

Grey Solutions versus Nature-based Solutions: which infrastructures to prevent pollution in urban water bathing sites?

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Submitted abstract:

City development along rivers in Europe has gone hand in hand with structural works to reduce water-related risks, such as levees (dikes) or dams for floods, and the burial of polluted rivers and sewerage networks, which have become invisible. Today this legacy is being challenged by the environmental turn of water-related risk policies towards more nature-based solutions and the aspirations of city dwellers for greener landscapes and a greater access to blue spaces. This environmental turn affects the framing of water-related risk prevention policies. Grey infrastructures, costly in investment and operation, whose design has been thought out on a sectoral basis to combat a single risk (flooding, pollution or drought) are no longer given priority. Environmentalists recast them as danger in the face of climate change and biodiversity loss. Instead, nature-based solutions (NbS) would meet several objectives, would be cheaper and more robust in the face of global change. We call this debate the dualism of grey infrastructures versus NbS, which tends to disqualify the former for the benefit of the latter.

The development of bathing sites projects in urban rivers is becoming very popular in several major European cities. The promoters of this outdoor activity argue that city dwellers practicing river bathing would be more likely to reconnect with the natural environment, to get to know it better and take better care of it. Such projects would also fulfil the claims for the right to the city and to nature in cities. Yet European regulation mainly addresses river bathing through the faecal contamination risk. In order to comply with the 2006 EU bathing directive, municipalities must enhance sewage treatment performances to avoid contaminated discharge upstream of bathing sites.

We study the policy choices made in two cities, Paris and Berlin, regarding the prevention of pollution for bathing sites in urban water. We observe that Berlin public authorities consider NbS to reach the bathing directive objectives. In Paris, along with the political commitment of organizing the fluvial and nautical events of the 2024 Olympic Games on the Seine River, water managers took decisions in favour of more grey infrastructures. Based on press coverage, in situ observations and semi-structured interviews in both capitals, we explain what the drivers

for such choices were. We account for material differences in structural legacies as well as the strategic use of the rhetoric of urgency and the reference to the Olympic commitments in order to impose grey investments instead of NbS.

Keywords : nature-based solutions ; grey solutions ; bathing ; open water ; Paris ; Berlin

Introduction

The paper presented was developed in the context of the political project, which is currently implemented in the Greater Paris zone, and which aims to create bathing sites in urban rivers. These sites would form the legacy of the 2024 Olympic Games hosted by the city of Paris and during which open water swimming events will be organised in the Seine river. This ambition, strongly constrained by time, requires the lifting of the ban on bathing on the rivers of the Seine and the Marne¹. Strongly conditioned by health constraints, themselves dictated by compliance with European standards² with regard to the concentration of faecal matter indicators (*Escherichia coli* and intestinal enterococci), this return to bathing requires the undertaking of major operations on the sewerage system and on the circulation of rainwater within urban spaces.

The focus is on point source pollution (both temporal and spatial) related to the discharge of wastewater into rivers. Some discharges are linked to the intrinsic functioning of the combined sewerage system (wastewater and rainwater mixed together), which has been designed to release excess water during episodes of intense rainfall into the rivers via stormwater overflows. Others are permanent discharges (even in dry weather) linked to defects of the sewage system (houses and buildings that are wrongly connected to the separate network leading to the presence of wastewater in the rainwater network, eventually discharged into the watercourses) or to exceptions (the houseboats were not obliged to have a sewage system and discharged their wastewater directly into the river).

In this context, this paper looks at the solutions that are being put forward as part of the “Water quality and Bathing plan” that was launched in 2018 in the Paris region. Although mainly focused on the Paris case, the paper will also refer to another bathing project which is currently being developed in the city of centre Berlin (Flussbad Berlin), and which is facing similar issues (i.e. improving water quality to comply with European standards and enabling the lifting of the bathing ban).

¹ Bathing has been progressively banned in the Seine in Paris and in the Spree in Berlin over the first half of the 20th century, mostly for sanitary reasons (see Lestel & Carré, 2017). The ban came later in the Marne, in 1973 (by prefectural decree).

² Directive 2006/7/EC of the European Parliament and of the Council of 15 February 2006 concerning the management of bathing water quality and repealing Directive 76/160/EEC.

We ask the following questions: what technical solutions have been adopted to combat the concentration of faecal indicators during the bathing season in the vicinity of bathing sites? Are these solutions a continuation or a rupture vis-à-vis the prevailing system? How do the timing and the presence of bathing sites in the city centre influence the choices made?

Conceptually, we propose to conduct a political analysis of the solutions under debate to reach a return to bathing in city centres, which is based on work on the formulation of public policies (Fischer, Zittoun, et Zahariadis 2021). Bathing in urban rivers can be analyzed as a new political problem aiming at improving water quality to satisfy a new social demand. In this perspective, we pay attention to the political dimension of the formulation of policy solutions, once the policy makers defined the problem as one of poor water quality downstream combined sewage overflows, which prevents meeting the European water bathing standard. Political struggles are not restricted to problem definition (Gusfield) and agenda setting (Kingdon). The choice of instruments to solve a recognized public problem is also a political stake, albeit a more discrete one. As Fischer, Zittoun and Zahariadis (2021) argue, the politics of policy formulation revolves around coalition building and binding policy solution to a pre-identified problem. We thus interpret the emergence of nature-based solutions to water management as the product of a coalition of actors who wish to differentiate themselves from civil engineering and cement industry actors to propose new ways of managing water in the city. These actors have more expertise in plants and techniques for separating flows at the source. They interpret the problem of water quality for bathing as a new opportunity for promoting their policy solutions. However, the choice of solutions to achieve bathing water quality in urban rivers cannot be reduced only to a professional battle between two types of expertise in the face of a new problem. Past choices in water management have also a strong inertia and constrain the possibilities for action today. This is why we need to complement the analysis of political struggles around expertise on the management of bathing by paying attention to the infrastructures that have modified the path of water in the landscape and by sacrificing certain territories. The concept of waterscape (Swyngedouw 1999) allows us to pay greater attention to the material effects of political choices related to water and their consequences in terms of inertia and social inequalities. Infrastructures shape a specific “waterscape”, partly under the ground and therefore invisible. We analyse the factors of obduracy and bifurcation of the existing 'waterscapes' of Paris and Berlin. In doing so, we follow Timothy Moss who argues that behind the apparent physical obduracy of infrastructures, it is necessary to disentangle the specific political strategies that shape and maintain these infrastructures (Moss 2020). Infrastructures have “shifting functions and values” over time, as the example of Berlin and its tumultuous history in the 20th century clearly shows. Infrastructural systems can therefore be described as palimpsests “in which new elements are layered over existing ones, rather than replacing them” (*Ibid.*, p.25).

We show that despite aspirations towards more nature-based solutions in urban environments that have been expressed in recent years (e.g. integrated rainwater management, phytodepuration of water...), opposing forces lead to the inertia of past prevailing grey solutions. As a consequence, the current urban waterscapes are the results

of the implementation of solutions promoted by former pro-grey infrastructure coalitions (part 1). Then, we document how the waterscape influences the process of building discursive coalitions and binding policy solutions with the public problem (part 2). Lastly, we investigate the discursive reconfiguration of both coalitions (pro-grey and pro-nature-based solutions) for improving the water quality of urban rivers for bathing (part 3).

1. A sociohistory of water management in urban environments

A. A long history of grey and modern solutions in cities

Grey solutions are premised on man's control of nature, within the limits of “normal operation”. In contrast, nature-based solutions (NbS) allow for a degree of unpredictability in ecological processes that are nonetheless considered more resilient to non-standard conditions. As Fischer and Zittoun (2021) argue, such policy solutions are not without political implications. The type of expertise required for grey solutions gives civil engineers a great deal of decision-making power, whereas nature-based solutions involve more ecologists and also give users a voice in the management rules and maintenance of these natural solutions. The cost of NbS solutions is often less than that of the grey ones. Moreover, since differences in access to nature are one form of environmental inequality, the development of NbS solutions in cities can contribute to offering more nature to residents who cannot afford to travel far to enjoy it. Yet restoring nature in cities may also be a driver for gentrification. Given these potentially conflicting effects, grey and green solutions are not backed by fixed coalitions. Building a coalition for one or the other policy solutions always requires site-specific policy work.

Grey solutions for managing water (pipes, reservoirs, dikes, dams, ...) require important workforce or energy for their implementation. Riparian communities rarely have the means to build civil infrastructures to manage water on their own. Historically in Europe, such projects were closely linked to national and international coalitions who promoted infrastructures as policy solutions of general interest for water-related public problems.

To address flood risk during the 19th and 20th centuries, a coalition of hydrologists and state engineers promoted grey solutions in combination with policy actions to maintain natural areas. They argued that non-artificialized (nature-based) flood expansion areas were needed so that other areas could be protected by dikes (grey infrastructures). Yet states, whether interventionist (France, the Netherlands) or liberal (USA), have more easily encouraged the construction of dikes than they have succeeded in imposing restrictions to maintain natural areas (Guerrin and Bouleau 2014). This has resulted in situations that are recognized as unsustainable by experts, and likely to cause levee breaches. Yet such disasters have not been sufficient by themselves to challenge this bias towards grey infrastructure.

In the 19th century, urban development of drinking water networks also increased the amount of wastewater in cities. They became unhealthy. The sanitarian movement, a coalition of

epidemiologists and urban planners who believed that accelerated water flows would make cities healthier, succeeded in imposing this vision of rapid circulation. They advocated waterproofing the soil and evacuating wastewater and rainwater in underground networks, which led to the development of major water networks to rapidly evacuate wastewater and rainwater out of the city and into the rivers (Barles et Thébault 2018; Geels 2005; Goubert 1986; Oestigaard et Tvedt 2014). Jean-Baptiste Nancy (2000) argues that management of *flows* has thus gradually replaced *spatial* water management, suppressing natural functionalities and implementing civil works instead. In some regions, downstream stakeholders opposed the discharge of wastewater upstream. Local authorities wishing to avoid the cost of wastewater treatment found arguments from experts in biology and chemistry (Gerardin 1874 in Carbonaro-Lestel et Meybeck 2009) to define the maximum pollutant load that could be self-purified by the river (abatement of fecal contamination). In other regions, such as France and the Ruhr, only some rivers were preserved for drinking water, while others were entirely dedicated for waste disposal (Garcier 2007), without regard to self-purification limits. Many urban rivers in Europe were sacrificed to discharge wastewater and stormwater runoff (Lestel et Carré 2017).

Urban waterscapes are thus largely shaped by long-lived grey infrastructure. Enclosed between dikes for flood control or docks for navigation and used for waste disposal, they do not offer much room for nature-based solutions. However political demands for more natural and spatial water management emerged in the 70s throughout Europe, voiced by heterogeneous constituencies.

Several northern European countries adopted more environmental regulations in the 1980s. This evolution is often explained by political scientists as a cultural shift towards post-materialist values and a commitment to ecological modernization. But a detailed analysis of the processes by which new paradigms emerged shows that this was not a gradual movement that spread through society, but rather political struggles that were played out at specific windows of opportunity.

For example, in the 1970s, environmentalists in the Netherlands succeeded in imposing a more nature-based paradigm during the controversy over the construction of the Westerschelde storm surge barrier. They argued in favour of maintaining the tidal functioning of the estuary and their struggle met a window of opportunity with the 1973 governmental elections. The controversy reached the political agenda. The victorious Social Democratic government coalition worked to promote a new doctrine of integrated water management in the 1980s, which aimed to give more space to rivers (Guerrin et Bouleau 2014).

Two other windows of opportunity for a nature-based paradigm occurred in the late 1980s and in 1999 at European level (Bouleau 2017). Since the 1970s a majority of member states had promoted utilitarian and sector-based interests and end-of-pipe policy solutions for water management and consequently European directives on water had stated low standards and regulations encouraging grey solutions (Aubin and Varone 2004). Yet in 1986 the European rules for deciding water policy changed from unanimity to qualified majority in the Council,

while the ecologist ideas gained support both in France and the United Kingdom. The same year, the European authorities reacted to the Sandoz accident (pollution of the Rhine from Bâle down to the Dutch estuary) with an inter-ministerial seminar on water policy. The French and British supports shifted the balance of power in favour of a coalition targeting good ecological conditions in watercourses. Both 1991 directives on nitrates and urban wastewater treatments are interpreted as a paradigm shift in favour of more considerations for natural areas (Aubin and Varone, 2004). The European Commission drafted an ecological quality directive in 1994. Yet the balance of power shifted again among member states, to the detriment of environmental ambition. However in 1999, the European Parliament obtained veto power on environmental issues. Ken Collins, president of the Environmental Committee of the parliament succeeded in forging a coalition in favour of the European framework directive on water, a text which aims at restoring the natural functioning of rivers.

What this long history teaches us is that the environmental turn toward nature-based solutions is not a foregone conclusion. Actors favouring grey solutions may find favourable opportunities and resources, especially in the obduracy of existing infrastructures. But here again we should not overestimate the physical determinism; infrastructures can also serve several purposes. Similarly, it is possible to achieve bathing water quality by promoting solutions based on nature (infiltration of water, phytodepuration) or by grey solutions (storage basins, water treatment in stations).

B. The conditions for change in infrastructural choices: political and spatial structuration of the Paris and Berlin waterscapes

Studies of the water infrastructure of Paris and Berlin point to the 19th century as an important turning point in the formation of the infrastructural systems. “Traces”³ of the infrastructures created at that time are still pervasive and influential in contemporary Berlin and Paris metropolises. The two cities under study are indeed deeply marked by the first stages of the infrastructural development whose main purpose was to evacuate water from the city in order to increase the public health of the urban environment and reduce excess mortality (highlighted by cholera epidemics). Influenced by the hygienist movement, “the emphasis on the importance of water circulation leads to “urban reticulation” (Barles, Thebault 2018, p.122). In Paris as in Berlin, the spatial expansion of the cities as well as political choices have led to the addition of new layers to the “infrastructural palimpsest” that has been forming since the end of the 19th century. In the course of the 20th century, in the aftermath of the two great world wars, the trajectories of these two cities diverged more and more. After the First World War, Berlin experienced a succession of very different political regimes, which was reflected in the functions and objectives given to the infrastructure system. Furthermore, while the demographics of the Paris agglomeration and 'Grossberlin' (an administrative unit created in 1920) were fairly similar in the first half of the twentieth century, after the Second World War

³ Timothy Moss uses the notion of “traces” to describe “the infrastructural legacies from the past that continue to influence the energy and water systems in Berlin” (Moss 2021, p. 20).

Berlin experienced demographic stagnation, while the population of the Paris agglomeration doubled in the same period.

The main stages in the infrastructural structuring of Paris and Berlin are summarised in the table below.

Period	Paris	Berlin
19th century	<p>Context: Demographic growth (+40% evolution rate between 1800 and 1850, from 600.000 to 1 million inhabitants) Excess mortality – Epidemics (cholera outbreak in 1832)</p> <p>Impetus given by the Haussmann baron (under Napoleon III), mission of Eugène Belgrand. During the 19th century, work was carried out to provide the capital with drinking water from distant sources and to make the sewerage system more widespread. Later on, water intakes upstream of Paris on the Seine were also created to supply the capital. At the time, wastewater was discharged downstream from Paris, directly into the Seine. In Paris, a combined sewer system was created, legislation made it compulsory (1894) to be connected to “tout à l’égout”. In the suburbs, the changes are not significant.</p> <p>The artificialisation of the Seine in the second half of the 19th century and the development of navigation led to a gradual disappearance of riparian uses. Bathing in the Seine banned in Paris at the beginning of the 20th century. Outside Paris, on the Marne in particular, the railway helped to develop weekend resorts and water-based activities (canoeing, swimming).</p>	<p>Context: Demographic growth (in Berlin, + 60% evolution between 1800 and 1850, from 172.000 to over 400.000) Excess mortality – Epidemics (cholera outbreak in 1830)</p> <p>Berlin relies almost entirely on groundwater for water supply. Until 1842, "black" water was dumped into the Spree. Thereafter, only domestic and industrial wastewater was discharged. The faeces were collected for spreading on the fields around the city as fertiliser.</p> <p>Implementation of the Holbrecht radial plan in the last quarter of the 19th century, construction of a combined sewage and rainwater collection system.</p>
1920s	The suburban municipalities sought to organise their water distribution network.	After the dissolution of the Prussian Empire, a transfer of authority over

	<p>They obtained the possibility of levying a tax for this purpose in 1926.</p> <p>The regulation of the Seine river's flow (to fight against major floods in winter and low water levels in summer) leads to the creation of reservoirs on the Seine and its tributaries several hundred kilometres from Paris.</p>	<p>infrastructure from the imperial administration to the state (Land) of Berlin (headed by the Berlin senate) takes place. Canals and waterways are placed under the authority of the central state (Bund)</p> <p>Creation of Grossberlin (Greater Berlin) in 1920: 8 cities and 59 smaller municipalities merge ; the previous administrative territory of the city increases over twelvefold. Efforts to lower the disparities between the different parts of the new city and to unify the infrastructural networks physically and juridically. A unique water utility (Städtische Wasserwerke) is created, as well as a unitary sanitation authority (Berliner Stadtentwässerung)</p> <p>The swimming pools on the river Spree in the city centre were closed by the municipal authorities for sanitary reasons in 1925.</p>
<p>1930s-1940s</p>	<p>The Paris municipality gets concerned with wastewater discharges from suburban municipalities to avoid degradation of the drinking water supplied to the city. Suburban municipalities (those closest to Paris) are gradually being connected to the Parisian and departmental outfalls. The sewage system remains highly centralised and the suburban communes are not allowed to treat their wastewater on their territory. The communes further away from Paris build their own networks, but many discharges into stormwater networks and rivers take place. The first wastewater treatment plant was created in 1940.</p>	<p>Under the Third Reich, infrastructures were put at the service of the war effort. Wastewater was once again used in spreading fields to fertilise agricultural land, to the detriment of sanitary aspects.</p>

1950s-1980s	After the Second World War, the suburban cities are progressively equipped with a separate network	Cooperation is decided between East and West Germany for sewage management despite the insularity of West Berlin. Maximised self-dependence is pursued for the supply of drinking water through the use of new underground sources and extensive repair work on existing infrastructure.
1970s - today	<p>Wastewater is gradually being systematically treated in wastewater treatment plants. Water quality improves.</p> <p>The municipality of Paris takes over the management of drinking water (2009). Some suburban territories are also committed to a return to public management, but most continue to delegate water management to the private sector.</p>	<p>Rise of the ecological movement in Germany. In Berlin, major mobilisations of citizens lead the authorities to abandon certain projects, such as delegating the management of the city's water to the private sector. Remunicipalisation was decided in 2013.</p> <p>Political debate has fed alternative visions “challenging conventional logics of the networked city and creating very different sociotechnical imaginaries of socially inclusive and environmentally sustainable urban infrastructures” (Moss, 2020, p. 32)</p>

Sources: Lestel et Carré, 2017 ; Moss, 2020.

The evolution of the infrastructural systems of these two cities also has to do with the very different governance models that characterise them. In Paris this governance model is very complex with different actors depending on the water services (drinking water; wastewater) and the centralising effect of both the state (on a political point of view) and Paris (on a spatial point of view) reflected in the prioritisation historically given to the needs of the capital city and the decision-making advantage of Parisian representatives over those of suburban municipalities. The complexity of the wastewater governance system, marked by a stratification of collection from the (inter)municipal to the interdepartmental level, has contributed to the estrangement of sanitation issues from public debate. Remunicipalisation of the water supply management has been enacted in 2010 for the Paris municipality and is currently under discussion for other suburban inter-municipalities. In Berlin, the Berliner Wasser Betriebe is the only actor responsible for both the distribution of water and its treatment. Historically it has alternatively been driven by private or public actors (see Moss, 2020) - recently (2013), following the mobilisation of a local civil society movement, the remunicipalisation of water management, which had been partially entrusted to private actors (including Veolia) was decided.

2. The emergence of new public policies on urban bathing: pro-bathing arguments differ according to the profiles of the actors

In Paris as in Berlin, various actors have called for a return to bathing over the last decades. In their discourses, a more ecological and inclusive vision of urban planning policies has been put forward. These discourses are reflected to a greater or lesser extent in the discourses and solutions proposed by public authorities for an effective return to bathing.

A. Civil society activists: Taking back urban rivers as clean, public and leisure-devoted spaces.

Different profiles of activists can be identified. While some of them are rather close to the environmental movement, others can be considered as belonging to the urban 'creative class'. Intermetropolitan links between these collectives exist.

1/ Environmental activists, rivers protectors

On a European scale, collective jumps in waters officially forbidden for bathing have been organised once a year since 2002, on the second Sunday of July, on the initiative of the *European Rivers Network*. This "Big Jump" initiative is used as a platform to call on the authorities to enhance the protection of rivers. The European Rivers Network has put forward several major claims: the ecological restoration of rivers, the dismantling of obstacles (removal of dams, etc.) in order to increase the number of "free rivers". This is also an opportunity to defend the existence of other uses on the river. According to Roberto Epple, founder of the European rivers network and the "wild rivers" label:

You will see, in a few years, we will be swimming in the Seine in Paris. It's a matter of time. Big Jump is a vehicle to promote this. It's already happening (...) This is a great return of something that was normal a hundred years ago, everywhere in Europe, because the public swimming pool was the river.
(Roberto Epple, interviewed by Céline Domengie, 2020⁴)

Big jump is organised within the legal framework with the previous agreement of the authorities. In the Paris region, this event has been followed for several years by those working for a return to bathing water quality, such as in the Marne river⁵, upstream from Paris (Saint-Maur-des-Fossés) or in the Seine river (Ile-Saint-Denis in 2019):

We had a demonstration authorisation [from the prefect], then (...) we made a declaration saying that there would be a moment symbolising the return to bathing (...). We had to display everywhere that swimming was forbidden, but

⁴ Link to the transcript of the interview : [5f0a7aa64693bc4b91d7c05f entretien-roborto-epple.pdf](https://www.webflow.com/entretien-roborto-epple.pdf) ([webflow.com](https://www.webflow.com))

⁵ The Marne vive Syndicate, which organised a forum on bathing in the Marne ("Objectif Baignade") in 2017, invited Roberto Epple, as well as the initiators of the Flussbad Berlin project to talk.

the jump was there to say help us achieve this. I really saw a change in the will of the inhabitants.

(Interview with a former representative of a local water-related organisation, July 2020)

2/ The creative class, urban utopians

In large European cities deprived of open water bathing areas in the city centre (London, Brussels, Paris, Berlin) collectives have emerged in recent years, bringing the issue of a return to bathing into the local public debate⁶. Although they propose distinct projects, more or less clearly defined and elaborated, these collectives share common features. Their members have notably relatively similar professional profiles (urban planners, architects). Bathing in open water is embedded in a larger reflection about the future of urban (public) space.

In Berlin, for instance, the Flussbad Berlin project was initiated in the 1990s by two brothers, Tim and Jan Edler, who are both architects. They stress the multiple benefits associated with their project, which could help draw attention to the need to improve water quality in the city, develop non-tourist uses in historic centres and reclaim the river as a public space.

We believe that [the project is] (...) part of a transition for the city. In Berlin, similar as in other cities, the water [of the river] belongs to the Federal State, it is not even the property of Berlin. This means that there is currently no communication about what Berlin wants to do with that water. It is managed under the impression that it should be like an “Autobahn” [highway]. So, the only use for the water is traffic, which is totally bullshit for Berlin because there is no traffic happening anymore, except for tourism. So we have this entire aspect of: how do we create a livable city and what is the role of water inside the city?

(Tim Edler, Co-founder of Flussbad Berlin, Talk at The Swiss Architecture Museum, June 2019⁷)

In Paris, a group of young students and professionals founded a collective in the early 2010s called "Le Laboratoire des Baignades Urbaines Expérimentales" (LBUE), without any formal intention at first, but with the aim of organising collective "pirate" baths (unauthorised baths) in the city's open water (rivers, canals). Over the years, this group has gained notoriety and support in Paris. The city authorities started to pay attention to their work in 2016. In contrast to Berlin, the LBUE had not developed a specific urban development project and soon disappeared after the return to bathing in urban rivers was put on the agenda of the municipal authorities. Their libertarian vision of bathing seemed hardly compatible with what was being developed by the authorities.

⁶ See the Thames Bath project in London, and the Collective “Pool is Cool” in Brussels.

⁷ [Tim Edler, Flussbad Berlin \(DE\) - YouTube](#)

We wanted to enjoy the city and we didn't think that the ban on swimming was legitimate, we wanted to make fun of it. (...) When it comes to swimming, the public authorities are capable of sterilising everything where there used to be space for freedom.

(Interview of one member of the LBUE, December 2020)

3/ Swimming athletes and events,

For the past 6 years, competitions have been organised in the Parisian river and canals of Paris with the support of the authorities, in particular as part of the preparations for hosting the 2024 Summer Olympics. These events can be used as a life-size test for the future competitions. It also serves the local authorities' agenda for a reopening of bathing for the general public:

The fact that more and more people are taking part in open water swimming events, this represents a means of pressure for the cities [in favour of swimming, vis-à-vis the health authorities, which are more reluctant]. (...) Paris serves as an example.

(Interview of an open-water competition organiser, March 2021)

The swimmers (sometimes former champions) who organise or participate in these events also disseminate information about the water quality of rivers. Recently, at the beginning of June 2021, Arthur Germain, who is none other than the son of Paris mayor Anne Hidalgo, undertook to swim up the Seine from its source to its outlet (almost 800 km) to raise awareness of the ecological problems affecting the river.

Beyond the individual athletes, the international triathlon federation has made the holding of Olympic events in the Seine conditional on a more stringent bacteriological quality than that required by the 2006 European directive on bathing. All the athletes do not defend this position, but it is taken by the authorities as a necessary reference. Thus, we are moving from a European bathing quality objective to a bathing objective for the Olympic Games which is more demanding in terms of zero default infrastructures.

B. Amongst managers and officials: bathing as a means to achieve the objectives of the EU Water Framework Directive

The actions implemented within the framework of the bathing plan are described by many state officials and managers working in the field of water as an opportunity to achieve the ambitious objectives of the EU Water Framework Directive towards a good ecological status for rivers. According to several managers and officials, who have been embarked in the achieving a return to bathing in rivers is a way to formalise and materialise the work undertaken for several years in order to improve water quality, but also a source of motivation. As stated by a local manager: "Swimming is 'the icing on the cake', the thing that can be seen and makes us want to make

efforts.”⁸ The Bathing objective is also considered as a lever to get large amount of public money spent to deal with long-term sanitation defaults that were not being tackled appropriately before (such as the misconnections on the separate network in the suburban areas of Paris).

Bathing has also been described as a effective rallying point for the population (unlike the “unsexy”⁹ EU Water Framework) which is not to participate in improving water quality. Another local representative stresses the fact that “bathing” can help create a “collective project” to give back an identity to the local territory and help its discovery by local inhabitants, as well as contribute to its attractiveness¹⁰. The objectives associated with a reopening of bathing sites in urban rivers are certainly larger than those anticipated by the public authorities.

C. The birth of public policies in favour of bathing and the conditions for political debate

In the case of Berlin, the project of making the Spree-Kanal a bathing site (Flussbad Berlin) was initially associated with aesthetic and ecological objectives, in a context where easy access to nature is already enjoyed by most Berliners. This project, initiated in the 199, has received growing support over time. It is currently being discussed in local democratic bodies (the Berlin Senate) with a planned opening date of 2025. This would be the first bathing site to be located in the city centre of Berlin, although the city, which is very large (the metropolis of Berlin covers an area 8 times larger that of Paris), already counts many bathing sites, mainly in the vicinity of lakes - the closest ones located 20/30 minutes from Alexanderplatz station for the closest ones, and up to 1.5 hour by public transport for the furthest ones)¹¹. In 2019, the local authorities have adopted an urban development plan called “Umfeld Spreekanal”¹² which, among other objectives, aims to identify “the concrete measures for transforming the Spree Canal into an urban ecological lifeline and provide impetus for upgrading the riverbank areas into attractive urban spaces”¹³. The Flussbad Berlin project shall be integrated in this urban development plan.

In Paris, the opening of bathing sites on the Seine and the Marne can be understood as a political response to the criticism of the non-sustainability of the Olympic Games in the world. Being accused of encouraging white elephants, the Olympic committee imposed sustainability criteria on candidate cities. The socialist city council of Paris proposed to offer the bathing site as a pledge of positive “legacy” to Parisians of the investments made. The process of designating a bathing site near the Iena Bridge took place at the time of Paris' candidacy to host the 2024

⁸ Declaration of a local manager, during a public meeting in March 2021.

⁹ Interview with a former representative of a local water-related organisation, July 2020.

¹⁰ Declaration of a local manager, during a public meeting in March 2021.

¹¹ Sources: Berliner Badestellen (<https://badestellen.berlin.de/>) ; BVG (<https://beta.bvg.de/de>)

¹² Déclaré “Stadtumbaugebiet” (urban development area) in 2019 (§ 171b BauGB).

¹³ Berlin State’s website dedicated to planning issues

(https://www.stadtentwicklung.berlin.de/staedtebau/foerderprogramme/lebendige_zentren/de/gebiete/mit/spreekanal/)

Olympic Games. In 2016, a call for statements of interest sent by the prefect led to the identification of 23 bathing sites spread over 16 municipalities of the Paris region. The Water Quality and Bathing Plan has been allocated 1.4 billion euros to bring the water quality of the Seine and Marne rivers into line with the requirements of the 2006 framework directive on bathing. It should be noted in the case of the Paris region that the bathing objective has been supported since the 1990s by the Syndicat Marne Vive, an environmental planning body¹⁴ for the downstream part of the Marne River, with an environmentalist agenda. Even before the impetus given by the Olympic Games, this body was working towards a reopening of bathing in the Marne with the expected deadline of 2022.

The projects under study are therefore inscribed into two different timeframes and political agenda. In Berlin, it all started as a "citizens' project" (van der Walt 2020), which has been later on endorsed and financed by the public authorities (but the official project coordinator remains the Flussbad Berlin e.V. association); in Paris, although citizens were also calling for a return to bathing (cf. the action of the Laboratoire des Baignades Urbaines Expérimentales), it was the public authorities, and above all the Paris municipality, which gave the project the decisive impetus. The solutions for achieving bathing water quality, the main obstacle to the creation of these bathing site projects, are designed by these actors with different statuses: Flussbad Berlin e.V. in Berlin, the actors united in the Water Quality and Bathing Plan in Paris.

In Berlin, the authorities began to support the project in the mid-2010s. In his article, S. van der Walt (2020) looks back at the stages that marked this development: first of all, the fact that they had won architectural prizes¹⁵ made them more credible and visible. The Senate began to listen more favourably to them. The project obtained public funds in the form of grants from 2014 onwards (a first envelope of €110,000 in 2014; followed by €3.9 million; €250,000 in 2017 and €6.5 million - for the financing of the stairway to the Humboldt Forum), *i.e.*, a total of more than €10 million. However, these endowments were not based on the total envisaged cost of the project which could be (according to various sources) as high as 77 million or even 200 million.

There is a certain political unanimity around the project¹⁶. The only criticisms from political representatives that have been voiced have come from the far-right group *Alternativ für Deutschland*, which points to the exacerbated cost of developing such a site. This criticism is in line with the conclusion of the report of the taxpayers' association (*Bund der Steuerzahler*)¹⁷, which expressed concern about the misallocation of money (pointing out that the money used for the project would better serve municipal swimming pools). Recently (during the first half of 2021), this issue as well as the solutions chosen to achieve bathing water quality have been debated in the press and discussed in the Senate.

¹⁴ Responsible for developing the "schéma d'aménagement et de gestion des eaux de Marne aval".

¹⁵ Holcim Award Europe (Gold), endowed with \$100,000 US, in 2011 and Holcim Award Global (Bronze), endowed with \$50,000 US in 2012

¹⁶ In 2017, a cross-party motion was passed in favour of the project with a large majority of 136 votes out of a total of 160 (van der Walt, 2020).

¹⁷ A report published in 2020 <https://steuerzahler.de/aktuelles/detail/flussbad-im-spreekanal-ab-2035/>

3. Choosing between NbS and Grey solutions

In order to achieve bathing water quality and meet the requirements of the 2006 EU Bathing Directive, the cities of Paris and Berlin are currently developing different technical solutions. Both must limit the overflows of wastewater on the combined sewage system that usually happen by rainy weather and lead to a pollution in the city centre. In the Paris region, other pollution sources have been identified: the misconnections on the separate sewage system (leading to wastewater discharge even during dry weather), the non-connection of houseboats to any sewage system, and the lack of treatment of some water rejected from the water treatment plants.

A. The case of Paris, centralised decision-making within a constrained time frame: prioritised grey solutions

Since 2001, the city of Paris has been governed by a socialist coalition, with the support of the Green Party in exchange for environmentalist commitments. In the field of water, the ecologists have notably asked for a return to public drinking water management (a campaign promise made by Bertrand Delanoé in 2008 and realized in 2009). Paris' bid for the Olympic Games, on the other hand, has often been criticized by environmentalists. Bertrand Delanoé has submitted three times the candidacy of Paris to the Olympics in vain. Anne Hidalgo succeeded him in 2014 with an ambitious program in terms of ecology while maintaining Paris' candidacy to the Olympics and winning the bid in 2017. Making this mega-event project compatible with ecological concerns is therefore a strong political challenge of her mandate, which aligned with the ecological turn of the Olympic Committee.

This project has received State support from the beginning. The Préfet de région, state representative at regional level, and the Mayor of Paris co-chair the steering committee that chooses the policy solutions for reaching bathing quality in the Marne and the Seine Rivers. As time passes, the committee more and more refers to the deadline of the Olympic games as a means to justify engineering solutions that are supposed to solve problems quickly and with guaranteed results (with a clear goal of reaching the “zero default” infrastructural functioning) rather than nature-based solutions that are considered too uncertain. This point was particularly controversial when solutions were discussed to solve the problem of houseboats not being connected to the sewerage system. Some houseboat owners and their representative union criticised the choice of making their connection to the sewage system compulsory, as other solutions, based on nature (such as the installation of phytodepuration systems or the use of dry toilets) could have been envisaged. The most expensive solution (about 2 million euros for the connection of a hundred boats in Paris) was chosen for grounds of "efficiency".

Similarly, rainwater infiltration is promoted as part of the bathing public plan but has not been given priority. Instead, a large underground reservoir will be constructed in order to store possible stormwater occurring a few days before the Olympic events.

Nature-based solutions such as rainwater infiltration require new expertise and coordination with multiple professionals (green space maintenance, underground geotechnical expertise, ...). It often implies actions beyond the territory of the capital city. The centralist mode of governance and the timeframe work against such pluralist design, and in favour of city-owned and state-supported grey solutions.

B. The case of Berlin, two solutions under public debate: a nature-based solution (phytofiltration of water) and a grey solution (wastewater diversion channel)

In contrast to Paris, the Berlin bathing site project plans to rely mainly on a natural solution to improve water quality. Along the 1.8 kilometre canal, three different zones could be created as part of the project. From upstream to downstream, these are a first zone ("der naturhafte Wasserlauf") dedicated to the protection of "nature" and which will consist of an "undisturbed area for fish, insects and plants"; a second zone ("der Filterbereich") is planned to be 300 metres long and will consist of a layer of gravel and a bed of plants that will help filter the water and retain polluted particles; a third zone ("der Schwimmbereich") will be the bathing part of the canal, accessible only by clean water. This device is presented as the cornerstone of the project, which would contribute to the "renaturation" of this canal, which for a long time has been dedicated solely to functional use. The Senate representative for urban planning and housing presented the project in the following terms:

First and foremost, this is about the renaturation of a section of the canal and the natural purification of the previously polluted water of the Spree River to achieve bathing water quality

(Flussbad Berlin Programmheft, 2020)

The functioning of this natural "filter" has already been demonstrated for a few years in miniature format on a barge on the canal, for educational purposes.

Although the project designers consider that the filtering zone (second zone) is adapted to the fluctuating intensity of the pollution (especially to the overflows that reach the river during storms), another "grey" solution is planned to be combined with this natural solution. Indeed, a bypass pipe will be built under the canal to allow the evacuation of wastewater during heavy rains. This solution has been criticised for its ecological and financial cost. A prominent engineer, known for his expertise on water issues in Berlin, recently stated in the press:

[This tunnel will need] as much concrete as is used for about one kilometre of highway. This would be equivalent to the CO² emissions of 24,4 million kilometres driven by a car.

(Ralf Steeg, interviewed by the Berliner Morgenpost, 19.02.2021)

He also questioned the effectiveness of the filter bed in purifying the water. More generally, the total cost of the project is increasingly discussed in the press and in the Berlin Senate. The project designers are criticised for underestimating many of the costs associated with the implementation of the project.

Conclusion

In both Paris and Berlin, raising the goal of swimming in urban rivers emerged from separate stakeholder groups before being seriously considered by public authorities and put on the political agenda. The social and ecological objectives put forward in Paris were in response to the need to organise a "sustainable" Olympic Games. In Berlin, it was primarily a matter of making ecological and more inclusive use of a neglected waterway in the shadow of the adjacent World Heritage area.

In Paris, the impetus of hosting the Summer Olympics to spend money to achieve 'zero default' infrastructure has its counterpoint. It also means that the timeframe for achieving bathing water quality is very tight, limiting the possibility of seriously considering nature-based solutions. In Berlin, the Flussbad Berlin project, developed over twenty years ago, is still awaiting public funding for its implementation and may suffer from the ongoing debate about the appropriateness of such an expensive project for a (still poor) city.

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