, distribution logistics for shops and offices, and waste management.

Addressing the challenges of urban congestion and pollution requires mixed river-based urban planning strategies in which the river assumes a greater role in managing urban flows. Small urban ports are therefore instruments of sustainability. Embedded within densely built environments, these ports must be redeveloped to better integrate them in the city.

In Paris, as in many European cities, port authorities and municipalities have, since the early twenty-first century, developed new frameworks for negotiation and cooperation. These evolving partnerships represent an important aspect of urban governance in port cities (Debrie and Raimbault 2016). The dual challenge of ensuring public acceptance of port activity in a context of citizen participation, and of advancing the sustainability of port development, has led to a rethinking of port integration. Cooperation between port authorities and municipalities should be strengthened through city–port charters that improve the landscape and architectural quality of these spaces. Such charters already exist and should be extended and discussed through participatory committees involving residents.

Deepening public dialogue around the city–port relationship constitutes an important democratic challenge. The presence of ports in the city can be legitimized through mixed urban uses (fig. 4). Combining logistics and port activities with other social and economic functions remains a relatively underdeveloped approach but is one that could signal a new era in the city–port relationship – an evolution that will require sustained public policy support.

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References

AIVP. 2015. *Faire la ville avec le port: guide de bonnes pratiques* [Making the City with the Port: Guide to Good Practices]. Le Havre: AIVP. Accessed September 10, 2025. https://www.aivp.org.

Atelier Parisien d'Urbanisme. 2010. *Paris Métropole sur Seine* [Paris metropolis on the Seine]. Arles: Actes Sud.

Backouche, Isabelle. 2000. *La trace du fleuve: La Seine et Paris*, 1750–1850 [The trace of the river: the Seine and Paris, 1750–1850]. Paris: Éditions de l'École des Hautes Études en Sciences Sociales

Debrie, Jean and Nicolas Raimbault. 2016. "The Port-City Relationships in Two European Inland Ports: A Geographical Perspective on Urban Governance." *Cities* 50: 114–22. https://doi.org/10.1016/j.cities.2015.10.004.

Guillerme, André. 1990. "Le testament de la Seine" [The testament of the Seine]. *Revue de géographie de Lyon* 65 (4): 240–250.

HAROPA Port. 2021. *Charte d'Améliorations des Ports* [Charter for improvements of the ports]. HAROPA Port. Accessed September 10, 2025. https://www.cap.haropaport.com/fr.

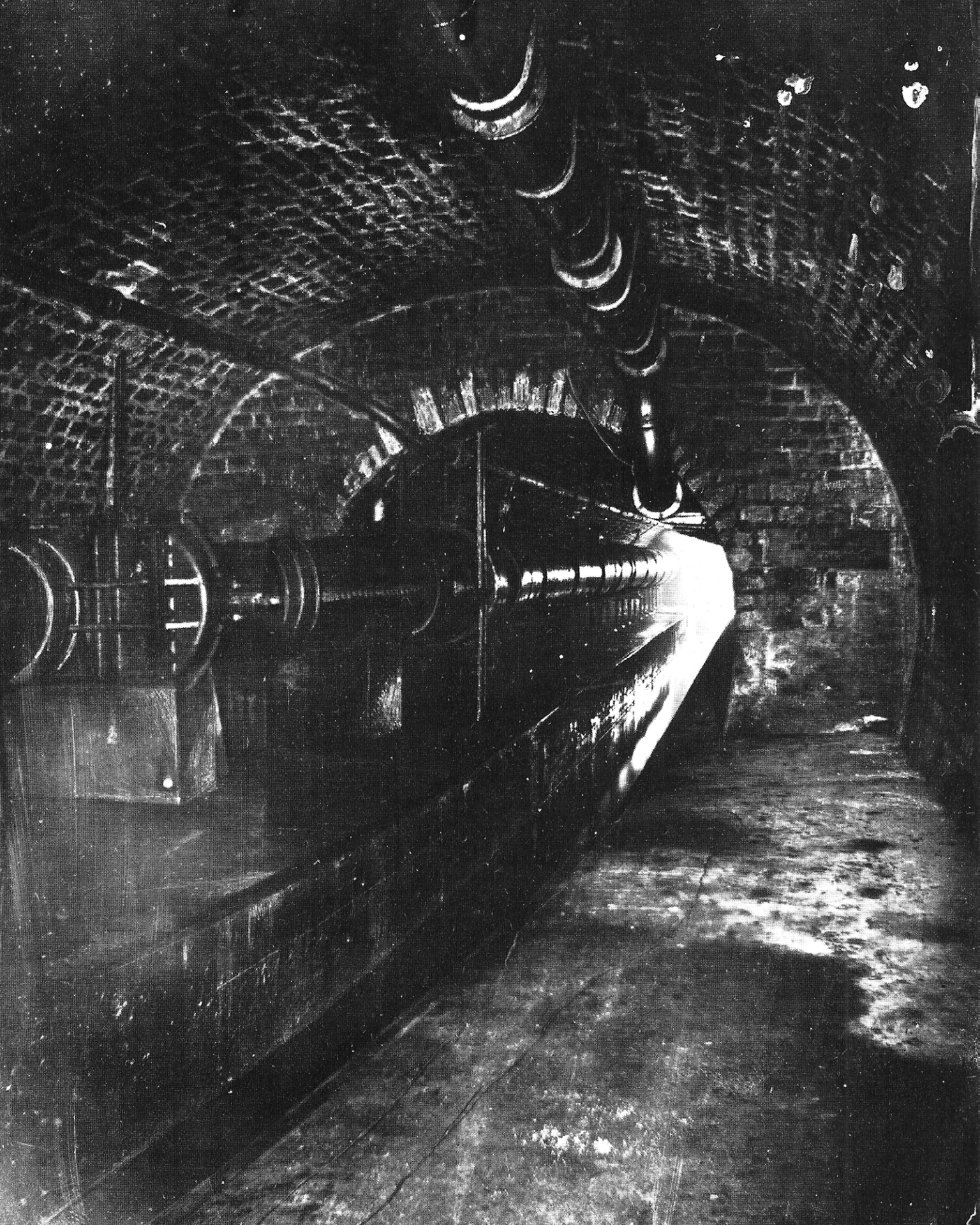
Mazy, Kristel. 2020. "The Evolution of the Relationship between Inland Ports and Cities: The Cases of Brussels and Lille." *PORTUSplus, the Journal of RETE* 10: 2–20. Accessed September 10, 2025. https://portusplus.org/index.php/pp/article/view/210/197.

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Paris Sewers: A 19th Century Heritage to Be Adapted to the Challenges of the 21st Century

Anita Ravlic

Abstract
The Parisian sewer system was designed and built primarily in the nineteenth and early-twentieth century. Today, the responsibility of the City of Paris is to maintain these 150-year-old structures, which are still in operation, and at the same time adapt this system to today's environmental challenges. When the sewer system was first established, the improvements it made to Parisians' comfort, health and quality of life were readily apparent: The sewers were part of the Hausmann plan, which modernized and beautified Paris, both above and below ground, bringing drinking water to homes and removing wastewater from the streets. At the time, Parisians were very aware of this new public service because it changed their lives, and they had the chance to visit the sewer as early as 1867. Today the situation is quite different: It is now a hidden, little-known part of the city, transformed to meet the challenges of preserving rivers and turning wastewater into a resource. However, the goal of making it possible to swim in the Seine has shed new light on the Paris sewer system and its catchment area.

KEYWORDS
modernity
heritage
sanitation
environment
adaptation

WATER ICONS



Policy Recommendations

- Ensure wastewater management that preserves natural environments and all living organisms (the return of urban swimming is indeed beneficial for the population).
- Move towards more environmentally friendly solutions such as on-site rainwater infiltration (the objective of the Paris-Pluie plan).
- Transform wastewater into a resource (thermal energy for renewable energy production, use of urine as fertilizer).

< Fig. 1 Égouts de Paris (Source: Gaspard-Félix Tournachon, 1861. Public domain, via Wikimedia Commons).

Introduction

Regardless of whether wastewater is ordinarily visible or not, we are reminded of its existence when problems arise. In Paris, such problems have included the devastating epidemics that took place until the end of the nineteenth century, and the pollution of natural environments that continues to occur in the twenty-first century. By inventing – or reinventing – its sanitation system, Paris has adapted to the needs of each of those eras, and it tells that story through a one-of-a-kind museum.

The Construction of a Sewer System: A Public Health Concern

According to engineer-turned-historian André Guillerme (1993), the more foul-smelling a city, the more prosperous its reputation. Paris fit that pattern under the Ancien Régime and even before that, as population density went hand in hand with an increase in waste and sludge. A few kilometers of sewers, attempts to create integrated systems – like the flush tank designed by Turgot in 1737 in the Chaussin d'Antin neighborhood – and authorities attempting to impose obligations on landlords did not eliminate the nuisances (e.g., stench, filthy gutters) caused by wastewater. Then, along came hygienists and Napoleon III. The former revealed the connection between dirty water, lack of sanitation and outbreaks of disease, while the latter launched Paris on a process of radical modernization and beautification.

The transformation of the city, above and below ground, was driven by Baron Haussmann, who in 1854 enlisted Eugène Belgrand, graduate of the engineering school École Nationale des Ponts et Chaussées and tasked him with distributing safe water throughout Paris, as well as organizing its drainage after use. Belgrand's integrated vision of the water cycle led him to design the entire system, which was a remarkable innovation at the time (Belgrand 1869; Reid 1991).

For sanitation, he designed a network of underground galleries operating as a hydrographic, gravity-fed system. A slope of 2 to 3 per cent eased the flow of water in small channels and collectors, while urban sewer sludge was evacuated partly by the strength of water through the use of flush tanks and partly by manpower. By studying the Seine's ability to carry waste, Belgrand solidified this water management model, which would become known as "*tout-à-l'égout*" (everything to the sewers) – collecting the entire mix of solid matter, wastewater and running water from the roads. The strength and intensity of the flows would ensure the purge and evacuation of the mix to the outlets.

Although in the first decades of its operation, the system mainly received runoff and domestic water, it was nevertheless designed to accommodate possible population growth and the collection of all wastewater. The size of the underground tunnels earned Belgrand the support of his contemporaries, who attributed to him a certain delusion of grandeur. After numerous debates between engineers and doctors, the *tout à l'égout* (sewer system) finally became mandatory in 1894, and cesspools eventually disappeared. The saturation of the Parisian sewer network today occurs during periods of heavy rainfall. A plan to disconnect rainwater from the system is being sought, at a time when the population of Paris is experiencing a decline.

Drinking water eventually made its way into the domestic sphere, and with it, sanitation. Paris became healthy, clean and navigable in all

weather. The sewers gained respect and admiration, with the first tours offered as part of the Exposition Universelle of 1867, testifying to the modernity and progress brought by this major work, which needed to be seen. Socialites were guided through the system by sewer workers, their immaculate white work coats symbolizing cleanliness. Ladies and gentlemen dressed in their finest attire rushed in. Victor Hugo, undoubtedly the author most inspired by the sewers, wrote an almost nostalgic description of the former cesspool of the first half of the nineteenth century (Hugo 1969):

> *Aujourd'hui, l'égout est propre, froid, droit, correct. Il réalise presque l'idéal de ce qu'on entend en Angleterre par le mot "respectable". Il est convenable et grisâtre ; tiré au cordeau ; on pourrait presque dire à quatre épingles. Il ressemble à un fournisseur devenu conseiller d'État. On y voit presque clair. La fange s'y comporte décemment.*
>
> [Nowadays, the sewers are clean, cold, straight, correct. They almost embody the ideal of what is meant in England by the word "respectable." They are fitting and greyish; laid out in perfect straight lines; one might almost say, neat as a pin. They resemble a supplier turned state councillor. One can almost see clearly in there. The mire behaves itself decently].

Tours of Paris's sewers have continued in various, more or less baroque forms: tours by "wagon-vanne" (valve-carts) in the early twentieth century and by boat until the early 1960s, before finally settling at the current Pont d'Alma site in 1975 under the name "Public Visit to the Sewers." At this focal point of the network, every type of chamber can be observed, from the smallest (the "elementary sewer") to the largest ("the emissary") as well as every type of equipment in the network, including automatic valves, stormwater outlets and floodwater



^ Fig. 2 Paris Sewer Museum's dry gallery (Source: Olivier Placet/Ville de Paris, 2021).



^ Fig. 3 The Bercy bathing area in the 12th arrondissement of Paris (Source: DPE/Ville de Paris, 2025).

plants. The collectors have been adapted to facilitate walking alongside the basins and the tour site has been known as the "Paris Sewer Museum" (Musée des Égouts de Paris) since its most recent renovation (2018–2021).

However, people no longer visit the Paris sewers for the same reasons they once did. People tend not to marvel at running water and wastewater disposal as examples of incredible progress. As the convenience gradually came to be taken for granted, public awareness of how these systems operate diminished and became part of the city's hidden side. Sewer workers, well-known figures to Parisians of past centuries and often caricatured, became men of the shadows (the profession just recently started seeing women join its ranks and only marginally).

For those of us who work at the Paris Sewer Museum, beyond offering the thrill still to be enjoyed by descending into the sewers, opening our galleries to users, tourists and the many school groups that visit mainly stems from a desire to explain how the city functions and a sense of mission to raise awareness about new challenges.

Sanitation, an Environmental Service

What visitors get to see at the museum – which remains an operational site, unlike what its name suggests – is the great paradox of the Paris sewers: a work inherited from the prodigious civil engineering of the nineteenth century, which must now meet contemporary

environmental challenges. In 1911, of the 2,500 km sewers Paris has today, 1,214 km of sewers had been built, amounting to nearly 50 per cent of the network. These kilometers of galleries, over 100 years old, are still in operation and conform to the three main principles that apply to almost the entire network: unitary, accessible and gravity-fed. The Service Technique de l'Eau et de l'Assainissement de Paris (Technical Service for Water and Sanitation of Paris) is responsible for the conservation of these works while they still fulfill their original function.

The Asnières collector, the main artery of the system and over 160 years old, has never been dry since its construction. It will undergo its first renovation in 2026. Other major historical works beneath the Seine's riverbed are the siphons: using gravity they carry water from the left bank of the Seine to the right, and every 10 to 15 years they are taken out of service for inspection.

In addition to fulfilling its maintenance responsibilities, The Service Technique de l'Eau et de l'Assainissement de Paris is striving to correct the main flaw of Belgrand's system. When the system becomes overloaded during intense rainfall events, the process of discharging into the Seine both wastewater and run-off water, collected together, becomes overloaded. A modernization plan launched in the 1980s has made it possible to automate the regulation and storage of wastewater. Equipment connected to and remotely controlled from a continuously operational control center is distributed across the network. Therefore, the network is now described as "regulated," since it has switched from simply collecting waters to managing fluxes and closely tracking meteorological events. The Gestion Adaptative des Ouvrages (Adaptive Infrastructure Management; GAO) commissioned in 2025 reinforces the network's resilience by anticipating rainfall events: automatic instructions follow predictive scenarios for those events instead of reacting to ongoing situations. Discharges into the Seine have been reduced tenfold from 1980 to 2000, thanks to the regulated networks, despite their representing only 3 per cent of the sanitation system.

We can now glimpse the possibility of an ecological revitalization of the river, and a swimmable Seine has become an attainable dream. The river's ecosystem restoration can be tangibly observed, as in the return of over 30 species of fish to the Seine in Paris. Meanwhile the Olympic and Paralympic open-water trials held in the Seine in 2024 served as a formidable catalyst for public action to improve the quality of both the Seine and Marne Rivers (Paques 2024). Once again, an assertive political vision set in motion through proactive public policies is enabling the city's transformation. Bathing in the Seine in Paris during a major heat wave is nothing short of a major transformation, as there is no greater cool oasis. In this sense, the idea of a swimmable Seine once again shines a light on the fundamental role of sanitation in people's everyday lives.

Sanitation can provide other strategic environmental services, such as the production of either heat or cold through the recovery of heat or cooling capacity from wastewater, whose temperature remains constant between 15 to 17 degrees Celsius throughout the year. In Paris, several public buildings are already partially heated or cooled in this way, and in the future, the brand new Grange aux Belles neighborhood in the 10th arrondissement will also draw on this energy source. Wastewater thus has become a resource that supports Paris's goals for local renewable energy production. Likewise, the planned large-scale separate col-

lection of urine in the future Saint-Vincent de Paul neighborhood in Paris's 14th arrondissement assigns new value to human excreta, with collected urine being used to fertilize the city's green spaces.

Conclusion

The strength of Paris's sanitation system lies in its ability to combine an infrastructure inherited from the nineteenth century, which could be described as "low-tech" and as historical heritage, with a state-of-the-art management system comparable to artificial intelligence. The former proved its resilience in a harsh environment, harnessing the strength of the elements, while the latter provides an answer to the need to safeguard ecosystems and life in general. Sanitation remains essential to urban operations, but it is increasingly perceived as an environmental service and an integral part of cities' adaptation to climate change.

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References

Belgrand, Eugène. 1869. *La Seine. I. Le bassin parisien aux âges antéhistoriques* [The Seine. I. The Paris Basin in prehistoric ages]. Paris: Imprimerie impériale.

Guillerme, André. 1993. *Les temps de l'eau: La cité, l'eau et les techniques: Nord de la France, fin IIIe-début XIXe siècle* [The times of water: The city, water, and technologies: Northern France, late third to early nineteenth century]. Seyssel: Éditions Champ Vallon.

Hugo, Victor. 1969. *Œuvres complètes*. Edited by Jean Massin. Paris: Le Club français du livre.

PAQES. *Plan pour l'amélioration de la qualité de l'eau de la Seine et de la Marne*. Signé en 2018 et engageant 27 partenaires d'Île-de-France, établit 50 actions pour atteindre l'objectif de baignabilité pour tous des deux fleuves franciliens.

Reid, Donald. 1991. *Paris Sewers and Sewermen: Realities and Representations*. Cambridge, MA: Harvard University Press.

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DANGER

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The Paris Sewer Renaissance: Data, Health and Participatory Science

Thomas Thiebault, Catherine Carré & Jérémy Jacob

Abstract
Aging urban wastewater infrastructure, often overlooked, can become a powerful lever for environmental and public health policy. Through the lens of the Parisian sewer system, this article highlights the growing pressures on sanitation networks – from combined sewer overflows to emerging chemical contaminants – and the limits of current treatment technologies. Yet, it also illustrates how wastewater can serve as a valuable resource. Initiatives like OBÉPINE have demonstrated the feasibility of wastewater-based epidemiology at scale, while participatory initiatives such as those performed in EGOUT show that citizen engagement and scientific monitoring can go hand in hand. Together, these efforts redefine wastewater as more than waste: It is a mirror of collective behavior, a platform for community science and a tool for decision-making. As cities face urgent climate and health challenges, this work calls for policies that reconnect people with infrastructure and invest in data-driven, inclusive approaches to urban sustainability.

KEYWORDS

water quality
wastewater
chemical contamination
microbial contamination
participatory sciences

WATER ICONS





Policy Recommendations

- Wastewater-based epidemiology (WBE) has transformed sewers into real-time monitoring tools, with initiatives like OBÉPINE in France demonstrating their value for national health surveillance and broader environmental policy.
- Aging combined sewer systems like Paris's face mounting pressures from climate change, urban densification, and emerging contaminants, making combined sewer overflows a persistent environmental and regulatory challenge.
- Participatory projects such as EGOUT show how wastewater science can reconnect citizens with invisible infrastructure, using co-designed interventions to link daily habits, health promotion, and community engagement.

< Fig. 1 Management operation in the sewer network (Source: Jérémy Jacob, 2025).

Introduction

Urban sewer systems form the foundation of modern sanitation, yet their age and invisibility have led to growing disconnections between infrastructure, public health goals and citizen engagement. In Western Europe, most networks date to the nineteenth century and have evolved incrementally rather than through comprehensive renewal. These combined sewer systems (meaning systems in which both stormwater and wastewater flow through the same pipes), like the system in Paris, now face mounting pressure from climate change, increased urban density and a growing array of chemical and biological contaminants. Combined sewer overflows (CSOs) during rainfall events discharge untreated wastewater into the environment and pose regulatory and ecological challenges that demand both technological upgrades and adaptive governance.

The legacy of outdated infrastructure also limits society's ability to respond to emerging threats, whether chemical (e.g., pharmaceuticals, PFAS, endocrine disruptors) or biological (e.g., viruses). However, recent developments in wastewater-based epidemiology (WBE), particularly during the COVID-19 pandemic, have revealed new ways to leverage this invisible infrastructure for real-time monitoring of population health and environmental pressure. Initiatives like the French OBÉPINE (Observatoire Épidémiologique dans les Eaux Usées) network have shown that wastewater data can inform national health policy, while opening new possibilities for local decision-making.

At the same time, reengaging citizens with their sewer systems, traditionally managed out of sight and out of mind, offers pathways toward participatory urban sustainability. Projects such as EGOUT (Extended Geochemical Observation of Urban Trajectories) demonstrate that wastewater can serve as a medium for public engagement, data co-production, and health promotion. This article introduces the converging challenges and opportunities of aging urban sewers, arguing for a renewed policy agenda that links infrastructure, science, and civic action.

Aging Sewers, Emerging Threats: The Hidden Challenge of Urban Wastewater

Western European sanitation networks mainly date back to the late nineteenth century and share common characteristics, one of the most significant being that they are often combined sewer systems. This has been the case for the Parisian sewer network since 1833. Such a network was a matter of national pride by the end of the nineteenth century, particularly with the discovery of the pathogenic role of waterborne diseases, such as cholera, and the system drew visitors of that era who were interested to observe how the system worked. This national pride has gradually declined, mostly as the system has become invisible to the public and city residents have lost knowledge of the system beyond waste transport (Barles 2007). In the run-up to the 2024 Olympic Games and during the COVID-19 pandemic, sewage returned to the news, but for different reasons. In relation to the Olympics, there was the plan to improve the network's capacity to limit direct discharges into aquatic environments, particularly during intense rainfall events, by developing storage capacity. In relation to the pandemic, attention was drawn to a plan to use wastewater to estimate the amount of SARS-CoV-2 circulating in the population.

However, this kind of sewer system is highly vulnerable to rapid overloading during intense

rainfall events on impervious surfaces, leading to CSOs of raw wastewater mixed with runoff from urban surfaces. Although episodic rather than continual, these CSOs are major sources of contamination for water bodies (Petrie 2021), particularly in terms of emerging contaminants, fecal bacteria and plastics. To mitigate them, storage capacities have been implemented to store temporary raw water during rain events (for example, in Paris in preparation for the 2024 Olympic Games). However, their total capacity remains limited and is designed to handle only frequent but moderate rainfall events (Lucas et al. 2020). It is also important to note that when considering chemical pressure on the receiving environment, it is primarily everyday practices, whose residues are not fully treated in wastewater treatment plants (WWTPs) that contribute to this pressure.

The intense urban concentration and densification of the past century, relying on sanitation networks that have been adapted rather than completely renewed, have tested the ability of receiving environments to absorb pollution. These environments are experiencing increasing chemical pressure, sometimes exceeding critical thresholds (e.g., massive deoxygenation, eutrophication), which significantly impacts ecosystems and biodiversity. While the widespread improvement in wastewater collection and treatment has recently reduced issues related to traditional water quality parameters such as carbon (C), nitrogen (N) and phosphorus (P), advancements in analytical capabilities and the expansion of the range of molecules being monitored have highlighted a major issue (Soares 2020). Current wastewater treatment processes are not well-suited to removing certain pollutants that involve particularly persistent and very mobile molecules (e.g., trifluoroacetic acid).

Wastewater Analysis as a New Frontier in Environmental and Public Health Monitoring

Awareness of low-dose environmental contamination by micropollutants has stimulated growing interest in monitoring raw wastewater prior to treatment, particularly to assess the efficiency of wastewater treatment processes. Raw wastewater is highly representative of population usage as it is closer to the source of human excretion and contains a wide range of detectable molecules. This proximity has laid the foundation for WBE, a discipline that quantifies daily human activities and uses through chemical analyses of wastewater. Initially focused on the detection of illicit drugs, WBE has expanded to include a broad spectrum of compounds, such as pharmaceuticals and pesticides, enabling insights into population-level exposure and consumption patterns. To produce meaningful interpretations, WBE requires accurate quantification of target compounds and correction factors such as human excretion rates and in-sewer degradation dynamics. Similar to approaches used for river monitoring, composite sampling is typically employed in wastewater studies to account for temporal variability. However, raw wastewater presents considerable analytical challenges due to its complex composition and matrix, requiring several steps to isolate micropollutants and pathogens from the organic matrix.

In France, and particularly in Paris, several initiatives aim to use wastewater for public health monitoring. The OBÉPINE network has played a pioneering role in applying WBE at a national scale, and particularly in the Parisian conurbation. Established during the COVID-19 pandemic, OBÉPINE demonstrated the viability of wastewater as a real-time health surveillance tool by tracking SARS-CoV-2 levels across hundreds of wastewater treat-

ment plants (Wurtzer et al. 2022). The network's success brought WBE into the public spotlight and underscored the value of decentralized, high-frequency sampling for public health decision-making. Beyond its application to viruses, OBÉPINE set a precedent for infrastructure, coordination and data interpretation that could be extended to other chemical and biological markers. The experience gained during the pandemic has laid the groundwork for integrating wastewater monitoring into broader environmental and health policies, particularly in urban areas where decision-makers face growing pressure to assess chemical exposure and improve quality-of-life indicators such as bathing water safety. Other Parisian initiatives on contaminant monitoring in wastewater for practice estimation are also promoted by the SIAAP (sewer manager) under its micropollutant observatory initiative, and the EGOUT project.

One ongoing challenge in expanding WBE lies in the need to monitor not just persistent xenobiotics but also labile endogenous compounds, such as human metabolic markers. These molecules degrade quickly in wastewater, yet they offer valuable insights into health, diet and stress. The ability to detect these compounds reliably would enhance WBE's relevance for preventative health monitoring, which will be an objective of a new project centered on the Parisian context, WHAOU (Well-Being and Health Observatory within Urban Trajectories). In the post-COVID context, the legacy of these wastewater-monitoring experiences make this socially and politically useful but buried heritage visible. It highlights wastewater's untapped potential as both a scientific resource and a tool for proactive public policy on health and sustainability.

Reconnecting Residents with Sewers through Participatory Action

While monitoring public health in large populations is notoriously difficult, particularly when



^ Fig. 2 Researchers and a Parisian volunteer presenting the experiment and distributing recipes at markets in the 20th arrondissement (Source: Jérémy Jacob, 2025).

timely, granular data is needed, the potential contribution of the sewer network in this endeavor is mostly invisible and unknown to the residents. Within the EGOUT project, an initiative was undertaken to reconnect residents to their sewers (fig. 2). The aim was to explore whether WBE could detect dietary changes during a community-driven dietary intervention and, in doing so, reconnect residents with their wastewater system through a shared scientific initiative. The initiative took place in Paris's 20th arrondissement and potentially involved over 100,000 residents, with a focus on the Pyrénées Elementary School. In collaboration with teachers, local officials and the Paris Volunteers network, a participatory campaign encouraged increased fruit and vegetable intake during a dedicated week. Researchers monitored wastewater before, during and after the intervention, analyzing specific biomarkers related to plant-based diets and vitamins.

To ensure engagement, the action was co-designed with 104 residents and publicized via local markets, media outlets and a school program involving 150 children. Communication avoided moralizing tones, instead framing the project as a "scientific adventure" that celebrated transparency and community input. Children created sewer models and visited the Paris Sewer Museum, helping translate the science to their families and neighbors. Recipes, educational videos and public events further supported community involvement. Wastewater samples were analyzed for eight chemical markers, including fiber tracers and vitamin B metabolites. Of the six relevant dietary tracers, four showed statistically significant increases during the intervention week, suggesting a measurable shift in food consumption (Thiebault et al. 2025). Control compounds like saccharin and paracetamol remained stable, reinforcing the dietary origin of observed changes. While individual intake could not be quantified due to population-wide sampling and varying excretion rates, the experiment showed that wastewater could reflect collective lifestyle shifts. Beyond data, it redefined wastewater as a community asset, both a mirror of urban behavior and a platform for civic engagement. Importantly, the project avoided privacy concerns by emphasizing aggregated, anonymous data, and involved the public throughout, from planning to results dissemination. Branded with the playful slogan ''Donner mon caca à la science'' (give your poo to science) the project reframed wastewater as a tool for health promotion and local empowerment. It opened up conversations about sustainable diets, food accessibility and the future of community-based monitoring. By linking daily habits with invisible infrastructure, the initiative reconnected residents with the urban sewer system and demonstrated the potential of wastewater science to support participatory urban sustainability.

Conclusion

Urban wastewater systems are at a crossroads. Originally designed for a different era, they now face mounting environmental, public health and societal pressures. Yet within these challenges lies an opportunity to reframe sewers not merely as conduits for waste, but as tools for monitoring, prevention and civic dialogue, thereby promoting a new way of thinking about these underground infrastructures.

The growing field of wastewater-based epidemiology, as demonstrated by initiatives like OBÉPINE, has proven the potential of sewage as a public health resource. Meanwhile, participatory projects such as EGOUT show that communities can be meaningfully engaged in

how wastewater is interpreted and used upon. Together, these approaches point toward a new policy horizon – one that integrates infrastructure renewal, scientific innovation and democratic participation.

Moving forward, aligning environmental and health objectives with sewer system upgrades will be essential. This means funding data-driven monitoring programs, enabling local experimentation and promoting public awareness. If embraced strategically, wastewater can become a powerful vector for urban resilience, social engagement and sustainable health policies – turning an aging network into a platform for renewal.

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References

Barles, Sabine. 2007. "Urban Metabolism and River Systems: An Historical Perspective: Paris and the Seine, 1790–1970." *Hydrology and Earth System Sciences* 11 (6): 1757–69. https://doi.org/10.5194/hess-11-1757-2007.

Lucas, Françoise, Bernard de Gouvello, Jean-Marie Mouchel, Laurent Moulin, Pierre Servais and Sébastien Wurtzer. 2019. "The Microbiological Quality of the Seine River: Is It Compatible with Open Water Olympic Competitions?" In *Hosting the Olympic Games: Uncertainty, Debates and Controversy*, edited by Marie Delaplace and Pierre-Olaf Schut, 163–177. London: Routledge. https://doi.org/10.4324/9780429274695-10.

Petrie, Bruce. 2021. "A Review of Combined Sewer Overflows as a Source of Wastewater-Derived Emerging Contaminants in the Environment and Their Management." *Environmental Science and Pollution Research* 28 (25): 32095–110. https://doi.org/10.1007/s11356-021-14103-1.

Soares, Ana. 2020. "Wastewater Treatment in 2050: Challenges Ahead and Future Vision in a European Context." *Environmental Science and Ecotechnology* 2: 100030. https://doi.org/10.1016/j.ese.2020.100030.

Thiebault, Thomas, Catherine Carré, Gauthier Bernier-Turpin, Camille Asselin, Anne-Fleur Barfuss, Nada Caud and Jérémy Jacob. 2025. "Using Wastewater to Monitor Suggested Changes in Dietary Intake: A Participatory Experiment." *Journal of Urban Health* 102 (4): 872–76. https://doi.org/10.1007/s11524-025-00992-x.

Wurtzer, Sébastien, Prunelle Waldman, Morgane Levert, Nicolas Cluzel, Jean Luc Almayrac, Charlotte Charpentier, Sophie Masnada et al. 2022. "SARS-CoV-2 Genome Quantification in Wastewaters at Regional and City Scale Allows Precise Monitoring of the Whole Outbreaks Dynamics and Variants Spreading in the Population." *Science of the Total Environment* 810: 152213. https://doi.org/10.1016/j.scitotenv.2021.152213.

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Possible Futures of the Parisian Sanitation System and How to Adapt the City's Heritage to the Effects of Climate Change

Jean-Pierre Tabuchi, Catherine Carré & Jean-Claude Deutsch

Abstract
Climate change will profoundly affect urban water management through its effects on the water cycle but also in terms of the changes required for climate mitigation. In this context, Eurydice, an association of urban hydrologists, has sought to imagine various futures of urban water management. In this article, we explore potential changes that could reshape the Parisian landscape, including the management of heavy rainfall and severe drought, very low flows in the Seine, and the phasing out of individual cars in the city, which may open new opportunities for the reuse of parking structures. Our aim in the article is to broaden perspectives on urban water management.

Policy Recommendations

- Set up a City of Paris working group by 2026 to carry out a preliminary study of the possible consequences of climate change for historical heritage, as well as for technical heritage, which is often neglected.
- Provide training from 2026 onward on the effects of climate change for institutions in charge of heritage management in Paris.

KEYWORDS

climate change
urban water
sewage
stormwater management
sanitation

WATER ICONS



< Fig. 1 A freight barge on the Seine in Paris (Source: Jean-Pierre Tabuchi, 2014).

Introduction

Eurydice, an association of urban hydrologists founded in 1988, has launched a foresight exercise to imagine possible futures of urban water management in about fifty years. Climate change is of course at the heart of these reflections, because of its many effects on natural, urban, agricultural, economic and other types of environments. Acting on these effects requires both drastic mitigation and adaptation measures. Despite the warnings issued by scientists, we have been slow to take necessary measures. The impacts of the measures to be taken, if they are taken, will be powerful and they will affect all societies (as will the effects of climate change, if we do nothing). Therefore, conducting this prospective exercise is eminently risky and it will most likely be contradicted by the facts. However, it allows us to see current points of weakness, both societal and technical, in order to remedy them today.

In carrying out this exercise, we have imagined three different scenarios based on the scenarios drawn up by the French Environment and Energy Management Agency (ADEME) for France to achieve carbon neutrality by 2050. The three contexts allow us to project ourselves into the future. The first is characterized by a controlled and accepted sobriety and assumes that climate change mitigation objectives have gained widespread acceptance by political leaders and members of the population. It means that society has been able to organize itself to reduce its final energy consumption by 40 per cent, with all that this implies in terms of changes in travel habits and becoming more careful about its consumption of raw materials. The second context is characterized by an unwanted and uncontrolled sobriety. Society has squandered its chances of adopting a successful climate change mitigation and adaptation policy. This has led to shortages of energy and raw materials. Society operates in a "degraded mode" or permanent crisis. The third context is shaped by technological innovation. Technology makes it possible to repair the damage caused to the environment by human activity.

Regarding the climate, given the global situation observed in 2025, we consider the IPCC's SSP3 scenario to be plausible. It involves an increase in the global average temperature of more than 3°C.

The result of this exercise is that the world of tomorrow will be very different from the one we know today. It will be a very unstable world where all our statistical references will be turned upside down.

The Case of Paris: A Significant Legacy

The city of Paris and the greater Paris metropolitan area have inherited an important and historic "water heritage" involving its water supply and wastewater treatment. The city's most significant water heritage dates mainly to the nineteenth century and includes its canals and aqueducts, its dual water distribution network (drinking and raw water) and a sewer system that is unique in the world because it is fully visitable (in its Parisian section) and was made famous by Victor Hugo's 1862 novel *Les Misérables*.

The twentieth century brought a system of 800 million m^3 reservoirs upstream of the agglomeration, which is a formidable tool for adapting to climatic extremes including droughts and flooding of the Seine. Wastewater treatment infrastructure has also undergone considera-

ble development, enabling the Seine, where it flows through the capital, to attain the good physico-chemical status of the Water Framework Directive.[1] This recovery of river water quality provides sufficient conditions, in dry weather, for swimming, as displayed during the Paris 2024 Olympic and Paralympic Games.

Finally, it is worth emphasizing the importance of clean water flowing along the banks of the Seine in Paris, which are listed as a UNESCO World Heritage Site.

The Consequences of Climate Change

Based on scientific studies of the effects of climate change, we have identified three major changes that will take place in the functioning of the water cycle in the Seine basin by 2100. As for total annual precipitation, it should remain close to current levels, but with a different distribution throughout the year. Winters will most likely be wetter, with increased frequency of flooding likely. In summer, the rains will be less frequent but more violent, thus challenging the ability of wastewater systems to manage storm events, particularly in the Parisian combined sewer system. Managing the impact of these rains on Seine River pollution (and therefore swimming) will also be much more complex.

However, the natural summer flow of the Seine will be reduced by 20 to 40 per cent. The Seine Grands Lacs reservoirs will be able to alleviate the reduced flow, but with a higher probability of failure compared to the present time (Dorchies et al. 2012). A recent study by Météo France (Soubeyroux et al. 2025) shows that in France at +4°C, the number of hot nights (night-time temperature over 20°C) would increase from 8 to 43. The number of heatwave days could be multiplied by 7. The fight against urban heat could therefore become a vital issue. On a purely physical level, we must therefore prepare for a world of tomorrow that is very different from today. Policies to adapt to climate change will become a necessity, provided that the financial means and natural resources are sufficient.

Possible Changes

As a consequence and as a response to climate change, there are many possible societal changes. If we remain in a context of voluntarily reduced fossil fuel emissions and resource consumption, it is very likely that investment capacity will trend downward because the objective of sobriety can only be achieved in a world that is reducing its economic activity. The role of the automobile in the mobility of tomorrow should be very different and significantly reduced. The role of river transport could be much greater. Eating habits could change quite radically, with animal protein consumption halved, for example, and local food production increased. Finally, it is reasonable to think that tourism could be very different from what we know today, and probably much reduced.

In terms of water management, due to extreme instability of the weather, we can expect a periods of water scarcity. We can expect the development of rainwater harvesting and its use, including domestic use, along with the development of alternative sanitation methods such as those that allow the use of urine as a fertilizer, as well as higher stakes in the manage-

1. https://www.eau-seine-normandie.fr/documents-strategiques/Etat-des-lieux-2025.



^ Fig. 2 Two examples of white roofs for albedo reduction (Source: Jean-Pierre Tabuchi, 2025).

ment of extreme rainfall events, an increase in the temperature of the wastewater and therefore significant odour problems, difficulties in maintaining the quality of the Seine in good condition and suitable for bathing, very low flows of the Seine in some summers.

Two proposals for adaptation

To illustrate the possible impacts of these changes on the urban fabric and sanitation, we propose two actions in response to urban runoff and heat waves. The first involves transforming underground parking lots into rainwater storage reservoirs. Indeed, a virtual disappearance of the private car is plausible, at least in Paris. Paris has 140,000 underground parking places. This potentially offers a storage capacity of 4 million m^3, representing an enormous potential to be investigated for the collection and reuse of rainwater.

Conclusion

Based on our reflections on what urban water management may face in about fifty years' time, we note that we can expect any possible future situation to be very different from what we know today. When reflecting on the future of historical heritage, this observation leads us to ask:

- what the consequences might be of a plausible scarcity of financial resources, while recognizing that adaptation to climate change should become an absolute investment priority;
- how to manage potential conflicts between adaptation measures and the protection of historical heritage (including the banks of the Seine and the rooftops of Paris);
- what place tourism might have in the future, and what revenues it might provide to finance heritage preservation.

As for reconnecting the city to its river, this would seem to be an essential step in the context of adapting to climate change, given the Riverbanks amenities. Will it be possible to maintain a swimmable Seine? It is legitimate to ask the question.

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References

Dorchies, David, Pierre-Yves Bourgin, Charles Perrin, Amélie Astruc, Jean-Louis Rizzoli et al. 2012. "Impacts des changements climatiques sur la gestion des barrages-réservoirs du bassin de la Seine: Premiers résultats du projet Climaware" [Impacts of climate change on the management of reservoir dams in the Seine basin: First results of the Climaware project]. Paper presented at the Conférence internationale I.S. Rivers, Lyon, France, June 2012. https://hal.science/hal-00952296.

Soubeyroux, Jean-Michel, Sébastien Bernus, Brigitte Dubuisson, Agathe Drouin, Thumette Madec et al. 2025. "À quel climat s'adapter en France selon la TRACC? Partie 2" [What climate should France adapt to according to the TRACC? Part 2]. Météo-France. https://hal.science/hal-04991790v3.

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From Paris Plages to a Sustainable River

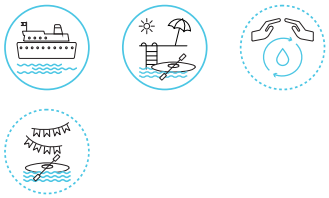
Bruno Gouyette

Abstract
Two decades ago, Paris shifted from a functional municipal policy for the Seine to one that approached the river as an extension of the city. Until the 1990s, the Seine was a service area that fulfilled very specific transport functions. The same period saw growing concern about heritage and a need to preserve the river landscape and its architecture. In the 2000s, the Paris-Plage program marked a transition to a policy focused on the variety of ways the river is used. It also led to the establishment of new urban lifestyles along the river and, as a result, to imagining new ways of using the water. Today, three new trends are emerging: the need to broaden our perspective and consider the Seine on the scale of the entire valley; the return of the "river system" with all its hydrological and natural characteristics; and finally, the slow emergence of "rights of nature" in political debates.

KEYWORDS

Seine River
Paris
usages
heritage
environment

WATER ICONS



Policy Recommendations

- The City of Paris and the Port Authorities should develop a new master plan with a 20 year perspective for the Seine River and its banks that includes neighboring local authorities. This master plan should specify main uses of the river such as for freight, sports and leisure, or biodiversity.
- The City of Paris should experiment with new natural riverfront developments in order to promote permeability of ground, natural air refreshment and new trees and aquatic plants, in accordance with its new biodiversity plan (City of Paris, June 2025a).

< Fig. 1 A barge crossing Paris on the Seine (Source: Jean-Baptiste Gurliat / Ville de Paris, 2025).

Introduction

My perspective is not that of a researcher: It is the perspective of an urban planner and the project manager for numerous public spaces in Paris. This article will attempt to interpret public policy concerning the Seine in Paris over the last 30-some years. During the 1990s, an imperceptible shift took place in municipal policy. At the beginning of the decade the Seine and its banks were largely perceived as service areas and the river as a fluid, aquatic space radically distinct from the rest of the city. By the end of the decade, as clear in various urban projects, the Seine was more often seen as an extension of the city. These two approaches continue to coexist, but they are also being challenged by new perspectives: the scale of the Seine Valley, the resurgence of hydrological and natural issues, and the rights of nature.

The Seine as Functional Resource and Heritage Site (Late Twentieth Century)

Until the 1990s, the Seine was primarily a service area, fulfilling very specific transport/mobility functions. The river hosted inland waterway transport, including bulk freight transport (of cereals, sand, gravel, construction waste, etc., amounting to 4 million tons crossing Paris in 2020) and tourist traffic on passenger boats. A significant portion of the banks was devoted to car traffic, with distinct sections open to walkers and serving boats at the quays, many of which were houseboats.

Everyday pedestrian use of the area at that time mainly consisted of walking along the high quays and looking down on the moving landscape of boats and cars crossing the Seine. This was also the period when the last bridges over the Seine were built, such as the Charles de Gaulle Bridge, opened in 1996, the last road bridge, and the two pedestrian bridges at Solférino/Léopold Sédar Senghor (1996) between the Tuileries Garden and the Musée d'Orsay, and the Simone de Beauvoir footbridge (2006) between the Parc de Bercy and the BnF-François Mitterrand (Pavillon de l'Arsenal 1998) (fig. 1).

At the same time, concerns were growing about the heritage of the riverbanks and the built and floating structures along the river. In 1991, UNESCO classified the banks of the Seine in Paris (an area of more than 500 hectares between the Île St-Louis and the Eiffel Tower-Trocadéro) as a World Heritage Site. Then, in 1997, Mayor Jean Tiberi announced an ambitious plan to reclaim the riverbanks, including the renovation of numerous historic bridges, the illumination of some of the bridges and the creation of a continuous promenade along the banks.

At the end of this period, the state services, the City of Paris services and the Paris Urban Planning Agency (APUR) drew up the first version of a charter of architectural and landscaping requirements for the banks of the Seine, which was approved in 1999 (APUR 2010).

Paris-Plages as a transition towards a more usage-oriented political vision (2000s)

In 2001, newly elected city mayor Bertrand Delanoë announced plans for Paris-Plages (Paris Beaches), which was presented as a first step in reclaiming the banks of the Seine for Parisians. The program consisted of providing spaces along the river, including sandy beaches, during the summer months, along with cultural and recreational activities including sports, as well as temporary refreshment stands.



^ Fig. 2 Swimming in the Baignade de Grenelle in the Seine, at Île aux Cygnes in the summer (Source: Josephine Brueder / Ville de Paris, 2025).

The program emphasized the preeminence of scenography over permanent works and the creation of an ephemeral decor designed to change representations of space and allow for new uses, based on the code of seaside resorts. Spaces began to be seen as having a temporary and reversible nature. This contributed to the emergence of new urban practices in which users become actors engaging in leisure activities on the banks of the Seine.

The early 2000s are the momentum of several public and private initiatives on the Seine and its banks. In particular, the construction of the national François Mitterrand Library and its opening to the public in 1998 led to a change in the perception of the ports located below key locations. The government decided to remove the industrial facilities from the Port de la Gare and relocate them upstream to the Port de Tolbiac, which was itself undergoing redevelopment. The Port de la Gare became the first urban port entirely devoted to leisure and dining activities. In the mid-2000s, it welcomed a public swimming pool on the water and a dozen restaurant boats. In fine weather, from May to October, the quays are covered by huge temporary terraces, hosting cafés, restaurants and leisure facilities that are popular with Parisian visitors and residents of the larger metropolitan

area. It was within the perimeter of the Port de la Gare that the first charter for the use of Parisian ports was established in the early 2010s.

In the mid-2010s, it was finally time to transform the riverside roads with the Parc Rives de Seine project, starting with the right bank, then the left. Once again, the ports became leisure areas and locations for new boats and floating facilities: the Hôtel de Ville port, the Solferino port, the Invalides port and so on.

The 2000s were a transitional period of converging, but often competing, visions of the uses and functions assigned to the river and its banks. The two approaches are not mutually exclusive. All these projects continue to be confronted with the structural elements that constitute the reality of the river in Paris (DRIET 2019; APUR 2020; Council of Paris 2021).

It is, first of all, a body of water, the Seine in Paris, that dictates the pace of activities on the river and its banks, depending on the season and the river's water level: high water in winter, low water in summer, thanks to the dams located upstream and immediately downstream from Paris.

Of course, the Seine remains a transport route that experiences tensions between the very high number of passenger boats, which have become increasingly numerous in recent decades, and freight boats that travel up and down the Seine, weaving their way between hundreds of leisure boats.

The morphology of the ports has remained unchanged in the last century, with the old gently sloping ports giving way to horizontal embankments and vertical quay walls: This has made urban integration and access to the water more complex, often requiring connecting structures (footbridges, pontoons) that fluctuate with changes in water levels.

The urban ensemble of the riverbanks, high quays and the buildings constructed during the nineteenth and twentieth centuries is particularly imposing and could be intimidating. However, it offers the possibility of playing with extraordinary scenography. This was invented in 2002 by Jean-Christophe Choblet and was even more exceptional during the opening ceremony of the Olympic Games on July 26, 2024 (City of Paris no date; City of Paris 2025b; City of Paris 2025c; Pradelle and Lallemant 2004).

Conclusion

At this point, we need to broaden our perspective, look beyond Paris, and consider the Seine on the scale of the Seine valley and its emerging and ongoing dynamics. Since 2020, the metropolitan areas of Le Havre, Rouen, the city of Paris, and the Greater Paris metropolitan area have come together in an agreement called “Axe Seine” and have invited the 12 other inter-municipal communities between Paris and Le Havre to join.

At the same time, we are seeing a return to the preeminence of the river as a “river system” in all its hydrological and natural characteristics. Consequently, we need to work on various long-term programs simultaneously: water-climate action plans (e.g., to preserve water resources and prevent drought) and management plans (e.g., for the protection of wetlands and flood prevention).

At the request of the City of Paris, a public law research group, GRIDAUH, conducted a legal study on the feasibility of recognizing the Seine as a legal entity. To explore this possibility, the

City of Paris launched a citizens' convention in the spring of 2025, enabling some 50 Parisian citizens to consider and produce a statement regarding the idea that the Seine has legal rights and how to strengthen protection of those rights.

Finally, the summer of 2025 saw the first swimming sessions in the Seine in Paris. Their success (100,000 swimmers, good water quality, no incidents or accidents) bodes well for the development of this practice on the Seine and other rivers in France.

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References

Atelier Parisien d'Urbanisme (APUR). 2010. *Paris Projet no. 40: Paris, Métropole sur Seine* [Paris, metropolis on the Seine]. APUR. https://www.apur.org/sites/default/files/documents/publication/etudes/paris_projet_40.pdf.

Atelier Parisien d'Urbanisme (APUR). 2022. *Cahier des prescriptions architecturales, paysagères et environnementales des berges de Seine dans Paris* [Architectural, landscape and environmental guidelines for the banks of the Seine in Paris]. APUR. https://www.apur.org/sites/default/files/cahier_prescriptions_berges_seine.pdf?token=bzQRophV.

City of Paris. n.d. Paris Plages. https://www.nezhaut.fr/page-de-projet.

City of Paris. 2021. *Rapport de la Mission d'Information et d'Évaluation sur la Seine* [Report of the information and evaluation mission on the Seine]. City of Paris. https://cdn.paris.fr/paris/2021/06/18/0c137c592a11fac120a42166824c58d3.pdf.

City of Paris. 2025a. "Découvrez le nouveau Plan Biodiversité - Ville de Paris" [Discover the new biodiversity plan]. June 2025. https://www.paris.fr/pages/un-nouveau-plan-biodiversite-pour-paris-5594.

City of Paris. 2025b. "La Seine s'Ouvre à la Baignade… Les Trois Sites Dévoilés" [The Seine opens for swimming… the three sites revealed]. March 14. https://www.paris.fr/pages/la-seine-s-ouvre-a-la-baignade-les-trois-sites-devoiles-31078.

City of Paris. 2025c. "Comment Protéger la Seine ? Les Propositions de la Convention Citoyenne" [How to protect the Seine? Proposals from the citizens' convention]. June 5. https://www.paris.fr/pages/comment-proteger-la-seine-voici-les-propositions-de-la-convention-citoyenne-31390.

De la Pradelle, Michèle, and Emmanuelle Lallement. 2004. "Paris Plage: 'The City Is Ours.'" *The Annals of the American Academy of Political and Social Science* 595: 134–45. http://www.jstor.org/stable/4127615.

Direction régionale et interdépartementale de l'Équipement et de l'Aménagement d'Île-de-France (DRIEAT Île-de-France). 2019. *Schéma d'Aménagement Fluvial de la Seine* [Seine development master plan]. https://www.drieat.ile-de-france.developpement-durable.gouv.fr/IMG/pdf/schema_d_amenagement_fluvial_de_la_seine_-_mai_2019_-_web.pdf.

Pavillon de l'Arsenal. 1998. *Sur les Quais* [On the quays]. Exhibition catalogue. Éditions du Pavillon de l'Arsenal. https://www.pavillon-arsenal.com/fr/edition-e-boutique/editions-du-pavillon-de-larsenal/catalogues-dexposition/9134-sur-les-quais.html.

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Making the Seine Swimmable: From Regulatory Challenges to a Metropolitan Vision

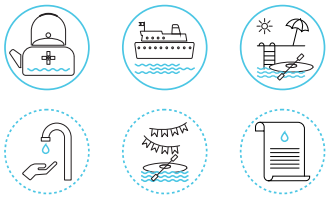
Clément Brun, Léonard Bertrand & Annabelle Nantier

Abstract
This article examines the reintroduction of swimming in the Seine from a dual perspective: first, the technical and regulatory constraints specific to Paris; second, the need to broaden the scope toward long-term territorial planning. In the first part, the authors show how floating bathing facilities must contend with regulations designed for river navigation rather than swimming. This framework imposes sometimes unsuitable standards (freeboard, ERP classification, navigation police regulations) leading to a highly controlled and formalized design of sites, though one deemed necessary to ensure the coexistence of multiple uses of the river. In its second part, the authors warn against the limitations of a single model – the enclosed pool – which fails to reflect the diversity of urban swimming practices and may in fact encourage informal, unsupervised swimming. Drawing on the example of Copenhagen, the authors argue for an integrated metropolitan strategy that embraces diverse forms of access to the water, making swimming a durable component of Paris's territorial development.

KEYWORDS

urban swimming
harbor
governance
regulation
navigation

WATER ICONS



Policy Recommendations

- Finalize a regulatory framework for urban swimming, building on ERP adjustments to ensure clear and durable safety rules beyond the first pilot year.
- Develop a metropolitan master plan for urban swimming that identifies diverse sites (oxbows, docks, canals, islands) and avoids reliance on a single facility typology.
- Pilot shared-use agreements between navigation and urban swimming, initially in controlled areas (e.g. Bassin de la Villette, 2026–2028), as a basis for Seine-wide regulation.
- Integrate urban swimming into the 2030 National Water and Climate Policy revisions.

< Fig. 1 Swimming in the Seine (Source: Clément Brun, 2025).

Introduction

At first sight, swimming in natural water may appear a simple activity, whether in terms of the equipment required or the layout of the areas in which it can be practiced. The joys of immersion in a river or by the sea evoke a simple gesture, a form of immediate and sensitive reconnection with the natural environment. Yet in Paris, this fantasy of beach bathing comes up against a host of historical, physical, heritage, health and legal realities (Bouleau, Lucas and Mouchel 2024), as well as the many rules governing the use of the Seine. In Paris, bringing bathing back to the Seine is not simply a matter of returning to nature (Paquot 2004), but a process of technical and institutional reconquest requiring complex engineering, involving experts in naval architecture, hydraulic engineers, building architects, biologists, civil engineering specialists and landscape architects (Bertrand 2024). But how far can technical solutions go in overcoming the obstacles to urban swimming? Must such projects, if they are to succeed, necessarily integrate a strong political dimension at the metropolitan scale, given that they challenge the very organization of the city and its river?

Without claiming to provide an exhaustive overview of the process of creating the Paris swimming facilities, this article aims to shed light on some of the operational and technical challenges encountered by the City of Paris, the contracting authority for the project. It highlights the work of its engineers and the issues they faced in reconciling inherited governance structures, technical innovations and future uses, collective ambition and legal responsibility. The second part of the text looks at how the legacy of swimming can be sustained beyond Paris, through long-term development planning to establish swimming as a genuine component of the Seine axis.

The examples of Paris and Copenhagen encourage us to think of swimming facilities not as an isolated object but as a component of a coherent territorial strategy based on diverse forms and uses (Augustin and Suchet 2016). Conflicts may have punctuated the project's early stages, but they did not hinder its momentum (Lascoumes, Timbart and Danglade 1994). On the contrary, they fostered innovation: greater dialogue between all the stakeholders, renewed governance, new navigation regulations, differentiated opening times, and adjusted sharing of uses. Opening the Seine to swimming does not call into question Paris's role as the world's leading inland passenger port, and it goes hand in hand with the growing importance of river transport. But a further step is now needed. While cities along the Seine have taken up the challenge of making their rivers swimmable, they now need to work toward a shared metropolitan vision. Through this case study, we show that the response to major contemporary challenges, such as reconnecting the city with its natural areas, can only be achieved by drawing on the historical heritage of practices along the Seine. This continuity between past and future is the guarantee of acceptability, both for the local population and for the activities already taking place in these areas.

Swimming in the Seine: Technical and Regulatory Challenges

The Seine today is among the busiest commercial waterways in Europe: In 2020, more than 21.3 million tons of goods were transported along the river under the management of HAROPA PORT.[1] At the same time, it remains a major tourist artery, continually traversed by sightseeing boats carrying over 7.5 million passengers in 2017. Ranked as Paris's second-

most visited monument after the Louvre,[2] the Seine simultaneously functions as a crucial logistical corridor and a cultural heritage site. To this functional complexity must be added a crucial sanitary dimension: More than €1.4 billion has been invested in connection with the 2024 Olympic Games to improve the quality of the water in the Seine and the Marne, notably through the construction of two new upstream wastewater treatment plants, two vast stormwater retention basins within the capital and extensive upgrades to the sewer system. In this context of already intense competition between uses, the reopening of the Seine for swimming has been presented by public authorities not only as a sporting legacy of the 2024 Games, but also as a civic project – enhancing access to leisure and addressing environmental justice issues such as the mitigation of urban heat islands – and as a lever for ecological restoration, in a river where no fish were present in 1990 but where 36 species of fish and several species of mussels have now been recorded.

The long history of the river in Paris has had a profound and constraining effect on current development. Since the eighteenth century, the Seine has been the subject of intensive canalization, followed by extensive modernization of its banks in the nineteenth century, under the impetus of Napoleon I and then Napoleon III. Right up to the present day, through the construction of ports and embankments human activity continues to shape the river's role as a boundary. Dominated by its port heritage, the water is now physically inaccessible along most of the Paris stretch.

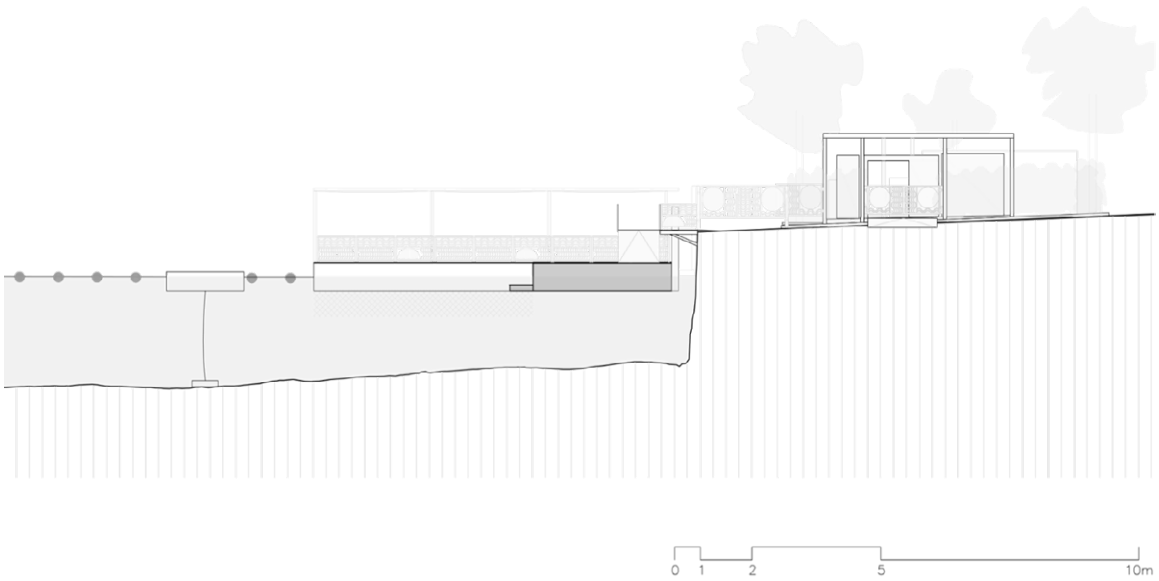
The first task for a developer of bathing facilities is to make the water accessible, at a level well below that of the quays. As this level varies over time (depending on low water levels) and space (the quays are not uniform), gently sloping walkways were chosen to make possible this descent. To accommodate the public, the solution adopted is based on large pontoon bridges, allowing safe and gradual access to the water. However, these facilities come up against a regulatory and normative framework that is unsuitable for swimming, and which will have to change in the future. As the water surface is usually only authorized for boats, floating facilities must be considered as such, with the standards and constraints this implies. The most striking illustration of this regulatory dissonance concerns freeboard – the distance between the surface of the water and the top edge of pontoons. While the aim for swimming is to have the smallest possible freeboard to make it easier for bathers to get into the water, the regulations specific to sailing impose a minimum freeboard height – to prevent passengers from getting too close to the water. Several months of discussions and collaboration between the competent authorities – the DRIEAT[3] and the Préfecture de Police de Paris – and experts, resulted in a uniform and coherent framework, which until now had not existed, for approving Parisian swimming areas. The adaptation of this framework had to be fiercely defended with the bodies in charge of navigation safety but was essential to offer an ergonomic layout for use.

Second, the sensory support provided to bathers as they enter the water is a determining

1. The public authority managing the ports of Paris, Le Havre, and Rouen.

2. Schéma d'aménagement fluvial de la Seine, DRIEAT, 2019.

3. DRIEAT Île-de-France: Direction Régionale et Interdépartementale de l'Environnement, de l'Aménagement et des Transports d'Île-de-France in charge of approving floating establishments.



^ Fig. 2 Cross-section of the Baignade en Seine de Grenelle project (Source: Mater Studio and Yacht Design Collective for the City of Paris, 2024).

factor in the desirability of the practice. The City of Paris is aware that there is still a great deal of apprehension about swimming in the Seine, a territory that is both familiar and distant, desirable and worrying. This work required particular attention to the design of the bather's itinerary, conceived as a gradual journey capable of reducing this apprehension. The distance created by the height between the quays of the Seine and the relative water level of the river is absorbed in the design of this progression (fig. 2). The path into the water is punctuated by a succession of thresholds: first the ramp, then the pontoon, the seat, the step and finally the water. The threshold imposes this progression and deals with the user's apprehension: This threshold connects, holds or does not hold. This perception is managed with the thickness given to each of the thresholds. For example, the facilities relating to reception and hygiene give a comfortable dimension to each of the sites, the thickness of which guarantees the modesty of the body. Conversely, the final threshold to the water is as light as possible to guide the bather toward the water. From these places, the water line becomes the landmark and initiates the desire for the shore (Nantier 2025).

The City of Paris has a new responsibility for bathing on a river that does not belong to it. This particularity gives absolute priority to the safety of swimmers.[4] The Seine falls within the public river domain of the state, which regulates access according to the activities it wishes to promote – unlike, for example, rivers in Switzerland, where access is free and equal, and bathing is at the users' own risk (Largey 2023). Under French law, all bathing in running water requires the adoption of a

4. Article L2213-23 of the Code général des collectivités territoriales.



^ Fig. 3 A cautious approach to the Seine: closed-pool architecture at the swimming site of Bercy, Paris (Source: Clément Brun, 2025).).

specific municipal by-law, by which the mayor assumes legal responsibility for the site. In issuing this order, the mayor of Paris confers the power to police bathing areas, which requires the local authority to implement the necessary measures to guarantee the safety of users. This responsibility is reflected in each of the boundaries drawn in the development of the sites: Delimiting the bathing area means defining another area that you want to make inaccessible without actually developing it. It is in this way that the typology of the enclosed pool is imposed through the prism of precautionary risk management around and within the finished space (fig. 3).

In French law, this new assumption of municipal responsibility is reflected in the legal classification applied to bathing facilities on the Seine. The *Establishment Receiving Public Access* (ERP) has become the reference tool, enabling the local authority to structure its action through a clear normative framework. The ERP delimits a precise time-space – an authorized zone, with set times – in which bathing is possible. The promise of swimming in the Seine does not mean that the river will be swimmable everywhere, every day. It also sets a maximum permissible number of people, depending on the buoyancy, stability and solidity of the launching structures. Finally,

the established perimeter of the ERP ensures that the number of people can be supervised. By including public safety as a primary condition for opening the site, it is the regulatory tool that reassures all those involved – elected representatives, technicians, emergency services and government partners – in the appraisal of a new object. However, while the ERP offers a familiar response to the issue of supervising bathing, it does so at the cost of regulatory complexity that can restrict freedom of use and make the appraisal process more cumbersome: For example, the floating pontoon will have to comply with safety standards and fire-fighting obligations inherited from the world of construction.

It is in this context that the City of Paris has chosen to introduce open-water swimming in a gradual and controlled manner. This strategy is essential if the city wants to fulfil its responsibilities but also ensure that bathing is safe and order is maintained on the river. While this model may seem restrictive from the point of view of the most experienced swimmers, it is also a lever for accessibility for a less experienced public. Be that as it may, the institutionalization of swimming by the Paris authorities opens the way for other river towns that will encounter similar constraints, particularly in terms of legal and regulatory issues.

Swimming in the Seine: A Step Toward Long-Term Planning?

Swimming in the Seine, in addition to the voluntarist political ambition to open it up to bathing that stems from the legacy of the 2024 Olympic Games, is part of a complex institutional context, structured by a series of restrictive rules laid down by the various players involved in the governance of the Île-de-France Seine Axis: the Préfecture d'Île-de-France, Voies Navigables de France and HAROPA Port. For example, three major precautionary principles strictly govern and supervise the use of the river and condition the establishment of new bathing sites: a ban on the simultaneous cohabitation of navigation and bathing, a compulsory 5-meter setback from the river channel and no quantitative impact on the volumes transported by freight navigation.

A field survey carried out in 2024 (Brun 2024) shows the extent to which these constraints have shaped the architecture and operation of the pilot sites from the outset. Naval engineering and conflicts over river sharing dictated the debates: The mobilized expertise focused on adapting to navigation conditions, rather than on the expectations or practices expected of users and the consultation cycles conducted by the City of Paris almost exclusively mobilized river transport stakeholders and administrative managers. The debate on opening times illustrates this: On the Bras Marie site, swimming could be authorized for only half a day. At the height of summer, on a very popular tourist riverbank, a very attractive swimming area will be created, but it will be inaccessible during the hottest hours of the day.

This paradox reveals a deeper tension: It is the management of the river as a shared space that has determined the forms of swimming, and not the other way round. From that point, swimming became an adjustment variable in a constrained space, rather than a fully assumed function of the river space. This choice was accepted from the outset by the City of Paris and the state actors involved, but may come up against the reality of use once bathing becomes popular with Parisians.

This is why a change of scale is needed: How can we plan for the legacy of bathing in Paris so that it becomes a lasting part of the functioning of France's leading commercial river? Here we explore the need to turn to a genuine long-term metropolitan planning strategy for bathing. If the constraints in central Paris have proven too difficult to overcome, other locations offer numerous opportunities for experimentation and diversification. The Bassin de la Villette and the Canal Saint-Martin are already home to swimming sites suitable for a wide range of visitors. In the Greater Paris area, the under-utilized oxbows of the Marne and Seine rivers are protected from navigation, making it possible to bypass these conflicts of use. A case in point is the Grenelle swimming site, where the Île aux Cygnes bisects the Seine, making one of the branches safe and establishing itself as a major recreational center. In Joinville-le-Pont, Maisons-Alfort and Neuilly-sur-Marne, urban bathing is becoming a lever for revitalizing former marinas that have fallen into disrepair. In Lyon, the bathing site will not be located in the Rhône, which is too restricted by navigation, but in a protected dock in the Confluence district, allowing for lighter development and freer swimming.

Copenhagen is a case study where, in just a few years' time, bathing in the harbor has become the capital's premier summer activity.[5] The city now hosts 14 official bathing sites with a wide variety of architectural features, including enclosed basins, open beaches on the harbor and sites integrated into the quays. Alongside these planned facilities, the city is also home to a broader network of informal bathing sites, resulting from spontaneous and free appropriation of port areas. One of the central lessons of this research is clear: A single bath with a unique architectural typology is not enough. Each of the official port baths with enclosed basins is systematically accompanied by informal bathing areas nearby. The analysis shows that these informal bathing situations are a consequence of the development choices made: They reflect a social demand that is not met by the available supply. Users are looking for a variety of experiences, including relaxation, spontaneity, sport and sociability, which a closed bathing area does not offer. Faced with this reality of massification and diversification of bathing uses, the response of public provision cannot be uniform. The solution found by the City of Copenhagen is therefore to offer several different types of infrastructure in the same area, depending on the urban fabric and the intended uses. In very busy areas, a large urban beach will channel informal practices and prevent uncontrolled bathing. On the other hand, in residential or family neighborhoods, an enclosed pool, with more supervision, will meet ritualized family and sporting expectations.

To date, however, the bathing facilities taking shape in the Paris region already seem to be limited to a single model: Almost all the projects launched on the Marne or the Seine are based on closed pools. While this option seems to be favored by local authorities for safety reasons, it excludes certain user profiles and, paradoxically, will accelerate the spread of unregulated informal bathing in the absence of suitable solutions. We need to move away from a one-size-fits-all approach and diversify our swimming facilities now.

5. Doctoral thesis by Clément Brun (2025), under the joint supervision of André Suchet and Kent Fitzsimons at the University of Bordeaux (LACES Laboratory) and the École Nationale Supérieure d'Architecture et de Paysage de Bordeaux (PAVE Laboratory).



^ Fig. 4 A morning swim at the Bras-Marie swimming site, illustrating key engineering and safety challenges: ERP classification, lifeguard supervision with yellow buoys, showers installed on floating pontoons, and the strict separation between the swimming area and the navigation channel (Source: Clément Brun, 2025).

There are a number of ways of doing this, including incorporating the backwaters and islands of the Seine and Marne rivers, marinas, docks and the canals of Paris (130 kilometers of which are co-managed by the local authorities in the Paris region) – all sites outside the main shipping lanes where lighter, more festive facilities could be developed: not just swimming, but also floating saunas, water sports centers and waterside restaurants. Thanks to this work of anticipation based on our doctoral thesis on Copenhagen (Brun 2025), the Belgian town of Mechelen, on the outskirts of Brussels, is working on a hybrid bathing site: a closed basin, combined with an open area on the canal delimited by buoys, welcoming both families and more free uses.

Conclusion: Feedback on the First Parisian Swimming Season (2025)

The 100,000 visitors welcomed during this inaugural season of urban swimming in Paris attest to the undeniable popular success of the 2025 Seine bathing initiative. These two months of experimentation already provide valuable lessons concerning modes of operation, architectural design and the processes of integration and awareness surrounding swimming in the river.

Water quality in the Seine, being highly dependent on weather conditions, fluctuated significantly during episodes of heavy rainfall. As a result, the sites were closed for nearly one-

third of the summer, as the season proved particularly rainy in early July and late August. Hydrocarbon pollution of unidentified origin also led to the closure of some sites on specific days. Furthermore, recently amended navigation rules were not immediately internalized: Violations of navigation restrictions were frequent at the Bras Grenelle site during the first weeks of operation, with vessels entering the branch during bathing hours.

Architecture and Legacy: Strengths and Areas for Improvement

The principal asset of the Grenelle site – beyond offering one of the most exceptional views in Paris – lies in its extensive pontoon surface, allowing bathers to sunbathe comfortably in the afternoons. Access to the water was also among the most fluid, thanks to the seating arrangements distributed across the bathing area. However, the resting islet, which could have been a genuine success, remained closed to the public due to stability concerns. At Bercy, the geometry of the protective structures contributed to creating a calm zone, enabling bathers to remain static and enjoy moments of conversation with friends.

The Bras Marie site was particularly appreciated for the lighter and more spontaneous approach it offered to open-water swimming. The possibility of changing "as on a beach" and the availability of showers directly on the pontoons contributed to a simpler, more streamlined experience, centered on the practice of swimming itself and the beauty of the surrounding environment (fig. 4).

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References

Augustin, Jean-Pierre and André Suchet. 2016. "Pratiques sportives et projets de territoire" [Sports practices and territorial projects]. *Cahiers de géographie du Québec* 60 (171): 433–438. https://doi.org/10.7202/1041215ar.

Bertrand, Léonard. 2024. "Quand la ville décoïncide son rapport au fleuve: La baignade en Seine à l'épreuve des institutions" [When the city decouples its relationship with the river: Swimming in the Seine put to the test of institutions]. Master's thesis, Université Paris 1 Panthéon-Sorbonne.

Bouleau, Gabrielle, Françoise Lucas and Jean-Marie Mouchel, eds. 2024. *La baignade en Seine et en Marne* [Swimming in the Seine and the Marne]. Fascicule no. 21. Paris: ARCEAU-IdF.

Brun, Clément. 2025. *The Contemporary City Between the Waters: Architecture, the Active Body and Recreational Practices. The New Harbor Baths of Copenhagen*. Doctoral diss., Université de Bordeaux.

Brun, Clément. 2024. "La Seine baignable: un pari sous tension. La conciliation des usages dans l'aménagement des sites de baignade en Seine" [A swimmable Seine: a tense wager. Reconciling uses in the planning of swimming sites in the Seine]. Master's thesis, École d'urbanisme de Paris.

Largey, Thierry. 2023. "Baignade en eau libre: quelles limites à la responsabilité individuelle en droit suisse ?" [Open-water swimming: what limits to individual responsibility in Swiss law?] Paper presented at *Droit des baignades, droits aux baignades: L'accès aux rivières urbaines face au réchauffement climatique*, EHESS Centre des colloques, Campus Condorcet, Paris, September 28, 2023.

Lascoumes, Pierre, Odile Timbart, Nathalie Danglade, Isabelle Sillon and GAPP. 1994. *Environnement et ordre public* [Environment and public order]. Paris: Ministère de l'Environnement.

Nantier, Annabelle. 2025. "La limite, outil de reconquête de la Seine" [The boundary as a tool for reclaiming the Seine]. Paper presented at *Cycle de réflexions Architecture de l'Eau*, AAIIA.

Paquot, Thierry. 2004. "Ville et nature, un rendez-vous manqué?" [City and nature: a missed encounter?] *Diogène* 207 (3): 83–94. https://doi.org/10.3917/dio.207.0083.

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