ETC/ICM Report 4/2022

Benefits of bathing waters in European cities

Authors:
Lidija Globevnik, Luka Snoj, Gašper Šubelj, Andrej Draksler,
Hugh McDonald, Thomas Thaler, Rob St. John

ETC/ICM Consortium Partners:
Helmholtz Centre for Environmental Research (UFZ), Fundación AZTI, Czech Environmental Information Agency (CENIA), Stichting Deltares, Ecologic Institute, International Council for the Exploration of the Sea (ICES), Italian National Institute for Environmental Protection and Research (ISPRA), Joint Nature Conservation Committee Support Co (JNCC), Middle East Technical University (METU), Norsk Institutt for Vannforskning (NIVA), Finnish Environment Institute (SYKE), Thematic Center for Water Research, Studies and Projects development (TC Vode), Federal Environment Agency (UBA), University Duisburg-Essen (UDE)

European Environment Agency
European Topic Centre on Inland, Coastal and Marine Waters

Cover photo
© Lucía deMosteyrín

Layout
F&U confirm, Leipzig

Legal notice
The contents of this publication do not necessarily reflect the official opinions of the European Commission or other institutions of the European Union. Neither the European Environment Agency nor any person or company acting on behalf of the Agency is responsible for the use that may be made of the information contained in this report.

Brexit notice
The withdrawal of the United Kingdom from the European Union did not affect the production of the report. Data reported by the United Kingdom are included in all analyses and assessments contained herein, unless otherwise indicated.

This report also partly based on the ETC/ICM Environmental and socio-economic benefits of bathing in cities workshop which was held on Tuesday, September 20th 2022.

Copyright notice
© European Topic Centre on Inland, Coastal and Marine waters (ETC/ICM), 2022
Reproduction is authorized provided the source is acknowledged.

More information on the European Union is available on the Internet (http://europa.eu).

ISBN 978-3-944280-18-9

Author affiliation
Lidija Globevnik, Luka Snoj, Gašper Šubelj, Andrej Draksler – TC VODE Thematic Centre for Water Research, Studies and Project Development, European Topic Centre on Inland, Coastal and Marine Waters, Ljubljana, Slovenia
Hugh McDonald – Ecologic Institute, European Topic Centre on Inland, Coastal and Marine Waters, Berlin, Germany
Thomas Thaler – University of Natural Resources and Life Sciences (BOKU), Vienna, Austria
Rob St. John – freelance writer, United Kingdom

Reviewed by
Jeanette Völker – UBA, Germany

Suggested citation
Globevnik, L., Snoj, L., Šubelj, G., Draksler, A., McDonald, H., Thaler, T., St. John, R., 2022, Benefits of bathing waters in European cities. ETC/ICM Technical Report 04/2022: European Topic Centre on Inland, Coastal and Marine Waters, 45 pp.

European Topic Centre on
Inland, Coastal and Marine waters (ETC/ICM)
c/o Helmholtz Centre for Environmental Research – UFZ
Brückstraße 3a
39104 Magdeburg
Web: https://www.eionet.europa.eu/etcs/etc-icm/

Contents

Authors and acknowledgements 4
List of abbreviations 5
Executive summary 6
1 Introduction 8
2 Urban bathing cultures and landscapes in Europe 9
2.1 Urban swimming: recreation and ecological recovery 9
2.2 Public bathing: health and well-being....10
2.3 Urban bathing landscapes: tourism, development, and planning....14
3 Benefits of improved bathing water quality for urban communities....17
3.1 Benefits of improved urban bathing waters 17
3.2 Improved water quality directly and indirectly improves the lives of urban inhabitants – the evidence 19
3.2.1 Swimmers love clean bathing water 19
3.2.2 Bathing waters support numerous recreational activities....20
3.2.3 Clean bathing water fosters human health and well-being benefits....21
3.2.4 Benefits for the local urban economy....22
3.2.5 Healthy aquatic ecosystems provide valuable services to urban inhabitants 23
3.2.6 The value of keeping future bathing options open....23
3.2.7 Non-bathers also benefit from improved water quality....23
4 Where are bathing waters found across Europe and what policy and management issues do they pose? 25
4.1 European towns and cities with bathing waters....26
4.2 Inland bathing waters in cities 28
4.2.1 Urban bathing waters as a motive for public and political action across entire catchments 30
4.2.2 Urban bathing water designation as part of river basin restoration 30
4.2.3 Cities sustain good bathing water quality for downstream sites 31
4.3 Coastal bathing waters in cities....31
4.3.1 Coastal city economies can be supported by safe urban bathing sites 31
4.3.2 Coastal bathing waters: economic and geographical variations 32
5 Invisible benefits of urban bathing water sites 33
5.1 Social policy 33
5.2 Drinking water resources 34
5.3 Climate change resilience....36
5.4 Innovative governance practices and new technologies 37
5.5 Public space improvements 38
6 Urban bathing waters now and in the future 39
7 References 41

Authors and acknowledgements

EEA project manager:	Mustafa Aydin – EEA, Denmark
EEA Head of group for water and marine:	Stéphane Isoard – EEA, Denmark
Authors:	Lidija Globevnik, Luka Snoj, Gašper Šubelj, Andrej Draksler (TC Vode, Slovenia) Hugh McDonald (Ecologic Institute, Germany) Thomas Thaler (BOKU, Austria) Rob St. John (the United Kingdom)
ETC/ICM Administrative Manager:	Claudia Neitzel (UFZ)
Additional support and guidance:	Stéphane Isoard (EEA), Peter Kristensen
English check:	Shane Hume (CENIA)

We thank all the participants of the expert stakeholder workshop held on 20th September 2022, especially the presenters Oliver Becker (Technical University of Berlin), María Jose Chesa Marro (Barcelona City Council), Michael Friesenecker (BOKU-University of Natural Resources and Life Sciences, Vienna), Nadine Gerner (German water board “Emschergenossenschaft & Lippeverband”) and Mathew White (University of Vienna).

List of abbreviations

Abbreviation	Name	Reference
EEA	European Environment Agency	www.eea.europa.eu
ETC/ICM	European Topic Centre on Inland, Coastal and Marine Waters	https://www.eionet.europa.eu/etcs/etc-icm
EU	European Union	https://www.britannica.com/topic/European-Union
BGI	Blue-Green Infrastructure	http://bioveins.eu/blog/article2
BWD	Bathing Water Directive	https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:32006L0007
DWD	Drinking Water Directive	https://eur-lex.europa.eu/eli/dir/2020/2184/oj
GDP	Gross Domestic Product	https://www.britannica.com/topic/gross-domestic-product
USA	United States of America	https://www.britannica.com/place/United-States
UWWTD	Urban Waste Water Treatment Directive	https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX %3A31991L0271
WFD	Water Framework Directive	https://ec.europa.eu/environment/water/water-framework/index_en.html
WISE	Water Information System for Europe	https://water.europa.eu/

Executive summary

City dwellers across Europe have bathed in urban rivers, lakes and seas for centuries. However, years of aquatic pollution across the continent made many urban waters unsafe for bathing in the 20th century. In recent decades, though, European water policies have helped guide many city water bodies back to health, and urban bathing is increasingly possible – and popular – as a result.

European bathing waters are officially designated by the EU Bathing Water Directive (BWD) (EU, 2006). Official bathing sites – found in both coastal and inland waters – are designated and monitored to both safeguard public health and protect the aquatic environment. Once a bathing site is designated, data on water quality and pollutants which pose a risk to bathers' health is regularly published.

The designation and restoration of urban bathing waters in European cities has many socio-economic benefits. We present them in this report based on scientific and applied research and the outcomes of an expert stakeholder workshop to highlight five key themes relating to urban bathing in Europe.

1. Europe has numerous historical urban bathing cultures. People have bathed in European cities for centuries. As a result, bathing has shaped how many urban areas have developed through tourism and recreation. Urban bathing is currently enjoying a renaissance across Europe, as cleaner seas, rivers, and lakes have encouraged the return of bathing and wild swimming communities.

2. Clean and safe urban bathing waters in Europe foster many socio-economic benefits. These include direct benefits to bathers, and indirect benefits to the health of the wider ecosystem and the services it can provide to humans. Increased bathing water quality has the potential to generate significant value through the increased recreational use and enjoyment of bathing sites. One study suggests that increasing water quality across Europe by one BWD quality level would generate an additional EUR 42 billion of recreational benefits for urban and non-urban citizens, while an equivalent decrease would reduce recreational benefits by EUR 131 billion. The benefits brought by bathing sites can shape the spatial development of seaside towns and cities, the scale of recreational architecture, and other forms of development related to tourism services. Many city planners and residents are increasingly recognising the recreational, aesthetic, and spiritual values of bathing sites as well as the opportunities they offer for leisure and socialising.

3. Around half of European citizens living in towns and cities have access to urban bathing sites. Bathing waters are a valuable attribute of urban public spaces and can act as a motive for public and political action across entire catchments. Of all the European bathing waters, almost 10 % (1 823) are located in 193 cities with more than 100 000 inhabitants. As the desire of urban citizens to live in eco-friendly cities increases, swimming 'in our own water' can be a powerful symbol of healthy aquatic environments. Citizens often use bathing waters close to their homes, emphasising the importance and value of maintaining and expanding local urban bathing sites.

4. *There are numerous 'invisible' benefits of clean and healthy urban bathing waters to both citizens and ecosystems.* These often occur over large areas and long timescales and interact with wider policy and management concerns. The maintenance of bathing waters can benefit urban drinking water supplies and help mitigate the effects of climate change on city environments. Urban bathing waters are often sites where innovative new approaches to environmental management, such as real-time water quality monitoring, are developed. Overall, urban bathing waters can contribute strongly to improvements in public space and quality of life for city inhabitants.

5. There are still significant challenges for restoring urban bathing waters across Europe: Following decades of targeted environmental legislation water quality has improved in many – but not all – urban areas in Europe (EEA, 2020). However, there are still significant challenges relating to water pollution, habitat alterations and climate change, and at present, many urban waters across Europe remain unsuitable for bathing due to excessive levels of pollutants posing public health risks.

There are important overlaps with key policy frameworks such as the European Green Deal in promoting the role of urban bathing waters in sustainable, low-carbon urban societies. The numerous environmental, social, and economic benefits of urban bathing water designation have the potential to align with Green Deal goals to help shift European economies towards a more sustainable future.

Urban bathing waters are a valuable symbol of sustainable European cities, where citizens can interact with urban nature as a result of the successes of long-term environmental management. The opening of each new urban bathing water and the continued maintenance of clean, safe bathing water should be met by praise and encouragement. We need to preserve and protect bathing waters in cities, both for ourselves and for future generations.

1 Introduction

Safe bathing is an important public value provided by seas, rivers and lakes across Europe. An officially-designated bathing water can benefit both human and aquatic life, and can stimulate local economies through recreational and tourist activities. It can also increase the value of nearby real estate and support community interactions. Europe's urban bathing water quality has vastly improved over the last forty years, following the introduction of the EU's Bathing Water Directive in 1975 (EU, 1975). Effective monitoring and management introduced under the Directive led to a drastic reduction in the volume of untreated, or partially treated, municipal and industrial waste water ending up in bathing waters.

Urban bathing waters (Box 1.1) are spread along European coasts, rivers, and lake shores. Swimming at these locations is possible where bathing water quality has been improved to a 'sufficient' status through the implementation of European policies such as the BWD, WFD and UWWTD.

One quarter of bathing waters in Europe lie in urban areas, and some are even located in city centres. Bathing waters in urban areas not only add value to tourist attractions, they offer daily possibilities for swimming and recreation to local populations. More than 4 500 urban bathing waters are easily accessible to one-third of all people living in Europe (EEA, 2021).

Box 1.1 What is a Bathing Water?

European bathing waters are officially designated by the EU Bathing Water Directive, which came into force in 1975 (EU, 1975). Official bathing sites – found in both coastal and inland waters – are designated and monitored to both safeguard public health and protect the aquatic environment. To be monitored by the Directive, bathing waters must either be officially authorized for bathing, or traditionally used by large numbers of people. Once a bathing site is designated, data on water quality and pollutants which pose a risk to bathers' health is regularly published.

The 'revised Bathing Water Directive' adopted in 2006 (EU, 2006) takes a proactive approach to informing the public about the four water qualities for bathing waters: 'poor', 'sufficient', 'good' and 'excellent'. Official bathing waters do not include swimming pools and waters used for therapeutic purposes. Not all commonly-used 'wild swimming' sites in Europe are designated as official bathing waters under the BWD, meaning the public health risks these waters pose to bathers are often unknown.

Urban bathing waters in Europe are closely linked to a network of environmental, socio-economic and political processes. These include:

- the policies and processes used in cities and urban areas to manage bathing water sites;
- investments to improve overall water quality leading to the opening of new bathing water sites;
- the economic and social importance of bathing waters in cities;
- and the changes that bathing brings to urban environments.

Bathing water characteristics in cities – and the profiles of visitors who use them – often differ from those in open, natural landscapes, but they remain inherently related to wider river basins and marine regions. Evaluations of water quality improvement in cities and entire river basins are therefore interdependent with wider socio-economic systems and need to be looked at holistically. Increasingly, in Europe there are urban areas where bathing tourism is a key economic activity in the local community, and others where swimming in natural waters is becoming a central part of urban living. In both cases, ensuring high bathing water quality is often a political priority. Fostering positive attitudes in urban residents toward bathing waters is therefore an important objective for management, often through initiatives and events that encourage a sense of public stewardship of 'our river, lake or sea'.

The key purposes of this report are to define the various values of European urban bathing waters for citizens, society, economy and the environment. Furthermore, to describe the experiences of the cities that have established bathing waters, and to assess the challenges ahead for cities in establishing and developing their bathing sites.

The fact that many European urban citizens can now swim in their local bathing water sites is a significant success story for recent environmental and urban policy. Moreover, the urban bathing trend can catalyse numerous environmental and socio-economic benefits for local communities. This report thus encourages European cities to actively participate in improvements to urban bathing water quality to support growing urban bathing cultures across the continent.

2 Urban bathing cultures and landscapes in Europe

Water attracts and invites rest, reflection, relaxation, and recreation. Bathing contributes to human health and general well-being, and has been practiced in European waters for many centuries. The modern era of bathing in natural waters began around two hundred years ago in places with thermal and mineral water springs, where the nobility and industrialists socialised and passed time (Chaline, 2018).

In the mid-19th century, bathing cultures spread along the coasts of Great Britain. With the help of railways built in 1840, Blackpool became the world's first working class seaside resort in the late 19th century (Brodie and Whitfield, 2014). Later, bathing cultures slowly spread throughout Europe, influenced by the developing railway network across the continent. Many towns and cities opened public baths on lakes, rivers and coasts, where health and recreation were a key attraction. Urban bathing is currently enjoying a renaissance across Europe, as cleaner seas, rivers, and lakes have encouraged the return of bathing and wild swimming communities.

This chapter highlights the key elements of urban bathing cultures in Europe in the last two hundred years, covering environmental, public health, economic, and urban development concerns. Together, they frame the context in which contemporary discussions over the form and future of urban bathing in Europe take place.

2.1 Urban swimming: recreation and ecological recovery

Urban bathing cultures in Europe are the result of public desire for recreation in urban waterways over the last two hundred years. They have been shaped by ongoing processes of ecological decline and recovery across the continent's river basins. Prior to widespread aquatic pollution following the Industrial Revolution, and urban development in the 20th century, many European cities supported thriving bathing cultures (Chaline, 2018). Whilst urban swimming was widely affected by poor water quality in rivers, lakes, and seas across Europe throughout the 20th century, ecological restoration has brought swimming cultures back to many urban areas in recent years. For example, freshwaters in Berlin, Amsterdam and Zürich, and seashores in Barcelona, Copenhagen and Oslo now teem with swimmers, both in the summer months and throughout the year.

Recreational swimming in the River Thames in England was popular amongst communities in riverside towns and cities as early as the mid-19th century. Up until the mid-20th century, the Thames was bustling with swimmers and swimming clubs. From splashing school children and intrepid wild swimmers to international athletes, the Thames was a favourite with bathers. By the 1930s, the Thames had become a top holiday spot for families, with beaches at the Tower of London, Greenwich, and Grays. Until the mid-20th century, the Thames hosted many organised river races, and even the long-distance amateur championships of Great Britain (Davies, 2015).

However, in 1957 the River Thames in London was declared biologically dead due to the effects of urban and industrial pollutants entering the river (McCormick et al., 2021). As a result of the risks to public health, recreational and competitive swimming largely ceased on the lower Thames in the second half of the 20th century. However, thanks to improvements in water quality in recent years – catalysed in part by EU policies such as the WFD – and the widespread boom in outdoor swimming, people are returning to the river in sizeable numbers, largely at sites upstream of London. At least 10 000 people a year take part in organised swimming events along the Thames (Hanley Swim, 2022). The Thames is not yet of sufficient quality to support designated bathing water sites, but if water quality continues to improve then it is possible in the future. As we see throughout this report, urban bathing cultures are strongly dependent on interactions between environmental and socio-economic forces and their management. Environmental and urban management towards high water quality means that ecological and human health go hand in hand in the cultures of urban bathing.

2.2 Public bathing: health and well-being

Urban health and recreation bathing practices are not limited to swimming. For centuries, European communities have flocked to bathing facilities, such as public baths, spas and saunas. Indeed, the fifth-century Roman military writer, Vegetius, noted that legionaries had already become too accustomed to the luxuries of Roman bathhouses, and had to be taught how to swim (Chaline, 2018). Due to an increased awareness of the role of bathing and soaking in warm and mineral-rich water in promoting human health and recovery from illness, bathing resorts began to proliferate across the continent in the late-19th century. These were found across the continent: on the shores of the Baltic, along the Alpine lakes, and in many lowlands or valleys of Europe with natural mineral and warm water springs. The idea of health-promoting bathing also spread to the shores of the Mediterranean Sea around this time. The warm Mediterranean waters offered opportunities for recreation and relaxation. Mineral and warm water resort centres across Europe began to develop mainly in the vicinity of cities, ports, or industrial centres, which could be accessed by growing rail or nautical transport networks. As natural waterways became increasingly polluted, such public baths and spas offered European citizens the chance to communally bathe (Urry and Larsen, 2011). Whilst such therapeutic bathing sites are not now designated under the BWD, they represent important places for public bathing cultures in urban areas.

Public baths in urban waterways across Europe also began to grow in popularity in the 19th century. The establishment of public baths on the Danube River and its canals in Vienna was a result of increasing industrialisation, urban growth and associated poor hygiene and housing conditions. The first unregulated outdoor baths were set up in the Danube River at the end of the 18th century, including the 'cold fall bath' in the Liechtenstein Garden (at that time still located on an arm of the Danube), and the Am Tabor cold bath. In 1790, another one was built in the Prater, and in 1839 another at Augarten ('Ferdinand-Marien-Bad'). Baths were constructed as simple wooden buildings with changing rooms, with the bathing pool in the middle. The military swimming school in the Prater (Image 2.1) had the same type of bath (Eder, 1995).

Image 2.1: Cold bath at the military swimming school in the Prater, 1813

Photo: © Vienna Museum, HMW 063435

Image 2.2: Alte Donau (Old Danube) in Vienna

Photo: © SZERVÁC Attila from Wikimedia

The swimming facilities along the Danube were replaced by the recreational areas along the Old and New Danube. The Old Danube (Alte Donau, Image 2.2) is now not used only by swimmers, but also sailors, rowers, and windsurfers. There are four lidos along the river and the Gänsehäufel area has 2 km of beach, swimming pools, playgrounds, and cafés for enjoying relaxing summer days (The Local, 2015). As in the River Thames, the Ljubljana city baths (Box 2.1) and outdoor Scandinavian saunas (Box 2.2), the return of communities to historical bathing sites represents a marker of improved water quality as a result of long-term ecological restoration programmes on the Danube. Importantly, they show the deep historical roots of European bathing cultures which are being encouraged once again following environmental management.

Box 2.1 The case of the lost city baths in Ljubljana

The inhabitants of Ljubljana, Slovenia once enjoyed socialising and bathing on sites along the city's rivers. One such site was Marija's bath on the river Ljubljanica at Livada and the Kolezija baths on the River Gradaščica. In the middle of the 19th century, a wooden bath with cabins was built at Kolezija, modelled on Vienna's public bath. A wooden construction with footbridges, piers, and cabins was built in 1923 at Livada (Image 2.3). The bath was opened throughout the summer months (Turk et al., 2009).

Bathing was also popular at Špica in the city centre, where terraced river channel slopes were arranged for sunbathing and relaxing. Due to the river regulation works, uncontrolled urbanisation with no sewerage, expansion of waste landfill area and the intensification of livestock breeding in the hinterland, the water quality of the river Ljubljanica deteriorated dramatically in the 1960s and 1970s. Despite large investments into urban drainage and sewerage lately, the water is still not suitable for bathing. The city, which was the 2017 Green Capital of Europe, is striving to restore and re-open the bathing waters where they once were. This example shows the ongoing potential to promote European urban bathing cultures as a means of fostering both environmental and community benefits.

Image 2.3: Bath at Livada in Ljubljana in the mid-20th Century

Photo: © Tjaša Grünfeld

Box 2.2 Scandinavian sauna cultures promote a connection to water

The Scandinavian sauna is not seen as a luxury treat, but as an everyday place to cleanse and relax, and as a place of social, political, and cultural exchange. Saunas are traditionally simple wooden structures, and are often located close to, or even floating on, natural waters. Immersion in lake, river or sea water (sometimes after first breaking an ice sheet) following time in the hot, humid sauna is a common element of the bathing process. As a result, a connection to water is an intrinsic part of Scandinavian sauna culture. Whilst many outdoor Scandinavian saunas are located on lakes and rivers in rural areas, there are also many in urban areas, such as the floating saunas on Stocksunds Harbour in Stockholm. Such outdoor immersion in urban waters as part of the sauna process depends on high bathing water quality, which has improved significantly around Stockholm and other Scandinavian cities in recent decades due to successful environmental policy and management (Millington, 2017).

Together, these examples briefly outline how different health and recreation benefits have shaped urban bathing cultures in Europe over the last two hundred years, influenced greatly by widespread processes of ecological decline and recovery. In short, there are deep historical urban bathing cultures in communities across the continent, which are increasingly strong and vibrant, as evidenced by the current popularity of practices such as wild swimming. In each case, the desire for clean urban aquatic ecosystems used for bathing links human and environmental health. As a result, promoting urban bathing cultures has the potential to cause numerous socio-ecological benefits in European cities. The next section considers how these bathing cultures have shaped the urban landscapes in which they take place.

2.3 Urban bathing landscapes: tourism, development, and planning

The development of tourist and leisure facilities for bathing can have a significant impact on urban landscapes, particularly in coastal regions. Bathing sites can shape the spatial development of seaside towns and cities, the scale of recreational architecture, and other forms of development related to tourism services. The gradual nature of this process results from evolutionary changes in the culture of recreation, and habits connected with tourist trips since the development of coastal resorts. Examples of these processes are shown through case studies of the bathing sites along the Baltic Sea in Poland, and on Barcelona's coast.

Table 2.1 Cultural stages of coastal beach tourism in the Pomerania region of Poland

Stage	I Formation	II Regionalism	III Socialisation	IV Pluralism
TIME PERIOD	Early 19th century to early 20th century	1918–1939	1945–1989	1989–present
KEY TRENDS	Elite tourism	Popular tourism	Package tourism under socialism	Mass tourism
ARCHITECTUAL FEATURES	Renaissance and Classicist villas and spas, wooden Swiss and Norwegian baths	Growth in modernist design and new leisure facilities	Growth of large modernist holiday centres	Development of large chain hotels, sports, and recreation facilities
LANDSCAPE IMPACTS	Minor landscape impacts due to the small number of tourists. Small scale public space design	Intensive development of resorts, including promenade, shoreline, pier and pavilions	Gradual decline of original resorts character, increasing impact on the landscape	Intensive landscape impacts, ongoing urbanization and commercialisation of space

Source: Bal and Czalczynska-Podolska, 2020

Table 2.1 shows how the growth of bathing tourism at Polish seaside resorts on the Baltic Sea has altered the built and natural landscape since the early 19th century (Image 2.4) (Bal and Czalczynska-Podolska, 2020). The cultural stages of development – from elite tourism with minor landscape impacts to mass tourism with intensive landscape impacts – highlight how bathing cultures shape coastal landscapes in numerous ways over time. This is an important point to note when the ongoing sustainable development of bathing sites is considered in urban policy and environmental management. Bathing cultures have a long history in Europe, but are constantly evolving in relation with the landscapes and environments in which they take place.

Image 2.4: Postcards from the beach at Dziwnow at the end of the 19th century

Source: Bal and Czalczynska-Podolska, 2020

Image 2.5: Recent urban bathing cultures along Barcelona beach

Photo: © David Mark from Pixabay

Barcelona's coastline (Image 2.5) has always been an important driver in the development of the city. Maritime trade has been a key activity in Barcelona's economies, so the necessity of having a safe harbour has been one of the most pressing forces in changing the coastal profile of the city. Barcelona's coastline has been altered since the beginning of the 15th century when initial transformations were made to enhance the protection of trade ships. The construction of dikes and breakwaters led to corresponding changes in sedimentary flows and the reclamation of almost 400 m of land from the sea. However, throughout the following centuries, the city has modified its relationship with the sea, and different ecosystem services – particularly those around tourism – have been prioritized (Tomlinson et al., 2011).

The Olympic Games in 1992 and the Universal Forum of Cultures in 2004 were two internationally recognised events that reshaped Barcelona, both figuratively as a city, and literally in terms of its coastline (Tomlinson et al., 2011). The city's existing industrial infrastructure was replaced with artificial beaches (Image 2.5) within the urban environment, which provided a leisure space for both residents and tourists. Fishing was also of considerable economic significance, but its importance decreased through the 20th century and became a marginal traditional activity. Nowadays navigation, recreation, and tourism can be considered the most important services addressed by the management of Barcelona's coastline. The large industrial harbour and the public use of beaches for leisure are the two main uses of Barcelona's urban littoral space today (Tomlinson et al., 2011). Barcelona now has numerous urban beaches where water quality is continually monitored and reported through a dedicated website (Barcelona, 2022). Bathing cultures relating to the growth of tourism continue to drive urban growth and development in the city.

The shoreline area of Barcelona is 15 km long and is one of the biggest open spaces in the city. Beach management includes activities such as: cleaning, rescue and assistance, security, environmental quality, accessibility, communication and information, environmental education, maintenance, and planning and evaluation. Barcelona has implemented seven Master Plans since the 1950s, which have aimed to strengthen and improve the city's sanitation and sewage system through innovative solutions such as monitoring systems. Urban planning instruments have been designed around economic efficiency criteria to reduce the risks from the combined sewer system overflowing. These instruments aim to protect people, property and the environment whilst addressing the ongoing effects of climate change (José Chesa Marro, 2022).

The examples of the Baltic coast and in Barcelona show that bathing cultures driven by tourism have the potential to shape socio-economic and landscapes in urban areas. A key consideration for policy and management is that these are complex and dynamic processes which continue to evolve.

The next chapter will consider how the benefits provided by contemporary urban bathing sites can be described and categorised, in order to make effective policy and management decisions about their future.

3 Benefits of improved bathing water quality for urban communities

The benefits of urban bathing not only include numerous opportunities for recreation and leisure, but also the potential for improved physical health through green exercise, visual amenity, improved mental well-being, artistic inspiration, and ecological education (Gibbons et al., 2014). As this list suggests, improved bathing water quality delivers diverse benefits to urban communities. Some such benefits are direct and are enjoyed by urban inhabitants who make use of the cleaner water, such as swimmers or those who visit the lakes, rivers or coast for recreation and health reasons. Others are indirect: improved bathing water quality also benefits those who do not personally make direct use of cleaner water. For example, cleaner bathing sites often attract locals and tourists, supporting local economies or boosting nearby property prices.

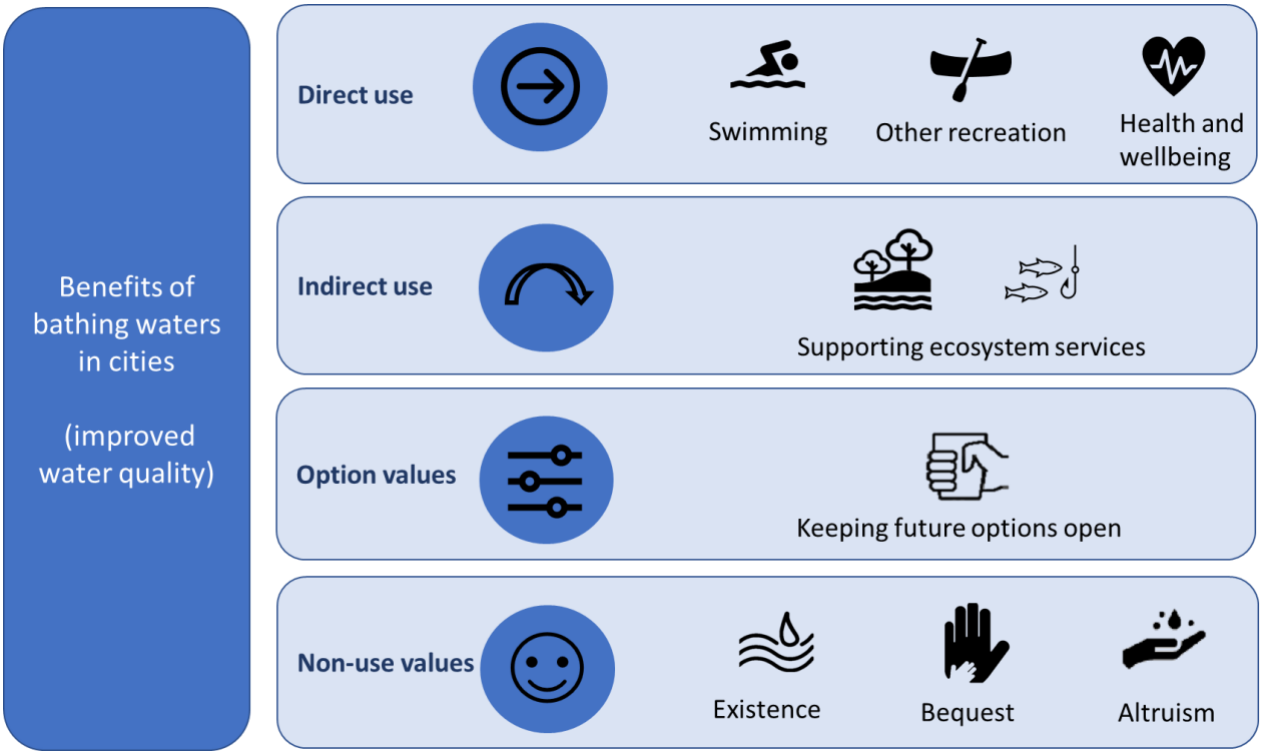
Others are not based on personal use, for example, non-swimmers might charitably be happy that their neighbours can swim in cleaner water, or proud that the local waterways are healthier for native plants and animals. In addition, urban bathing waters are often spaces that foster community interactions and cohesion. Improving urban bathing water can therefore have not only foster health benefits for bathers, but also create wider social value. This chapter draws on economic theory and studies to describe the distinct types of benefits provided by improved bathing water quality, as well as exploring the value of these economic benefits, illustrated with examples from cities across Europe.

3.1 Benefits of improved urban bathing waters

Cleaner bathing water brings many distinct types of benefits to many different beneficiaries. These benefits might be obvious, such as the public health benefits enjoyed by swimmers or surfers using safe, clean bathing sites. Benefits can also be more intangible – but no less significant – such as the indirect positive impacts that bathing waters have on the aquatic ecosystems that we rely on for food, water, and many other essential services. As highlighted throughout this report, human and environmental health are linked through the improvement of bathing water sites.

Economists classify these benefits into four groups – *direct use*, *indirect use*, *option value* and *non-use value* – as shown in Figure 3.1 and explained in Table 3.1.

Figure 3.1: The total value of improved urban bathing waters



Source: Own elaboration; (Kumar, 2010)

Table 3.1 The total value of improved urban bathing waters

Direct use	The benefits that urban inhabitants enjoy from **directly using** improved water quality. These include new ways of using the water (e.g. swimming becomes possible); or an increase in how often an individual uses the water (e.g. swimming more regularly); or how much an individual benefits from the activity (i.e. the enjoyment gained from each swim), and the flow-on impacts of these (such as health and well-being).
Indirect use	Improved bathing water quality supports healthier freshwater ecosystems, which **indirectly benefit** urban inhabitants (clean bathing water reduces pressure on freshwater habitats, increasing their ability to deliver ecosystem services such as maintaining flora and fauna, regulating water quality, etc.).
Option values	The value of **keeping open the option** of using improved water quality in the future (i.e. people value preserving water quality today, as it ensures that they will be able to enjoy clean water in the future).
Non-use values	The benefits of improved water quality enjoyed by urban inhabitants who don't even use bathing waters, including the satisfaction they get from knowing that clean waters **exist**, or the **altruistic** enjoyment of knowing that neighbours can enjoy bathing, or the pride of knowing that they will **bequest** cleaner waters to the next generation.

3.2 Improved water quality directly and indirectly improves the lives of urban inhabitants – the evidence

What evidence do we have about the benefits of improved bathing water quality in Europe? This section explores the evidence on the scale of socio-economic benefits of improved bathing water quality for urban communities, drawing on existing studies of the value of urban water quality improvements in Europe. All types of benefits and urban beneficiaries are outlined: from direct users such as swimmers and recreational visitors, to indirect health and well-being benefits, and the benefits enjoyed by those who do not go near the water.

3.2.1 Swimmers love clean bathing water

The most immediate beneficiaries of improved bathing water quality are those who make direct use of it. Bathing waters and other blue-green spaces significantly contribute to human health and well-being benefits. The COVID pandemic demonstrated that these benefits can be particularly significant to communities during times of crisis. Common uses of urban bathing sites include swimming and water sports activities, sunbathing, dog walking, wildlife watching, and picnicking. Indeed, one study suggests that only 8 % of recreational visits to blue spaces – including waterbodies not designated as bathing waters – involve getting wet (White et al., 2021a). In addition, research suggests that as water quality improves, communities can access an increasing number of potential bathing sites, and swimmers enjoy their swims more (Vladimirova et al., 2018).

Several studies across Europe attempt to quantify the monetary value of bathing benefits resulting from improved water quality in urban areas. While their results vary considerably depending on the context and type of study, their findings give some idea of the potential value generated by the BWD. For example, a 2013 study by Hynes and colleagues (Hynes et al., 2013) asked beach visitors (including swimmers, kayakers, and surfers) how much they would be willing to pay for improved water quality. They found that visitors would on average be willing to pay EUR 6.78 for access to cleaner bathing water per visit.

Other studies found willingness-to-pay values of EUR 0.50 – EUR 35 per visit, depending on the study approach and specific context such as the water quality before and the level of water quality improvement. While the diversity of these studies and their study contexts makes generalisation across Europe challenging, they provide evidence that improving water quality delivers significant benefits to swimmers, bathers, and other urban inhabitants who make direct use of nearby lakes, rivers, and beaches. More specifically, they indicate the desire amongst urban communities in Europe for cleaner bathing sites.

3.2.2 Bathing waters support numerous recreational activities

Cleaner, healthier bathing waters are also enjoyed by those who carry out activities on or nearby water, such as walkers, cyclists, and sailors (Image 3.1). These recreation values arising from clean bathing waters can be significant. For example, large-scale river restoration in the Emscher catchment, Germany, begun in 1990, created an estimated EUR 1.4 million of additional value per year for walkers, cyclists, and boaters, which was estimated by calculating the amount visitors would be willing to pay for improved recreational opportunities (Gerner et al., 2018).

Image 3.1: Ljubljanica River (Ljubljana, Slovenia) offers several recreational activities

Photo: © pixaba01 from Pixabay

A 2021 study estimated the total value of recreational visits to blue spaces across 14 countries in the EU, representing 78 % of the EU's population (Börger et al., 2021). Blue spaces are locations around rivers, lakes and the sea, including non-bathing sites such as coastal promenades, ponds and urban canals. On average, survey respondents (Börger et al., 2021) made 47 visits to blue spaces each year, and that the average value of each of these visits was EUR 41.32[1]. When these averages were summed up across the total population of all adults in those countries, the authors estimated that the total value of recreational visits to half of all EU states in 2018 was equivalent to EUR 631 billion. The study also assessed the impact of changes in water quality to recreational value. The authors suggest that an increase in water quality led to visitors making three additional visits per year, while a decrease in water quality would result in ten less visits per year. This implies that increasing water quality by one BWD quality level would generate an additional EUR 42 billion, while an equivalent decrease would mean missing out on EUR 131 billion in benefits. In short, increased bathing water quality has the potential to generate significant economic value through increased recreational use of bathing sites.

3.2.3 Clean bathing water fosters human health and well-being benefits

Research shows that clean bathing waters have the potential to deliver significant health and well-being impacts. The direct health benefits of cleaner water can be extensive, both for the individual and for society more widely.

A key benefit of cleaner bathing water is the reduction of two key public health risks from polluted bathing waters:

- *Blue-green algae:* blooms of algae can result from nutrient pollution and warmer temperatures. Contact with freshwater experiencing blue-green algae blooms can cause skin rashes, eye irritation, vomiting, diarrhoea, fever, muscle and joint pain in humans, and can be toxic to wild and domestic animals.
- *Faecal bacteria:* untreated sewage pollution after heavy rainfall can cause harmful faecal pathogens such as *E. coli* to enter bathing waters from combined sewer systems. These can cause gastrointestinal illness and respiratory, ear and nose infections in bathers if contaminated water is swallowed.

While these public health risks can be managed (e.g. through mitigating agricultural and urban pollution, improving wastewater treatment facilities, and restricting bathing at times of high rainfall or extremely hot weather), there is a risk that climate change will increase their occurrence. This has already been seen over the summer of 2022, for example, in waterbodies around Upsalla in Sweden, where increased algal blooms negatively impacted bathing and public health and well-being.

In addition to the risk and discomfort for the individual, these ailments have public health costs. A 2005 study in California, United States of America (USA), found that each gastrointestinal illness episode resulting from bathing costs USD 37, each acute respiratory disease episode USD 77, each ear ailment USD 38, and each eye ailment USD 27 (Dwight et al., 2005). The study considered the costs of these direct health impacts for recreational visitors to two beaches, which summed up to annual cumulative costs of USD 3.3 million per year (Dwight et al., 2005). A 2018 study focused on Scotland found that improving water quality to Scottish microbial standards would reduce the costs associated with gastrointestinal illness by GBP 5.8 million over 25 years (Phillips et al., 2018).

Safe and accessible bathing sites also have the potential to improve mental health. One study suggests that people who made more frequent visits to coastal and inland blue spaces were found to report high

[1] Börger and colleagues calculate the value of visits using the 'travel cost' method, which assumes that the (minimum) value of a visit must be at least equal to the cost of travelling to the site. They gather this information using on-site surveys, which also ask questions regarding how many more visits the respondent would be willing to make if water quality changed.

personal well-being and less likely to report mental distress (White et al., 2021a). In Vienna, a quality survey of the effects of blue-green spaces on general well-being is conducted every five years. The outcomes of the survey are that the blue-green spaces have numerous positive effects on public well-being and satisfaction (Friesenecker, 2022). In recent years, wild swimming has become an increasingly popular activity across Europe, with participants often citing heightened mental well-being resulting from immersion in bathing waters.

3.2.4 Benefits for the local urban economy

In addition to the direct benefits of bathing and recreation, clean urban bathing water delivered by BWD initiatives also supports European city economies. Visitors to bathing sites, both locals and tourists, spend money at local businesses, such as restaurants, accommodation and travel companies. This provides jobs as well as supporting local and regional economies. This expenditure and employment cannot be exclusively tied to bathing water quality (or to improvements that are due to the BWD), but they are nonetheless indicative of the central role that bathing sites can play in local economies. For example, Keep Scotland Beautiful (2005) estimated the average person spent EUR 3.2 – EUR 9.0 per beach visit, and would spend more at cleaner 'Blue Flag' beaches (Papadopoulou et al., 2018). A more recent survey estimated that visitors to Scottish beaches spent EUR 94.7 million in expenditure in nearby shops, restaurants, and other businesses. Another Scottish study, focused on five Scottish coastal bathing sites, found that these locations supported EUR 22.4 million of local business turnover and supported 263 full-time equivalent jobs (Phillips et al., 2018).

In 2018, the European coastal tourism sector (including accommodation, transport, and other coastal tourism expenditure) generated EUR 80 billion gross value added and employed 2.8 million people (EU Commission, 2021). While these numbers cannot be directly tied to improvements in bathing water quality, a recent study from Bulgaria modelled the socio-economic impacts of poor water quality in the coastal tourism site of Varna Bay and Varna Lake, Bulgaria (Moncheva et al., 2012). The authors found that 72 % of tourists visited the area primarily for recreational and beach activities, and two-thirds of visitors were concerned with water quality. The authors conclude that a failure to protect bathing water quality would reduce tourist numbers by up to 40 % over ten years, with accompanying direct and flow-on costs on the local economy of EUR 1 230 million over that period. In short, research suggests that bathing water quality is a significant driver of European coastal tourism, and that visitors make choices over their destinations and spending patterns based on water quality.

Urban properties located nearby to safe bathing water sites are often more desirable, which can be reflected in higher property prices. A number of European studies have evaluated the relationship between safe bathing sites and local property prices. One Dutch study found that a 10 cm increase in nearby water clarity increased property prices by 3.6 % (Nicholls and Crompton, 2018). A Finnish study found that properties near 'poor' quality water sold at a discount of 65–105 % compared to those near 'satisfactory' quality water, while those near 'excellent' quality water sold for 19–30 % extra[2] (Nicholls and Crompton, 2018). A third study concluded that rents were 60 % higher in areas close to improved water quality (Gerner et al., 2018). The specific contextual elements of each study site and the varying methods applied in each study mean that these numbers cannot be simply extrapolated to other areas or scales, or directly tied to the BWD. However, they again indicate that there are significant direct use values associated with access to safe bathing water quality. Property prices are a controversial measure of value, however. Increases in property prices can have significant negative impacts on societal equality, particularly on low-income groups. It is therefore important to consider the potential impacts of property prices on low-income groups when making decisions about bathing sites (Friesenecker, 2022).

[2] The authors defined poor, sufficient, and excellent water quality using their own qualitative scale.

3.2.5 Healthy aquatic ecosystems provide valuable services to urban inhabitants

Safe bathing water quality depends on natural ecosystem processes, as well as human interventions such as those resulting from the BWD. Indeed, freshwater ecosystems provide numerous useful services that support safe bathing water quality. These so-called 'regulating' ecosystem services include the regulation of chemical pollutants and the filtration of toxic substances in water bodies (Potschin et al., 2016). As a result, measures implemented to achieve BWD goals, such as improved sewage treatment and reductions in agricultural pollution support the health and functioning of freshwater ecosystems. These environmental improvements can in turn support the regulating ecosystem services that help deliver safe bathing water quality. As highlighted throughout this report, human and environmental health is linked through improvements to urban bathing waters.

Healthy freshwater ecosystems also deliver many other valuable indirect benefits to urban communities. These include habitats for wild plants and animals (such as fish populations for anglers), water filtration that enables low-cost safe drinking water, natural flood protection, carbon storage, and other valuable services. While difficult to quantify, these indirect benefits can be significant, and are important to recognise when considering the added value generated by the BWD. In short, urban bathing waters are not only places for community recreation but can also form vital green spaces which support a range of important ecosystem processes across the landscape.

3.2.6 The value of keeping future bathing options open

Urban inhabitants value preserving water quality today, so that they might be able to benefit from healthy freshwater ecosystems in the future – this is referred to as option value (Spit et al., 2019). It exists because urban inhabitants know that their ability to swim in the future is in part determined by current water quality management decisions. Accordingly, urban inhabitants may value the BWD's provision of safe bathing water today because they value the positive impact that this will have on their future ability to enjoy clean bathing water and its direct and indirect benefits.

A classic study found that the option value of ensuring future freshwater quality was equivalent to 40 % of the current use values (Greenley et al., 1981). In other words, managing for clean, safe urban bathing waters is important for fostering long-term sustainability, both in aquatic ecosystems, and the bathing cultures that are linked to them.

3.2.7 Non-bathers also benefit from improved water quality

Even if urban inhabitants never directly take advantage of safe bathing water themselves, many will be happier knowing that safe bathing water quality has been achieved. They may simply value that there is safe bathing water out there for its own sake (what is called *existence value*), or they may value this because their neighbours and friends will get to enjoy it (*altruistic value*), or because they want to leave safe bathing water for future generations (*bequest value*).

Compared to direct use values, non-use values are often high, but are frequently forgotten or poorly understood, in part due to limited evidence and research. In the context of the BWD, Papadopoulou et al (2018) reported that such *non-use values* can arise from a sense of ownership and pride of place in local residents and communities. In some contexts, these non-use values can be very large. For example, Gerner et al. (2018) suggested that inhabitants of the Emscher region would each be willing to pay EUR 41 per year to improve local water quality to a 'good' status for its existence value alone. This figure is five times as large as the direct use values alone. In short, clean urban bathing waters do not only benefit the people that use them, but can also foster value in wider urban communities based on their existence and health alone. The many benefits that clean bathing waters bring mean that they are often highly prized by urban communities. One such example is found in the Berlin municipal area (Box **3.1**).

Box 3.1 Environmental benefit assessment in Berlin and Brandenburg

Research suggests that Berlin and Brandenburg inhabitants would be willing to pay EUR 183 each per year for improved water quality: a total of EUR 360 million per year for the whole of Berlin (Meyerhoff et al., 2014). The same study found that the value that Berlin and Brandenburg residents place on water quality also depends on the bathing site amenities such as clean changing rooms, clean beaches, and good access. By providing well-maintained, safe bathing sites that are well-connected to public transport and other amenities, public authorities can ensure that the public can fully benefit from the direct use values generated by BWD initiatives (Image 3.2). City planning and infrastructure investment decisions are thus important aspects to maximise the value of the BWD. They are also important in terms of ensuring equitable access to the benefits of safe bathing water across different sectors of society. To this end, it is important that, as far as possible, bathing sites are made accessible to local low-income urban inhabitants.

Image 3.2: Berlin residents using well-maintained, safe bathing sites and bathing infrastructure at Wannsee Strandbad

Photo: © Christiane from Pixabay

Non-use values are especially strong in regions with a significant history of hydro-morphological alteration or pollution, such as the Ruhr basin, Copenhagen harbour, and Alte Donau. Revitalisation of bathing waters is often very important for local culture and identity in such areas. Research suggests that it is often important to urban communities that their local water body has been ecologically restored and meets even the bathing standards, even where only a minority of people will use it for recreation (Gerner, 2022).

4 Where are bathing waters found across Europe and what policy and management issues do they pose?

The chapters so far have outlined the diverse values clean and safe urban bathing waters can foster in local communities. Citizens can meet and socialise with friends on their city beaches, swim in the water, sunbathe on the beach, sail on the water, or enjoy the benefits of public green spaces. Bathing waters are therefore a valuable attribute of urban public spaces. As the desire of urban citizens to live in eco-friendly cities increases, swimming 'in our own water' can be a symbol of a healthy aquatic environment. As a result, bathing waters can be vital spaces for both human and non-human communities in urban areas. But where are bathing waters found across Europe, and what policy and management issues do they pose?

As a result of management through policies such as the WFD and BWD, many urban waters in Europe now reach better water quality than fifty years ago. However, maintaining bathing quality standards remains a challenge. Many city planners and residents are increasingly recognising the recreational, aesthetic, and spiritual values of bathing sites as well as the opportunities they offer for leisure and socialising. For example, Paris has set up water playgrounds, parks, and beaches along the Seine River (Image 4.1). The city mayor aims to have the water clean enough to swim in by 2024. To offer swimming right in the city centre, urban planners in Vienna submerged a floating pool in the Danube canal. European citizens are also demonstrating that recreation in the water is about more than swimming alone. In Hamburg, sports enthusiasts now take a break from the beaches along the Elbe River and practice stand-up paddling in its vast network of canals.

Image 4.1: Children enjoying the water playground at the Seine River in Paris

Photo: © Lionel Allorge from Wikimedia

This chapter illustrates where both coastal and inland urban bathing waters are found across Europe. It outlines how the various environmental and socio-economic benefits of urban bathing waters provide a common focus for urban residents, planners and politicians in shaping the form and future of European cities.

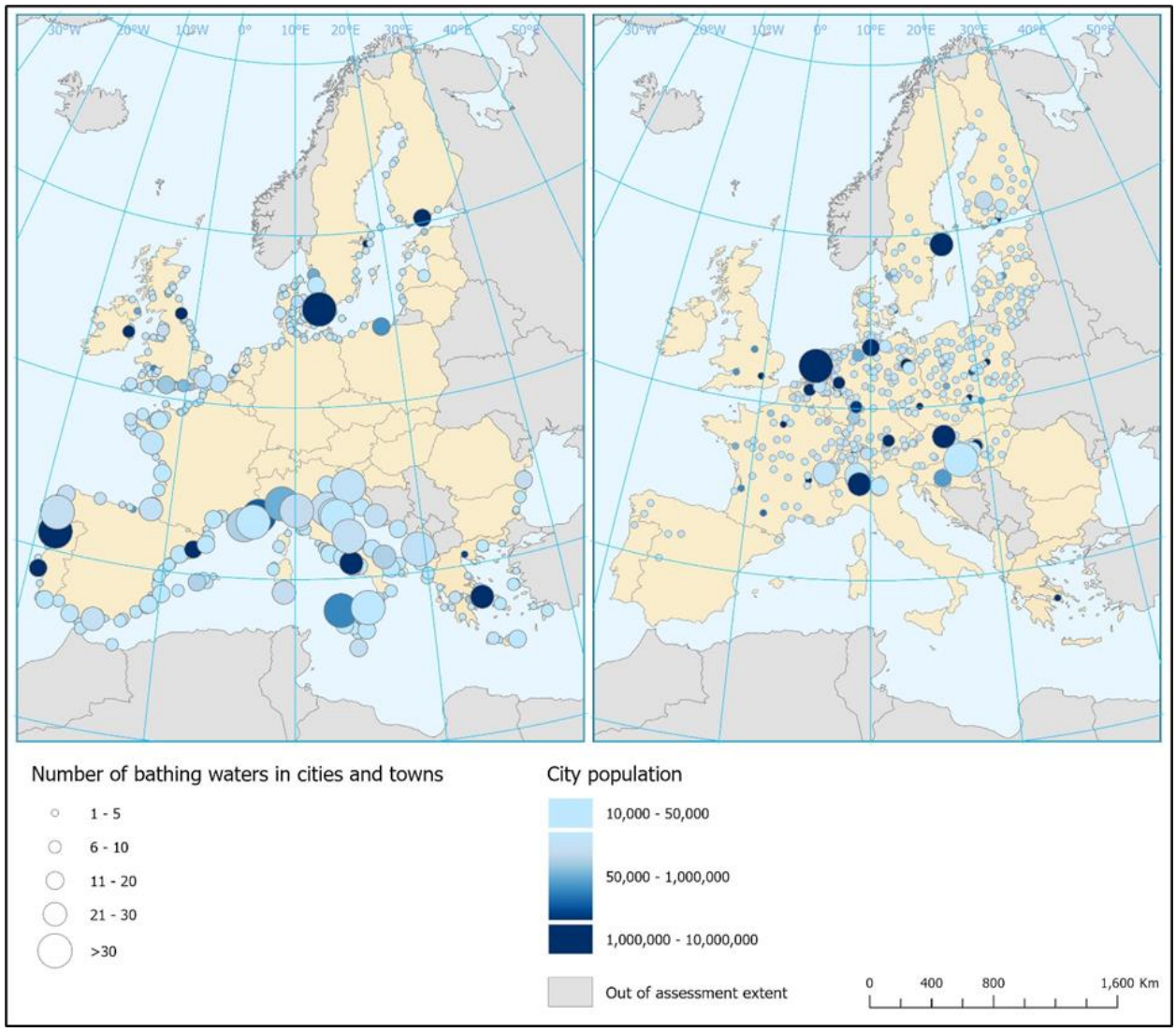
4.1 European towns and cities with bathing waters

Around half of all European citizens live in towns and cities (urban areas with 10 000 or more inhabitants), and half of these residents have easy access to one of almost 4 000 bathing waters that lie within urban zone limits (Map 4.1). This means that a quarter of all European citizens can enjoy bathing waters close to their homes. Almost half (more than 1 800) of European bathing waters are located in 193 cities with more than 100 000 inhabitants.

There are regional variations in the number of bathing sites accessible to urban communities across Europe. This difference is due to population distributions, geographical characteristics and the efficiency of bathing water quality management. For example, in Austria, Denmark, Estonia, Finland, Malta, the Netherlands, Latvia and Switzerland, more than 80 % of people who live in urban areas can visit bathing waters on a daily basis. But there are no official urban bathing sites in Luxembourg and Slovakia, and in Bulgaria, Romania, and Slovenia less than 10 % of the population live in urban areas with bathing sites.

Almost three quarters (71 %) of bathing waters in large European cities (with more than 100 000 inhabitants) are coastal sites (1 274) located in 89 urban areas. The highest proportion (67 %) of European bathing waters are in 47 Mediterranean cities across four countries: Greece (37 sites in seven cities); France (280 sites in nine cities); Italy (343 sites in thirteen cities); and Spain (192 sites in eighteen cities). Other bathing waters are spread-out over twenty-one cities in the United Kingdom, seven cities in Portugal, and two in the cities of Croatia, Denmark and Albania.

Map 4.1: Cities with coastal (left) and inland (right) bathing sites



Source(s): WISE BWD – Status of bathing waters database (EEA, 2021)

The following sections outline the distribution of inland (4.2) and coastal (4.3) bathing water sites in Europe, and the specific policy and management issues they pose. Some coastal European cities also have river and lake bathing sites. For example, Helsinki has all three categories of bathing sites (river, lake and coast), while Stockholm has 27 lake and two coastal bathing sites. Bathing cultures are thus particularly important to urban communities in such cities.

4.2 Inland bathing waters in cities

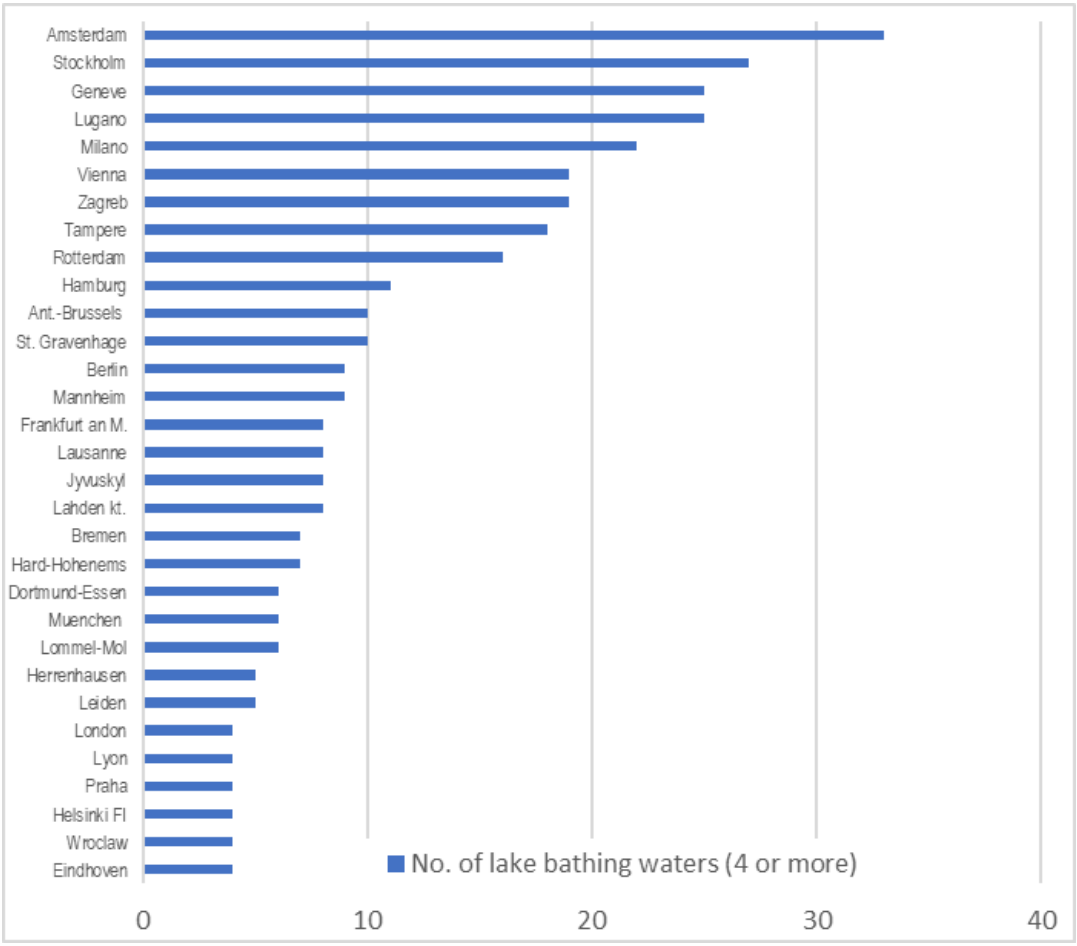
One-quarter of European urban bathing waters are situated on lakes, located across 105 cities (Figure 4.1). There are only 39 designated urban bathing water sites on European rivers (Figure 4.2). Cities with river bathing sites include the European capitals of Budapest, Helsinki, Paris, Riga, Vienna and Vilnius. Some have lake bathing waters as well: Budapest two, Helsinki four, Riga, Paris and Vilnius three each, and Vienna as many as 19.

Image 4.2: Bathers enjoy the Spree River in Berlin

Photo: © Alana Harris on Unsplash

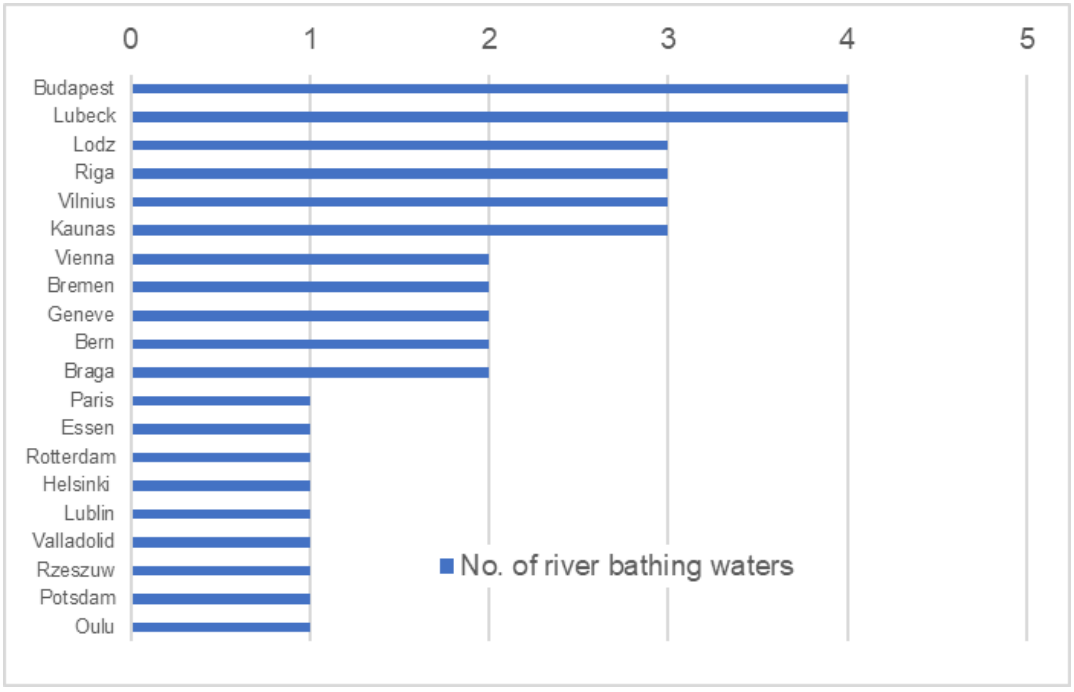
Management of the quality of urban bathing waters on lakes can be less complicated than on river bathing sites, due to the closed geography of lake water bodies, compared to the wide catchments of many rivers and the discharge of wastewater from many wastewater treatment plants along the river stretch. Designated river bathing sites (Image 4.2) can thus be seen as a sign of successful water management across entire river basins, and if located in city centres or downstream of cities, efficient sewage treatment management. For example, in Paris and Essen, city authorities have developed advanced warning systems to control pollution risks to human health, allowing rapid management of their urban bathing water sites (Mälzer et al., 2016).

Figure 4.1: European cities with four or more lake bathing sites



Source(s): WISE BWD – Status of bathing waters database (EEA, 2021)

Figure 4.2: European cities with river bathing sites



Source(s): WISE BWD – Status of bathing waters database (EEA, 2021)

4.2.1 Urban bathing waters as a motive for public and political action across entire catchments

River restoration projects for the improvement of water quality, accompanied by suitable nature-based management solutions, can have broader impacts on the local environment, economy, and society. They can simultaneously achieve numerous environmental objectives, support enhanced biodiversity, increase social and economic welfare, and offer water recreation opportunities.

The conservation and restoration of urban bathing waters is thus a sign of successful management of water pollution across entire river catchments or lake basins. As cities are often locations of the greatest national economic prosperity, recognising the importance of a high level of water quality in river basins is important for urban planners. Bathing water sites in cities therefore provide a common motivation for planners, politicians and the public to support the sustainable use of water and the restoration of ecosystems across entire river basins.

The Ruhr catchment is one of the most populated urban areas in Germany. The catchment once supported thousands of inland bathing sites, before widespread industrial pollution significantly reduced water quality. Today, in the North Rhine-Westphalia federal state, the overall number of designated bathing sites is very low (Kistemann et al., 2016). There are 108 bathing sites in total, a ratio of one site per 165 000 inhabitants. Further, only one bathing site is situated on a river, even though there is a long tradition of recreational use of rivers in the catchment and the demand for bathing sites is rising. However, citizens of the Ruhr catchment have a significant collective desire to reclaim the urban blue space of the river for bathing. Local communities organise a 'Big Jump' day every year on the Ruhr and support the 'Safe Ruhr project' (Strathmann et al., 2016). This is a collaborative project with the purpose to lift bathing bans along the river. Such citizen action projects are increasingly common across Europe, as communities organise events to demonstrate their desire to restore bathing cultures to urban waterways. These projects are often designed to demonstrate to policy makers that there is a need to restore bathing water quality to benefit both human and environmental health.

4.2.2 Urban bathing water designation as part of river basin restoration

The designation of an official BWD bathing water site brings a series of environmental protections to monitor and manage water quality. As a result, such official designation can be a significant 'success story' for community-based activism and lobbying at a bathing site and as part of a river restoration project.

For example, in Germany, large-scale restoration projects across the neighbouring Emscher and Ruhr Rivers – both tributaries to the Rhine – have been implemented for decades. The crowning achievement of restoration work was the opening of Baldeneysee (Lake Baldeney) in Essen as an official bathing site in 2017 (Strathmann et al., 2016). Local authorities that manage the site have introduced an early warning system which communicates human health risks to the public after periods of heavy rain (Mälzer et al., 2016). Interviews with local stakeholders – including boaters, researchers, educators, students and residential property owners – show a general eagerness to pay for better water quality in the catchment (Gerner et al., 2018). Interviewees strongly expressed that bathing is an important ecosystem service providing significant recreational and tourist values. The non-market value of water improvements was found to be EUR 110 million per year. This figure is five-times higher than the market value of EUR 21 million per year (Gerner et al., 2018). Water quality in the Baldeneysee is now high enough for designated swimming areas, and bathers have returned nearly half a century after bathing was banned.

The Safe Ruhr project – of which the iBaldeneysee bathing site is important building block – shows how opening official bathing waters motivates joint and collaborative action for improvements of water quality across wider catchments. The project is also a successful example of how four European water policies – BWD, WFD, UWWTD and the Drinking Water Directive (DWD) – meet at catchment level and create the conditions to open safe public bathing waters.

4.2.3 Cities sustain good bathing water quality for downstream sites

The restoration of clean urban bathing water doesn't only benefit local communities, it can also bring benefits to downstream sites. Urban planners can implement systems for water quality improvements in the rivers that flow through their settlements, which can in turn sustain good water quality in downstream bathing sites (Lerner and Holt, 2012). For example, until recently, water quality was low in the Bourne Stream in Bournemouth, Southern England, which was contaminating the coastal bathing waters into which stream discharged. Here, the bathing water problem was a motivation for the formation of the Bourne Stream Partnership[3], which worked to pool resources and skills, and negotiated compromises amongst stakeholders in the catchment.

The Bourne Stream Partnership helped restore this small urban stream via the improvement of a drainage system to tackle excess runoff and diffuse pollution. A cycle path was opened along its course. As a result, water quality in downstream bathing waters was improved. Additional benefits include higher land value and improved aesthetic value along the stream's course through urban Bournemouth. As in the previous section, this case study shows that safe and healthy urban bathing waters are inextricably linked to the management of entire river basins. In this case, improvements to the catchment have the potential to generate benefits for both human and non-human communities across the landscape, in addition to the bathing waters themselves.

4.3 Coastal bathing waters in cities

The highest number of designated European urban coastal bathing sites are found in urban agglomerations along France's Azure coast (Antibes-Cannes-Nice – 122 bathing sites) and Toulon (54 bathing sites). The next highest concentrations of bathing sites are found in the Italian coastal urban areas: Cervia on the Adriatic coast (49 sites); Genova (43 sites); Massa (40 sites); and the Ligurian Sea (43 sites). On the Croatian Adriatic coast, in Rijeka, there are 39 bathing waters. The largest urbanised area with coastal bathing waters in Northern Europe is Copenhagen with 43 bathing waters. Other European urban areas with bathing waters are shown on Map 4.1.

4.3.1 Coastal city economies can be supported by safe urban bathing sites

Bathing waters in coastal tourist towns and cities are often important to local economies, as outlined in Section 3.2. As a result, urban planners are often willing to invest into water quality improvements, being aware that by doing so the attractiveness and safety of their bathing waters may increase.

The Guadiana River borders Spain and Portugal, and runs into the Atlantic Ocean. Fifty thousand people live in the Guadiana catchment, which supports two bathing waters in its estuary between the settlements of Ayamonte and Vila Real de Santo António. Since the 1980s, tourism has become the major economic driver for local economies in the Guadiana basin, and has catalysed a steady pace of urban development. Nowadays, in the summer seasons the number of people visiting the Guadiana basin increases ten-fold. Since local residents depend heavily on tourism related to coastal beaches, bathing water quality is of primary concern. As a result, residents are generally willing to support investments into restoration of water quality of the river along its entire course. Both use and non-use benefits of bathing water sites have been calculated to help guide water management in the basin. One study suggests that over a 20-year period, the economic benefits of removing 99 % of harmful coliform pollution in the Guadiana River would surpass the costs by 30 % (Guimarães et al., 2012).

Beach tourism is also a key source of income, wealth and employment in the Black Sea resort of Varna in Bulgaria (Moncheva et al., 2012). As reported in section 3.2.4, a failure to protect water quality threatened

[3] https://www.bournestreampartnership.org.uk/

to significantly reduce tourist visits and income. In response, in 2020, the Golden Sands wastewater treatment plant in Varna was renovated, and its capacity significantly increased.

In both the Guadiana and Varna examples, efficient management of water pollution in coastal bathing water sites is a key measure in supporting urban tourism economies.

4.3.2 Coastal bathing waters: economic and geographical variations

Coastal tourism is the most significant economic sector of the European blue economy[4] in terms of local employment and associated economic benefits (Kidd et al., 2020). Coastal municipalities make up only 15 % of the land area of the EU, however, 47 % of all paid accommodation nights are spent there. Many coastal areas of Europe experience an influx of visitors in the summer months. In terms of coastal tourist home locations, there are strong spatial trends. For example, almost 90 % of tourists to Croatia come from central European countries, but there are also significant numbers of visitors from the rest of Europe. In contrast, on both sides of the German-Polish border in the Pomeranian Bight and in the Gulf of Gdańsk, more than 75 % of visitors travel from within the respective countries, but links with the other Baltic Sea countries are also prominent and growing in significance (Kidd et al., 2020).

Coastal beaches may be regarded more as additional attractions for tourists in the Baltic region. The Baltic Sea region accounted for 7 % of the world's tourism and 13 % of tourism in Europe. In Lithuania, tourism accounts for 1.6 % of GDP and 1.5 % of national employment, and locally comprises of up to a 50 % of GDP at tourist sites (Schernewski et al., 2019). Tourism is a key economic factor in many European coastal cities, and beaches with good water quality are thus important factors for choosing a holiday destination.

In addition to accommodation services, tourist activities support food and drink establishments, and so influence the scale and nature of local retailing. For example, 40 % of retail sales in Mecklenburg-Vorpommern on the German Baltic coast are associated with travellers and visitors (Kidd et al., 2020). Similarly, the provision of a wider network of visiting locations and associated attractions including natural, historic, cultural and sporting destinations are evident.

High recreational values in coastal bathing sites are particularly concentrated along the Mediterranean coast and islands, where most visitors are international (Ghermandi, 2015). Domestic recreation plays a much more important role in northern coastal areas, such as in Germany and the United Kingdom. The economic income in monetary terms in European urban coastal tourism ranges from EUR 2 240 million per year in Fuerteventura on the Canary Islands to EUR 0.8 million per year in Tulcea, Romania.

These two sections outline how coastal bathing water sites are often critical for urban tourism economies, generating a range of socio-economic benefits which can be supported by effective water management. More broadly, this chapter illustrates how bathing sites can act as foci for public, policy and management groups to catalyse positive environmental change across coastal, lake and river ecosystems.

[4] 'Blue Economy' denotes the sustainable use of sea and ocean resources for economic growth, improved livelihood and jobs, and ecosystem health. It includes coastal and marine tourism, energy, fisheries and aquaculture sectors, and is a concept central to current EU policy – EU Blue Economy Report (2021).

5 Invisible benefits of urban bathing water sites

Some of the socio-economic and environmental benefits provided by urban bathing water sites are not immediately obvious. Such 'invisible' benefits can be generated over wider geographic and longer temporal scales than those already described in this report, and often interact with wider policy and management concerns. This chapter outlines five 'invisible' benefits and how they interact with other sectors: social policy, drinking water resources, climate change resilience, innovative governance and new technologies, and public space improvements.

5.1 Social policy

Improved water quality benefits some groups within society more than others. Ensuring that environmental policies such as the BWD meet social and economic objectives at the same time as environmental targets is fundamental to the integrative approach to EU public policies and strategies, as illustrated by the European Green Deal.

There is a growing body of economic and interdisciplinary evidence that environmental benefits are shared unequally within communities. European neighbourhoods with lower-income residents are more likely to be exposed to pollution, and to have less access to green spaces (Banzhaf et al., 2019). Such environmental inequality is potentially harmful for the affected groups and their children, who often have worse health and educational outcomes as a result (Banzhaf et al., 2019).

This general trend also broadly applies to bathing water: poor water quality can be associated with low-income areas. For example, in the United Kingdom, for those people in the lowest 10 % of the income distribution who live near a river, 44 % live near a poor or bad quality river, and only 13 % near a good or very good quality river. Conversely, for those in the top 10 % of the income distribution who live near a river, only 7 % live nearby a poor or bad quality river, while 59 % live near a good or very good quality river (England and Wales Environment Agency, 2008).

The question of who wins and loses from bathing water improvements also depends on where bathing sites are located (Rodella and Corbau, 2020). Access to bathing sites and other blue spaces – including ponds, rivers and coasts not designated as bathing sites – has significant impacts on individual well-being, as well as supporting positive social relationships (White et al., 2021b). Bathing water cities that are integrated into larger areas of urban green-blue infrastructure (Žuvela-Aloise et al., 2016; Huang et al., 2020; Kumar et al., 2020).

In contrast, a potential risk exists, that new bathing sites in low-income areas can put long-term upwards pressure on house prices as newer, wealthier residents are attracted by the improved amenities (so-called 'gentrification'), which can negatively affect existing communities (Pareja-Eastaway and Winston, 2017). It is therefore important to consider different groups of society and how they will be affected by improving water quality, as these decisions can both decrease and increase social inequalities. Just as previous chapters have highlighted how bathing water quality interacts with public and environmental health, this section shows how it links to social urban policy and planning.

Image 5.1: Seestadt (Lakeside City) in Vienna, Austria

Photo: © Ruperta M. Steinwender from Flickr

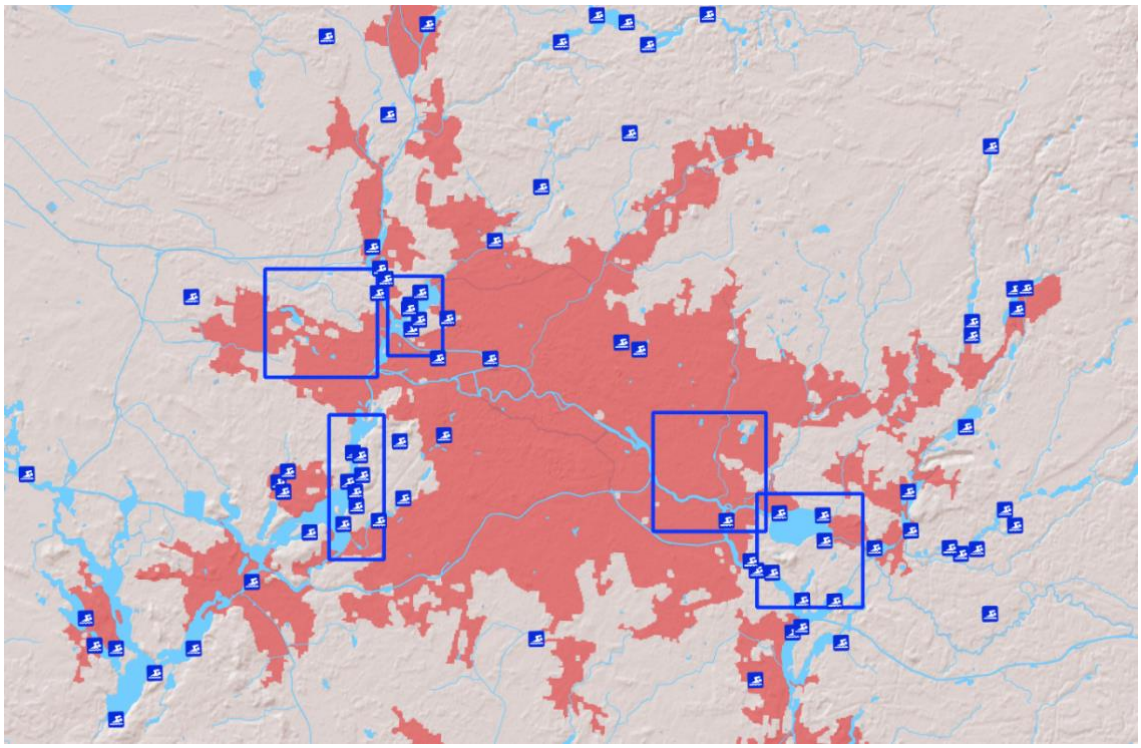
5.2 Drinking water resources

In Europe, it is common for inland bathing waters to be situated within drinking water protected areas. These are designated areas in which the use of certain substances must be carefully managed to prevent the pollution of raw water sources that are used to provide drinking water of a high quality.

Nine waterworks supply Berlin and its surrounding areas with drinking water. The waterworks are located near lakes and rivers, or in green areas, and utilise groundwater reserves. Groundwater originates from percolated stormwater and surface water – so-called 'bank filtrate'. As percolation (or seepage) is a slow process involving many different layers of soil, the water in Berlin flows through a process of natural filtration, resulting in high quality groundwater (Berliner Wasserbetriebe, 2020).

Groundwater in Berlin is pumped from approximately 700 wells – each between 30 to 170 metres deep – to the waterworks, where it is further processed and stored in clean water tanks. From the three large waterworks, Tegel, Friedrichshagen, and Beelitzhof, two smaller waterworks and the pumping stations in the supply network are also monitored and controlled.

Map 5.1: Drinking water protection zones (large blue squares) and bathing sites in the Berlin urban area (small dark blue squares)



Source(s): WISE BWD – Status of bathing waters database (EEA, 2021)

The use of water resources for bathing and drinking is mutually supportive, since both depend on good water quality and stable hydrological conditions. Some Berlin bathing sites are in green areas with drinking water pumping stations (Map 5.1). The risk of pollution is reduced through co-management, resulting in the increased potential for safe bathing and recreation activities. An example is given by Tegeler See, which is both a bathing and drinking water site. It was formed out of a backwater of the Havel River in the north-west close to five permanently monitored bathing waters.

Image 5.2: Bathing at Lake Wannsee within the Berlin drinking water protection zone

Photo: © Axel Maurusza from Wikipedia

Wannsee, located in the south-west of Berlin, supports two bathing waters, and is an area important for drinking water recharge. The lake is 23 km^2 in size and offers beach space for around 30 000 bathers. There are numerous dining and snack options, boat rental, a high-octane playground with a water slide, and a range of chairs and shelters for rent. There are eight bathing waters where water quality is monitored and communicated to the public. All Wannsee bathing waters were classified as being of the highest, excellent quality class in 2021.

Großer Müggelsee is the largest of Berlin's lakes, supporting two bathing waters amongst wild and sandy banks and wooden walkways. Both bathing waters are classified as the highest, excellent quality class. Over the last decade, water quality improvements in Lake Wannese and Müggelsee have also been observed through improved water transparency and lower algae toxin peaks.

Berlin also has several bathing sites along the lower part of the Havel River, some of them also located in drinking water protection zones. These bathing sites have improved in quality over recent years. Following an awareness of the need for better bathing water quality, wastewater treatments in the inner city were steadily developed and improved, resulting in the better water quality of inflowing waters. Bathing sites at the lower part of the Havel River changed status from sufficient to excellent quality over time. This shows how bathing waters can act as strong political tools to improve urban wastewater treatments, causing positive effects on the quality of urban waters.

Berlin supports one of the strongest local urban bathing cultures in Europe, and these examples show that the management of its bathing waters has strong overlaps with the protection of its drinking water resources and supplies. In short, sustainable management of water resources can co-support both important sectors of city life.

5.3 Climate change resilience

Inland bathing waters in European cities are often located in green areas along lake or river shores, and are as such an integral part of urban blue-green infrastructure[5]. Bathing sites in urban areas can thus act as motivation for citizens to support water quality improvement activities and programmes. Faced with ongoing climate change and environmental degradation most European cities are developing solutions for enhancing climate resilience and restoring urban ecosystem health (Green cities, 2022). One solution is a strategically planned network of blue-green infrastructure. Such systems consist of natural and semi-natural areas in a city such as rain gardens, rainwater tanks, swales, rooftop gardens, green streets and public space, all integrated in the urban water cycle. Bathing water sites have the potential to form an important part of this blue-green urban network, particularly where they are managed to encourage aquatic ecosystem health and functioning. Test sites for this approach include the *Block 6* residential complex built in 1987 in Berlin, where an integrated water system created new bathing water pools (Roof water farm, 2022); and the *Of Soil and Water* 'natural swimming pond' opened at King's Cross London between 2015 and 2016 where wetland vegetation created a closed-loop filtration system (King's Cross, 2022).

Urban blue-green infrastructures are often designed to 'buffer' the quantity and timing of stormwater run-off and to improve water quality through processes of storage and filtration. Plant roots and soil absorb nutrients and purify infiltrating water, and also improve general water quality in urban catchment areas, thereby reducing energy demands and economic costs associated with water treatment. Green areas on lake and river shores can contribute to the avoidance of overheating and oxygen shortages caused by high temperatures. Ponds and green areas enhance the on-site retention of stormwater, allowing water to seep into the ground, recharging underlying aquifers, balancing groundwater stores and reducing the impact of flooding (Liao et al., 2017).

[5] Blue-Green Infrastructure (BGI) is an approach to urban flood resilience, recognised globally and in international literature, that capitalises on the benefits of working with urban green-spaces and naturalised water-flows (Lamond and Everett, 2019).

In addition to the benefits directly related to water, blue-green infrastructure can affect the urban climate by reducing urban heat island effects, balancing daily temperature fluctuations, and supporting natural air ventilation (Gunawardena et al., 2017). By influencing hydroclimatic variability and weather extremes, this approach to urban planning enhances the adaptability and resilience of urban infrastructure. Whilst bathing waters are not yet widely used as part of urban blue-green infrastructure planning, there is significant potential in their role in delivering linked social, environmental, and economic benefits.

An example of blue-green infrastructure already developed in a heavily populated area is Lake Phoenix in Dortmund. The lake does not meet bathing water quality standards yet, but it may in the future as it is a part of the ongoing catchment-wide restoration projects of the Emscher and Lippe rivers, tributaries of the Rhine. They integrate nature-based solutions with multiple purposes such as climate change resilience, flood retention, increased biodiversity, urban development, recreation and sailing. A key question for management is thus: how can freshwaters in densely urbanized and industrialized areas like the upper Rhine catchment reach bathing water status? (Gerner, 2022).

5.4 Innovative governance practices and new technologies

Urban bathing waters in Europe increasingly form sites for cutting-edge governance practices using new technologies. City authorities in Copenhagen, Paris, and Berlin are currently pioneering innovative technologies in city water management, including the real-time control of stormwater and in-situ bacterial monitoring, flood forecasting, machine learning modelling and decision support systems. These initiatives are strongly motivated by the need to avoid short-term pollution events in existing bathing waters or even to improve water quality to a level where new ones can be opened.

Both Berlin and Copenhagen have achieved excellent water quality levels for their urban waterways and are currently proposing new bathing waters at the heart of their cities. A major challenge regarding bathing water management is to monitor the spatial and temporal variability of faecal bacteria pollution discharged from sewer overflows (Digital Water, forthcoming). Early warning systems allow city planners to forecast short-term pollution events in bathing waters, and to subsequently announce temporary advice against bathing. As the popularity of urban bathing increases across Europe, such year-round monitoring initiatives are important in minimising health risks to bathers (EEA, 2020).

In Paris, city authorities plan to provide more permanent and safe opportunities for bathing in the River Seine ahead of the 2024 Olympic and Paralympic Games. They are developing new technology for real-time in-situ bacterial monitoring in the river and machine learning systems to forecast the contamination risk at official bathing waters. The result will be an early warning system based on a forecast of bathing water quality. Stakeholders and citizens will be informed about the system through mobile technologies. This system will also enhance the management of the city's sewer network. This initiative is a result of collaborative work by the organising committee for the Olympic and Paralympic Games, the regional water agency, the authority in charge of regional health management, the municipality of Paris and the metropolitan region of Paris (Digital Water, forthcoming). Together, these examples show how forward-thinking city authorities are embracing new technologies, both to monitor the health and status of existing bathing waters, and to diagnose water quality problems and support decision-making about new and potential sites.

5.5 Public space improvements

Inland bathing waters in European towns and cities are often located in public city parks. Such sites were often created or landscaped to enrich the attractiveness and amenity of the space for visitors, as well as to encourage recreation and outdoor recreation in the urban environment. Many of these sites are easily accessible to anyone. The character of bathing waters is that they generally do not cause social separation. On the contrary, most encourage socialising and the mixing of different social groups, as shown in the success of the Copenhagen Harbour bathing site (Box 5.1).

Box 5.1 Copenhagen's changing shorelines become a recreational and social hub

For many years, water quality in Copenhagen Harbour was low, as a result of pollution from discharges of wastewater, sewage, industrial waste and oil spills from harbour transport (StyleWise Reportage, 2009). In 1995, more than 90 overflow channels fed wastewater into the harbour and its adjacent coastlines. Since then, the municipality has built rainwater reservoirs and reservoirs that can store wastewater until the sewerage system can operate again. As a result, more than 50 overflow channels have been closed and wastewater is today discharged to the harbour only during very heavy rainfall (EEA, 2016).

Many years of investment in modernising the sewerage system – expanding the city's wastewater treatment system, which now also removes nutrient salts and minimises the discharge of heavy metals – have successfully revitalised Copenhagen's Harbour (StyleWise Reportage, 2009). The first official public harbour bathing water opened in 2002. Today, bathing is possible in eight bathing waters in the harbour, all classified as having excellent water quality. An established online warning system monitors the water quality in the harbour. If the water quality is poor, the swimming facilities are immediately closed (EEA, 2016).

Copenhagen Harbour has changed from an industrial port to a lively, vibrant and social centre of the city. Clean water and well-established recreational bathing facilities along the harbour front attract crowds of visitors seeking refreshment on hot summer days. The harbour has become a valuable public space in the city, offering safe, accessible urban bathing for diverse communities, both locals and tourists. The harbour now forms part of a network of bathing sites – or sea baths – close to Copenhagen, which reflects the resurgence in the city's bathing cultures because of water quality improvements.

Image 5.3: Enjoying shared adventures at the bathing site in the middle of Copenhagen

Photo: © Astrid Maria Rasmussen

6 Urban bathing waters now and in the future

Good quality water in urban aquatic systems – and especially in bathing waters – is a sign of the successful management of the problems of 20th century industrial development in Europe. This report has highlighted the diverse environmental, economic and social benefits resulting from the designation and maintenance of urban bathing waters across the continent. As this report has shown, urban bathing cultures are thriving across Europe, and in many places citizen groups are providing the impetus for policy makers to conserve and restore urban coastal, river and lake bathing sites.

Following decades of successful initiatives fostered by environmental legislation such as the BWD and Water Framework Directive we have improved the quality of water in many – but not all – European urban areas. Key ongoing problems include: pollution loads reaching cities along rivers from upstream areas, rainwater overflows from city sewers during heavy rains, sudden surface runoff from paved urban areas, built-up water banks, nutrient pollution (mostly from inputs of nitrogen and phosphorus), artificially-narrowed riverbeds, plastic litter in bathing waters, and insufficient riparian vegetation (EEA, 2020). These issues are often exacerbated in multiple pollution mixture effects catalysed by ongoing climate change and habitat alterations. Many urban waters across Europe remain unsuitable for bathing due to excessive levels of pollutants posing public health risks. Some cities have failed to maintain their historic bathing waters or have so far failed to rehabilitate them.

As this report has shown, however, there are many examples of good practice. Many cities have shown that success can be achieved when residents, environmental mangers, urban planners and politicians come together for a common purpose. As outlined in the preceding chapters, numerous environmental and socio-economic benefits stem from the designation and restoration of urban bathing waters in European cities.

This report has highlighted the deep historical roots of urban bathing cultures in Europe, which are increasingly returning to cities across the continent following decades of environmental restoration. Clean and safe urban bathing waters foster numerous socio-economic benefits. These include bathers' health and wellbeing, ecosystem service provision and economic value for local businesses. As a result, the benefits brought by bathing sites can shape the spatial development of seaside towns and cities, the scale of recreational architecture, and other forms of development related to tourism services. Many city planners and residents are increasingly recognising the recreational, aesthetic, and spiritual values of bathing sites as well as the opportunities they offer for leisure and socialising. There are also potentially significant 'invisible' benefits of urban bathing such as innovative water management practices and better resilience to climate change.

Around half of European citizens living in towns and cities have access to urban bathing sites. Bathing waters are thus a valuable attribute of urban public spaces and can act as a motive for public and political action for environmental restoration across entire catchments. However, there are still significant challenges for restoring urban bathing waters across Europe. Despite decades of targeted environmental legislation, many urban waters across Europe remain unsuitable for bathing due to excessive levels of pollutants posing public health risks.

Managing for clean, safe bathing water is intricately linked to the goals of contemporary European policy. One key element is the European Green Deal, which aims to shift European economies towards zero net carbon emissions by 2050 and ensure sustainable resource use. The Green Deal builds a broad policy framework through which the EU plans to deliver the UN's Sustainable Development Goals through climate change adaption and mitigation and sustainable development. Key aspects of the Green Deal related to bathing waters include the promotion of environmentally-friendly food production systems, the restoration of European ecosystems and their services, and the implementation of sustainable blue economies through green infrastructure in coastal areas. The Green Deal offers a framework through which existing EU policies such as the WFD and BWD can be integrated towards these ambitious goals.

One key link between the Green Deal and the BWD is the implementation of a zero-pollution action plan. In May 2021, the European Commission adopted the EU Action Plan: *Towards a Zero Pollution for Air, Water and Soil* (EC, 2021), which is a key deliverable of the European Green Deal. The action plan sets out a vision for zero harmful pollution to air, water and soil by 2050, through a series of measures to prevent, remedy, monitor and report on pollution. Throughout this report we see synergies between the environmental, social and economic benefits of urban bathing water designation, and the goals of the European Green Deal to shift European economies towards a more sustainable future.

As such, urban bathing waters are a valuable symbol of sustainable European cities, where citizens can interact with urban nature as a result of decades of successful environmental management. The opening of each new urban bathing water and the ongoing maintenance of high-quality water should be met by praise and encouragement. We need to preserve and protect bathing waters in cities, both for ourselves and for future generations.

7 References

Bal, W. and Czalczynska-Podolska, M., 2020, 'The Stages of the Cultural Landscape Transformation of Seaside Resorts in Poland against the Background of the Evolving Nature of Tourism', *Land* 9(2), p. 55 (DOI: 10.3390/land9020055)

Banzhaf, S., et al., 2019, 'Environmental Justice: The Economics of Race, Place, and Pollution', *Journal of Economic Perspectives* 33(1), pp. 185–208 (DOI: 10.1257/jep.33.1.185)

Barcelona, 2022, 'The beaches of Barcelona' (https://www.barcelona.cat/en/what-to-do-in-bcn/bathing-and-beaches) accessed 15 October 2022.

Berliner Wasserbetriebe, 2020, 'From the wall to the tap', Berlin's Water (https://www.bwb.de/en/2156.php) accessed 15 November 2020

Börger, T., et al., 2021, 'The value of blue-space recreation and perceived water quality across Europe: A contingent behaviour study', *Science of The Total Environment* 771, p. 145597 (DOI: 10.1016/j.scitotenv.2021.145597)

Brodie, A. and Whitfield, M., 2014, *Blackpool's Seaside Heritage*, English Heritage, United Kingdom.

Chaline, E., 2018, 'How Europe learnt to swim', *History Today*, 2018 (https://www.historytoday.com/miscellanies/how-europe-learnt-swim) accessed 21 April 2020.

Davies, C., 2015, *Downstream: A History and Celebration of Swimming the River Thames*, Quarto UK, London, United Kingdom

Digital Water, 'Digital cities – challenges and objectives', Digital Water (https://www.digital-water.city/city/paris/) accessed 20 June 2021

Dwight, R. H., et al., 2005, 'Estimating the economic burden from illnesses associated with recreational coastal water pollution—a case study in Orange County, California', *Journal of Environmental Management* 76(2), pp. 95–103 (DOI: 10.1016/j.jenvman.2004.11.017)

EC, 2021, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Pathway to a healthy planet for all — EU action plan: 'Towards zero pollution for air, water and soil' (COM(2021) 400 final)

Eder, E. G., 1995, *Bade- und Schwimmkultur in Wien: sozialhistorische und kulturanthropologische Untersuchungen*, Böhlau, Wien

EEA, 2016, *European bathing water quality in 2015*, EEA Report No 32/2016, European Environment Agency (https://www.eea.europa.eu/publications/european-bathing-water-quality-2015) accessed 3 March 2020

EEA, 2020, *Bathing water management in Europe: successes and challenges.*, EEA Report No 11/2020, Publications Office, Luxembourg (https://data.europa.eu/doi/10.2800/782802) accessed 3 August 2022

EEA, 2021, 'Bathing Water Directive - Status of bathing water' (https://www.eea.europa.eu/data-and-maps/data/bathing-water-directive-status-of-bathing-water-14) accessed 3 June 2021

England and Wales Environment Agency, 2008, *Addressing environmental inequalities: water quality*, Science report, England and Wales Environment Agency (https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/291068/scho0507bmru-e-e.pdf)

EU, 1975, Council Directive 76/160/EEC of 8 December 1975 concerning the quality of bathing water (OJ L 31, 5.2.1976, pp. 1–7)

EU, 2006, 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 (OJ L 64, 4.3.2006, p. 37–51)

EU Commission, 2021, *The EU blue economy report 2021*, Publications Office, Luxembourg

Friesenecker, M., 2022, 'EEA-ETC/ICM workshop "Environmental and socio-economic benefits of bathing in cities", Urban bathing: Evidence on local economic impacts and property price impacts', presentation given at: Environmental and socio-economic benefits of bathing in cities – workshop, 20 September 2022

Gerner, N., 2022, 'EEA-ETC/ICM workshop "Environmental and socio-economic benefits of bathing in cities", Non-use values: Large-scale river-restoration pays off: A case study of ecosystem service valuation for the Emscher restoration project', presentation given at: Environmental and socio-economic benefits of bathing in cities – workshop, 20 September 2022

Gerner, N. V., et al., 2018, 'Large-scale river restoration pays off: A case study of ecosystem service valuation for the Emscher restoration generation project', *Ecosystem Services* 30, pp. 327–338 (DOI: 10.1016/j.ecoser.2018.03.020)

Ghermandi, A., 2015, 'Benefits of coastal recreation in Europe: Identifying trade-offs and priority regions for sustainable management', *Journal of Environmental Management* 152, pp. 218–229 (DOI: 10.1016/j.jenvman.2015.01.047)

Gibbons, S., et al., 2014, 'The Amenity Value of English Nature: A Hedonic Price Approach', *Environmental and Resource Economics* 57(2), pp. 175–196 (DOI: 10.1007/s10640-013-9664-9)

Green cities, 2022, 'The positive effect of European green cities' (https://thegreencities.eu/) accessed 25 October 2022

Greenley, D. A., et al., 1981, 'Option Value: Empirical Evidence From a Case Study of Recreation and Water Quality', *The Quarterly Journal of Economics* 96(4), p. 657 (DOI: 10.2307/1880746)

Guimarães, M. H. E., et al., 2012, 'The impact of water quality changes on the socio-economic system of the Guadiana Estuary: an assessment of management options', *Ecology and Society* 17(3), p. art38 (DOI: 10.5751/ES-05318-170338)

Gunawardena, K. R., et al., 2017, 'Utilising green and bluespace to mitigate urban heat island intensity', *Science of The Total Environment* 584–585, pp. 1040–1055 (DOI: 10.1016/j.scitotenv.2017.01.158)

Hanley Swim, 2022, 'Henley Open Water Swimming Events' (https://henleyswim.com/) accessed 30 October 2022

Huang, Y., et al., 2020, 'Nature-based solutions for urban pluvial flood risk management', *WIREs Water* 7(3) (DOI: 10.1002/wat2.1421)

Hynes, S., et al., 2013, 'Valuing improvements to coastal waters using choice experiments: An application to revisions of the EU Bathing Waters Directive', *Marine Policy* 40, pp. 137–144 (DOI: 10.1016/j.marpol.2012.12.035)

José Chesa Marro, M., 2022, 'EEA-ETC/ICM workshop "Environmental and socio-economic benefits of bathing in cities", Indirect benefits – Intermediate regulating services Barcelona – Life iBATHWATER', presentation given at: Environmental and socio-economic benefits of bathing in cities – workshop, 20 September 2022

Keep Scotland Beautiful, 2005, 'Our beaches & seas – keeping them clean', presentation given at: Firth of Clyde Forum Seminar, 21 March 2005

Kidd, S., et al., 2020, *Maritime Spatial Planning and Land-Sea Interactions*, ESPON EGTC (https://www.espon.eu/sites/default/files/attachments/MSP-LSI %20Final %20Report.pdf) accessed 20 February 2021

King's cross, 2022, 'Of soil and water: King's cross pond club' (https://www.kingscross.co.uk/of-soil-and-water-kings-cross-pond-club) accessed 9 October 2022

Kistemann, T., et al., 2016, 'Post-industrial river water quality—Fit for bathing again?', *International Journal of Hygiene and Environmental Health* 219(7), pp. 629–642 (DOI: 10.1016/j.ijheh.2016.07.007)

Kumar, P., ed., 2010, *The economics of ecosystems and biodiversity: ecological and economic foundations*, Earthscan, London; Washington, DC

Kumar, P., et al., 2020, 'Towards an operationalisation of nature-based solutions for natural hazards', *Science of The Total Environment* 731, p. 138855 (DOI: 10.1016/j.scitotenv.2020.138855)

Lamond, J. and Everett, G., 2019, 'Sustainable Blue-Green Infrastructure: A social practice approach to understanding community preferences and stewardship', *Landscape and Urban Planning* 191, p. 103639 (DOI: 10.1016/j.landurbplan.2019.103639)

Lerner, D. N. and Holt, A., 2012, 'How should we manage urban river corridors?', *Procedia Environmental Sciences* 13, pp. 721–729 (DOI: 10.1016/j.proenv.2012.01.065)

Liao, K.-H., et al., 2017, 'Blue-Green Infrastructure: New Frontier for Sustainable Urban Stormwater Management', in: Tan, P. Y. and Jim, C. Y. (eds), *Greening Cities*, Advances in 21st Century Human Settlements, Springer Singapore, Singapore, pp. 203–226

Mälzer, H.-J., et al., 2016, 'Comparison of different model approaches for a hygiene early warning system at the lower Ruhr River, Germany', *International Journal of Hygiene and Environmental Health* 219(7), pp. 671-680 (DOI: 10.1016/j.ijheh.2015.06.005)

McCormick, H., et al., 2021, *The State of the Thames 2021: Environmental trends of the Tidal Thames*, ZSL, London, United Kingdom (https://www.zsl.org/sites/default/files/ZSL_TheStateoftheThamesReport_Nov2021.pdf) accessed 5 July 2021.

Meyerhoff, J., et al., 2014, 'The value of water quality improvements in the region Berlin–Brandenburg as a function of distance and state residency', *Water Resources and Economics* 5, pp. 49–66 (DOI: 10.1016/j.wre.2014.02.001)

Millington, S., 2017, 'Swedish bathing culture' (https://www.a-n.co.uk/blogs/swedish-bathing-culture/) accessed 6 May 2021

Moncheva, S., et al., 2012, 'Environmental and Management Constraints on Tourism in Varna Bay, Bulgarian Black Sea Coast', *Ecology and Society* 17(3), p. art35 (DOI: 10.5751/ES-05107-170335)

Nicholls, S. and Crompton, J., 2018, 'A Comprehensive Review of the Evidence of the Impact of Surface Water Quality on Property Values', *Sustainability* 10(2), p. 500 (DOI: 10.3390/su10020500)

Papadopoulou, L., et al., 2018, *The value of bathing waters and the influence of bathing water quality: Literature Review*, Scottish Government Environment and Forestry Directorate, Edinburgh (https://www.gov.scot/binaries/content/documents/govscot/publications/research-and-analysis/2018/08/value-bathing-waters-influence-bathing-water-quality-literature-review/documents/00539016-pdf/00539016-pdf/govscot %3Adocument/00539016.pdf) accessed 23 May 2021

Pareja-Eastaway, M. and Winston, N., 2017, *Sustainable communities and urban housing: a comparative European perspective*, Routledge & Kegan Paul, Dublin

Phillips, P., et al., 2018, *The value of bathing waters and the influence of bathing water quality: Final Research Report*, Scottish Government Environment and Forestry Directorate, Edinburgh (https://www.gov.scot/binaries/content/documents/govscot/publications/research-and-analysis/2018/08/value-bathing-waters-influence-bathing-water-quality-final-research-report/documents/00539029-pdf/00539029-pdf/govscot %3Adocument/00539029.pdf)

Potschin, M., et al., eds., 2016, *Routledge handbook of ecosystem services*, Routledge, Taylor & Francis Group, London; New York

Rodella, I. and Corbau, C., 2020, 'Linking scenery and users' perception analysis of Italian beaches (case studies in Veneto, Emilia-Romagna and Basilicata regions)', *Ocean & Coastal Management* 183, p. 104992 (DOI: 10.1016/j.ocecoaman.2019.104992)

Roof water farm, 2022, 'Block 6 in Berlin-Kreuzberg' (http://www.roofwaterfarm.com/en/block-6/) accessed 20 October 2022

Schernewski, G., et al., 2019, 'Establishing new bathing sites at the Curonian Lagoon coast: an ecological-social-economic assessment', *Journal of Coastal Conservation* 23(5), pp. 899–911 (DOI: 10.1007/s11852-017-0587-4)

Spit, W., et al., 2019, *The Economic Value of Water – Water as a Key Resource for Economic Growth in the EU. Deliverable to Task A2 of the BLUE2 project "Study on EU integrated policy assessment for the freshwater and marine environment, on the economic benefits of EU water policy and on the costs of its non-implementation*, Report to Directorate-General for the Environment of the European Commission, ECORYS, Rotterdam (https://ec.europa.eu/environment/blue2_study/pdf/BLUE2 %20Task %20A2 %20Final %20Report_CLEAN.pdf) accessed 5 May 2021

Strathmann, M., et al., 2016, 'The River Ruhr – an urban river under particular interest for recreational use and as a raw water source for drinking water: The collaborative research project "Safe Ruhr" – microbiological aspects', *International Journal of Hygiene and Environmental Health* 219(7), pp. 643–661 (DOI: 10.1016/j.ijheh.2016.07.005)

StyleWise Reportage, 2009, 'Copenhagen: From Sewer to Harbor Bath', The StyleWise Reportage (https://www.stylewise.tv/copenhagen-from-sewer-to-harbor-bath/) accessed 17 September 2019

The Local, 2015, 'The Local', Austria's most beautiful spots for lake and river swimming (https://www.thelocal.at/20150710/best-places-for-open-water-swimming-in-austria/) accessed 5 July 2021

Tomlinson, B., et al., 2011, 'The Systems Approach Framework as a Complementary Methodology of Adaptive Management: a Case Study in the Urban Beaches of Barcelona', *Ecology and Society* 16(4), p. art28 (DOI: 10.5751/ES-04484-160428)

Turk, P., et al., eds., 2009, *The Ljubljanica--a river and its past*, Narodoni Muzej Slovenije, Ljubljana

Urry, J. and Larsen, J., 2011, *The tourist gaze 3.0*, SAGE, Los Angeles; London

Vladimirova, I., et al., 2018, *Annex VI. Application of the bottom-up multicriteria methodology in eight European River Basin Districts – The East Aegean RBD. Deliverable to Task A3 of the BLUE 2 project "Study on EU integrated policy assessment for the freshwater and marine environment, on the economic benefits of EU water policy and on the costs of its non- implementation".*, Report to DG ENV, Institute for European Environmental Policy, London (https://ec.europa.eu/environment/blue2_study/pdf/Task %20A3 %20Annex %20VI_East_Aegean_RBD_CLEAN.pdf) accessed 5 April 2021

White, M. P., et al., 2021a, 'Associations between green/blue spaces and mental health across 18 countries', *Scientific Reports* 11(1), p. 8903 (DOI: 10.1038/s41598-021-87675-0)

White, M. P., et al., 2021b, 'Associations between green/blue spaces and mental health across 18 countries', *Scientific Reports* 11(1), p. 8903 (DOI: 10.1038/s41598-021-87675-0)

Žuvela-Aloise, M., et al., 2016, 'Modelling the potential of green and blue infrastructure to reduce urban heat load in the city of Vienna', *Climatic Change* 135(3-4), pp. 425–438 (DOI: 10.1007/s10584-016-1596-2)

European Topic Centre European Topic Centre on Inland, Coastal and Marine waters (ETC/ICM)
c/o Helmholtz Centre for Environmental Research – UFZ
Brückstraße 3a
39104 Magdeburg

The European Topic Centre on Inland, Coastal and Marine waters (ETC/ICM) is a consortium of European institutes under contract of the European Environment Agency.