

The Multiple Values of Urban Waterways

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Abstract

This chapter addresses the benefits that urban waterways – including rivers, streams, canals and water bodies such as reservoirs and docks – deliver to society. Using a series of short case studies from Great Britain this chapter illustrates key stakeholders, synergies and conflicts in ‘unlocking’ and managing the multiple values of urban waterways.

Waterways are many things to many people. How they are valued, by whom, changes over time and according to socio-environmental context. Urban waterways in particular have been harnessed over millennia to deliver a wide range of benefits to society, from provision of food and drinking water through to transportation, industrial power and urban sanitation. They have been modified to control flooding and free up development land and to support an aesthetic urban environment. Changes to natural water courses and water systems to achieve different priorities have often compromised their ecological value and their ability to support and regulate natural processes.

The role of water in managing the environmental performance of cities in the face of future challenges is increasingly being recognised. However, conventional economic mechanisms for decision-making do not easily account for the ecosystem services that urban water can provide or the costs of neglecting these. Observable waterways (or the flooding effects of hidden ones) are the aspects of urban water most evident to communities as well as to policy decision-makers; this visibility is an asset in engaging both policymakers and the public with understanding the wider social, environmental and economic benefits of water in cities.

Keywords

Value, Waterway, River, Canal, Urban Waterways, Policy, Ecosystem services

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1 Introduction

This chapter addresses the multiple values of waterways in urban areas, highlighting approaches to understanding 'value' before exploring some of the value themes and stakeholders identified in studies of British urban waterways - defined here as bodies of urban water including rivers, streams, canals, reservoirs and river docks. Other water infrastructure such as water supply, drainage or SUDS are addressed insofar as they link to these water bodies. Using case studies it explores how diverse values have been - and can be - embedded into decision-making for future resilience of urban waterways and their corridors. While the focus of the selected cases and the policy context is Great Britain, the principles and lessons are widely applicable.

Water is the lifeblood of all settlements, as the origin of all has been determined by water supply of some form, bridging points or harbours. Waterways supply water for drinking, irrigation and food, but also other services such as defence, power and transportation. Waterways have shaped the development of towns and cities and, in many cases, form an essential element of the 'sense of place'. They are the elements of urban water that people see and engage with - and thus attach value to.

The development of water infrastructure, such as piped water and sewerage, led to a disconnection between urban areas and the water sources which sustain them. Many smaller urban waterways have been buried in culverts, used as sewers (for example the Fleet river and others in London) or engineered to 'tame' them and manage flooding (see Gurnell et al, 2007) according to the best practice of the 19th and early 20th centuries. Artificial waterways, formerly commercial canals, have been similarly neglected, with many being filled in once commercial navigation became unviable. However, cities are also now more threatened by water, from flooding caused by densifying development, from more extreme climate events and from rising sea levels.

There has been a resurgence in recent decades of interest in the benefits that water in all forms can bring to cities, and in how water can be effectively managed to deliver environmental resilience. There is an extensive and growing technical literature on blue-green infrastructure planning (see for example O'Donnell et al, 2017; Brears, 2018) and its benefits (see for example Ashley et al 2018). There is also increasing consideration of water in policymaking at national and local levels. Advances are being made in water management engineering and approaches to flood management though, as O'Donnell et al (2017) highlight, social and political resistance to new blue-green infrastructure approaches remains a challenge. Urban waterways are increasingly studied for the benefits they can deliver, whether environmental, social or economic. Nevertheless questions remain of how multiple perspectives and priorities can be translated into policy and practice, and who gains which benefits from which aspects of these waterways.

The premise for this chapter is that any technical or policy decision about the management of water rests on underlying understanding by decision makers about what is desirable and 'best'. Central to policy decision-making processes are concepts of political power and agenda setting – what Birkland (2015) defines as the collection of problems, knowledge and issues on the policymaking 'radar'. Political choices about natural assets such as waterways are determined by who has the power to shape control mechanisms such as regulations or fiscal policy (Williams, 2020); however, those in power must have interest and motivation to use that power. Interventions cost money; policy decisions are closely linked to funding decisions in contexts of limited resources and multiple demands. While always true, this has been more significant in a time of prolonged austerity. The visibility, accessibility and diverse uses of urban waterways by a wide variety of stakeholders with differing priorities and values makes them an excellent means by which to show challenges and opportunities in managing urban water more widely.

2 Valuing urban waterways

‘Value’ is a term that can be used in different ways. Definitions show that, while the value of something can be quantifiable and often monetary, the word can also simply signify the importance or worth of something to individuals or organisations. Conventional economic frameworks of value assume that the importance, worth or ‘value’ of various resources can be reliably indicated by human preferences about how their welfare wants and needs are met by those resources and what they are prepared to exchange for them such as time, other goods, or money (Howarth and Farber, 2002; Raffaelli et al, 2009). However, as Brown (1984) stresses, humans are not homogeneous and people’s internal ‘held values’ (such as beliefs and ideals) influence what they prefer or see as ‘better’ when faced with options. This is as true for policy decision-makers as it is for potential users and the wider public. In addition, frameworks based on exchange decisions do not address indirect values that have no exchange value. New natural capital approaches including ecosystem services (ES), natural capital accounting (NCA) and total economic value (TEV) have attempted to address this.

2.1 Ecosystem services and natural capital in valuing waterways

The concept of ecosystem services, which has gained traction in policymaking since the early part of the century, is a means of articulating the benefits of nature to humans and human life in a way that can (but does not have to) be monetised. The Millennium Ecosystem Assessment (MEA) - the first analysis of the world’s natural environment in terms of the stocks of natural capital assets and the flows of services they provide to society - categorised four types of service:

- **Provisioning** services are products obtained from ecosystems. Urban waterway provisioning services include food such as fish or plants, fresh water, hydropower and even transport.
- **Regulating** services are obtained from the regulation of ecosystem processes. Urban waterway regulating services include flood risk protection, pollution filtration and dilution, climate regulation such as through urban cooling,
- **Cultural services:** are the non-material benefits people get from ecosystems such as spiritual enrichment, cognitive development, reflection, recreation and aesthetic experiences. Urban waterway cultural services include watersports, leisure boating, recreational fishing, bird watching, exercise and ‘sense of place’ including the aesthetic aspect of waterside living.
- **Supporting** services are underpinning services needed for the delivery of all other ecosystem services; they include soil formation, photosynthesis, primary production, nutrient cycling and water cycling.

The categorisations of use and non-use values as summarised in Table 1 below are important when considering urban waterways. These can be used to simply identify types of values, but are used within natural capital accounting which attempts to quantify the stocks of natural assets and capture the total economic value of ecosystem services for a world that relies primarily on economic decision-making processes. By making values explicit they can be ‘counted’ and compared by decision-makers weighing up options.

Use values	Direct Use Value	Direct value of consuming or using a resource. For example consumption of water, fishing, boating, mooring, recreation, transport, habitat provision
	Indirect Use Value	Value derived from using the services the resource provides. For example flood control, climate regulation, recreation, businesses associated with water use

Non-Use values	Option Value	The value of future potential for use or existence if needed. For example ensuring viable natural environment in the future, or securing potential future transport use.
	Intrinsic value	Value of a resource (for example a waterway) in and for itself, even if never used
	Legacy value	Value of leaving the resource intact for future generations

Table 1: Use and non-use values. Adapted from Valuing Ecosystem Services <http://www.ceeweb.org/work-areas/priority-areas/ecosystem-services/how-to-value-ecosystem-services/>

Few economic analyses have been carried out of urban waterways. A 2016 report commissioned by the River Mersey Task Force using Arup’s natural capital accounting tool (Arup, 2016) outlined in Case 1 is therefore a useful example to illustrate how the ecosystem service approach can bring the ecosystem stocks and flows into the language of policymaking, i.e. money. While the study did not attempt to quantify many of the non-use values, it nevertheless identified these for consideration.

Case 1: The value of the River Mersey

The aim of the study was to identify and try to quantify the value of many of the important but not always immediately evident environmental assets that are derived from the River Mersey to the Liverpool City Region (LCR). The report mainly addressed use values related to navigation, water extraction and discharge and leisure. It and concluded the Value of Natural Capital from the River Mersey to be £348 - £400 million/year across the LCR. Stakeholders benefiting were identified as:

- Businesses (and employees) reliant on water supply from the river, discharge to the river, or its ability to remove and dilute pollutants
- Businesses (and employees) reliant on navigation and associated infrastructure, including those whose materials are transported through the Port of Liverpool.
- Visitor economy, including major and more local attractions and employees
- Local populations with cultural attachment to the river and its history, as well as those who use it for leisure and those who rely on regulating services.
- Rest of UK and global populations benefiting from carbon sequestration, improved health and employment associated with the river.

The report highlighted that value is not a ‘given’. Without the natural capital asset there would be no value; but, equally, human creativity, investment or time are necessary to realise this value across a range of areas ranging from local health to economic contributions from the port. Interdependencies, conflicts of services and benefits for different stakeholders such as businesses, landowners, local authorities, visitors were identified in order to inform discussions on how to best ‘unlock’ the values the river does and could provide to the city region.

While the services provided by waterways may be relatively easily categorised and use or non-use values identified, policy decisions about which values to prioritise are made by human decision-makers, often following complex and sometimes opaque processes. A complication when attempting to quantify values is that the services provided by urban waterways may be differently valued by different parties, in different spatial, social or temporal contexts. There may be changes in predominant use and may be conflicts between different uses or stakeholders over the benefits to be derived from a particular waterway. Many indirect and non-use values are hard to measure, even if they are identified.

2.2 Understanding values in collaborative policymaking

Policy and funding silos also affect perceptions of value. In situations where notions of ‘better’ and ‘value’ are complex, any attempt to allocate public resources or to make policy requires consideration of the opportunity cost of allocating those resources elsewhere. However, knowledge about alternatives is inevitably imperfect; and any evidence is balanced with values and political judgement (Cairney, 2019). Therefore what is considered – and how – in decision-making is important to outcomes. Equally, understanding the values and priorities of other stakeholders of an urban waterway allows all partners to identify shared priorities.

Waterways tend to traverse administrative as well as policy and funding boundaries. To derive the maximum benefits for flood regulation, water quality, recreation, economic development and health outcomes requires cooperation and partnership working between different agencies with different priorities. The Value of the River Mersey study (Case 1) concluded that “if a strategic total economic value view of the River Mersey is to be considered in future decisions, there is a need for strategic governance i.e. a body or individual responsible for considering the total economic value of the river. Such a body or individual should be charged with attempting to represent the viewpoints of all stakeholders who derive value from the river” (Arup, 2016, p45). The Mersey Basin Campaign plus successor collaborations outlined in Case 2 are an example of how this is being achieved.

Case 2: Partnership working in the River Mersey Basin

By the mid-1980s the River Mersey was known as one of the dirtiest in Britain. The Mersey Basin Campaign pioneered effective partnership working in British administration, bringing together private, public and voluntary sectors at both catchment and local scales. The focus was to link catchment-level environmental improvement in water quality with local economic and social regeneration, stimulating waterside business, housing and leisure and heritage development and developing a sense of local pride and social value in the river. High-level government backing for such a long-term project and funding for water quality supported the partnership; also key was the scale of investment and support from water companies and environmental regulators.

When the Campaign closed in 2010 it was hailed as a success and a model of how to deliver collaborative environmental planning. Principles of partnership to create a sense of ownership across diverse communities delivered significant local impact; recognising and nurturing common interests made actions more sustainable (Wood et al, 2010). Much of the momentum has been maintained with ongoing protection and liaison work passed to what became the Mersey Rivers Trust. Though funding cuts have limited large-scale actions the principle that the river’s health is important to the region’s economy and social wellbeing is well established. The Value of the River Mersey study (Case 1 above) was commissioned to support further bids for continued action.

While quantitative valuation methods may have recently been developed and applied, core to unlocking the values of any urban waterway in the long term appears to be the recognition of the multitude of partners and priorities and their willingness to work together towards shared goals. Project histories from the Mersey and other waterway restoration campaigns indicates that engaging different groups, from policymakers to local community organisations, relies on skills of strategic influencing and creating a narrative to support and explain evidence in ways that different audiences can engage with. This is particularly important where resources are limited and where values may not be easily visible (Leinaweaver, 2015).

2.3 The changing nature of values – Britain’s urban waterways

Values change over time depending on context and knowledge and can be associated with the non-use as well as the use of resources (see, for example, discussions of intrinsic and bequest values in

Raffaelli et al, 2009). The multiple nature of urban waterways comprising, for example, freight networks, heritage assets, tourism and leisure venues, housing and regeneration settings, habitat corridors, green transport routes and community foci (among many other uses - see Jacobs, 2009; CRT, 2017, Schiessel Harvey, 2019) create different, evolving, narratives about what waterways 'are' or 'should be'. These narratives overlap with those in associated fields, such as heritage or green infrastructure.

Whereas a waterway may once have had a direct use value for its provisioning services (eg freight transportation), that may have altered to an option value (preserving capacity for freight transport for the future), delivery of cultural services directly (eg leisure and recreation boating or walking) or indirectly (through the heritage value of the former industrial waterway and sense of place). At the same time, the ability of urban waterways to deliver supporting and regulating services (such as clean water) was often hindered by industrial interventions such as culverting and industrial pollution. Opportunities to reinstate these services and combine them with new uses depend on the recognition of the broadest range of values.

Urban waterways have changed in form and function over many centuries; the urban rivers of today are a product of this change. Skelton's five-century environmental history of the River Tyne (Skelton, 2017) clearly illustrates the constantly changing uses, priorities, management structures and environmental conditions of one river. She demonstrates how the interplay between past interventions and current needs at any point in history affect the values assigned to the river by different stakeholders and the actions stemming from these. What may nowadays be seen as environmental mistakes were often - at the time - seen as appropriate practice. When considering the contribution of urban waterways to future society, current knowledge about future social and environmental changes can be informed by looking back at past values and management.

3 Values of urban waterways

The following sections outline a range of value themes. Applying the natural capital and ecosystem services concept to urban waterway decision-making, policymakers and particularly funders do not fund or support waterways per se; they fund or support the services these deliver. The aim of each section and the example cases is to illustrate how services which are offered by urban waterways, but often ignored, can be built in to development, attracting decision-maker and funder attentions.

3.1 Industrial and commercial water transportation

Industry and commerce were the reasons for the modification of – if not the creation of – many urban waterways. In the UK, almost all commercial water-based transportation has ceased. In countries with larger waterways, however, this remains a significant use and inland ports contribute to urban and national economies (examples being the port of Hamburg on the Elbe or St Louis on the Mississippi).

The decline of commercial water transportation has left many cities with low use but highly-engineered waterways and related facilities in need of maintenance and management. In many cases disused navigations were infilled, their line replaced by railways, roads or simply lost under development (such as the Miami and Erie Canal in Cincinnati). In others the failure of aging infrastructure prompts investment decisions about the viability of retaining navigability (see Hidjra et al 2016). The nature of waterways is such that a single intervention or infrastructure failure can block or close an entire transport route, potentially permanently.

The decision to cease or resume waterborne transport on a waterway is normally commercial, but influenced by administrative and policy decisions on the funding of infrastructure and on controlling surrounding land uses, as outlined in Case 3. Fiscal and non-fiscal policy interventions such as subsidies

or land use controls and incentives may also influence decisions. It is clear that retaining the option value of waterways, to allow them to meet future societal needs, requires coordination with multiple users and priorities.

Case 3: Preserving future freight options through safeguarded wharves

London has many low-use and disused wharves which still retain potential for freight handling. With increasing demand for housing and office space, these spaces have come under development pressure. However, operation of commercial wharves and associated activity is generally incompatible with nearby residential or office uses due to noise and access issues. Where a wharf is preserved but surrounded by incompatible development, it becomes effectively inoperable; this compromises the potential for future freight use of the waterway. To preserve the option value of the rivers as transport routes requires policy protection.

Since 2000 there has been a network of wharves in London protected by Safeguarding Directions which require the Mayor of London to be consulted on any proposals for development. These periodically reviewed Directions aim to balance protecting current and future waterborne freight opportunities with releasing land for urban housing needs.

While there is pressure from many local authorities to release wharves from safeguarding, there remains a strong policy support for preserving future freight capacity (Mayor of London/TFL, 2019; Mayor of London, 2021). The most recent implementation report (Mayor of London, 2021) highlights how the construction of London's new super sewer, the Thames Tideway Tunnel Project, has brought vacant wharves back into active use for construction materials, easing congestion and pollution in west and central London.

The case for commercial use of waterways alone may not be sufficient to bring them onto the decision-makers' radar. Identification of a wider range of benefits and values to a wider range of stakeholders can lead to a critical mass or desire for inter-agency working, where benefits to a range of decision-makers can be highlighted. The restoration and regeneration of the rivers of east London stimulated by the 2012 Olympics are seen as a legacy success story; transport uses were a small but significant element of Case 4 which was developed from author involvement in one of the project teams.

Case 4: London Olympics construction transport and regenerated multi-use rivers

Ahead of the 2012 London Olympics the tidal Bow Back Rivers to the north of the River Thames were identified for their potential to transport aggregates and large loads to the site from wharves south of the river, thus reducing road transportation by up to 700 trucks per day. This required a new £20 million lock to hold the rivers at half-tide - to allow depth of passage while preserving clearance under bridges. This needed to be approved and constructed well ahead of any other Olympics construction, prompting lobbying by the lock promoters. The 'visuals' of attractive waterways during the Games themselves, broadcast to a world audience, were a powerful argument to the Olympic Delivery Authority for clearing the rivers and maintaining a half-tide rather than empty state. The environmental value of transportation reduction became a secondary consideration.

Transport on the Bow Back Rivers was ultimately limited to the construction phase and to passenger transport during the Games themselves. However, the improved visual and amenity value of the restored waterway and proposals to use the waterways post-Games for the bulk transportation of waste justified the cost to the political decision-makers (Guardian, 2009) and 'kick-started' wider river improvements. The Bow Back Rivers were cleared, stabilised and are the focus for leisure and housing around the former Olympic Park in line with the Olympic Legacy waterways framework (CRT, 2012).

Additionally, the new thinking around using the rivers for transportation during the Games triggered funding for new ferry pier infrastructure along the Thames and an impetus for integrating London's rivers into public transport (Bignon and Pojani, 2018). A River Action Plan (Mayor of London/Transport for London, 2013) was launched in the year following the Games (See Case 5).

3.2 New modes of transport in waterway corridors

Water-based passenger transport is well-established in many cities (for example London, Bangkok, New York) and is often seen as a green alternative. However, overall it remains a very small proportion of urban transport; due to the infrastructure resource, fuel and staff needs, costs can be high and may require public subsidy. Equally, where ferries are privately operated, they may not be well integrated with public transport systems. Studies of effectiveness of urban water transport (Tanko and Burke 2017, Tsoi and Loo, 2021) advocate good multi-modal integration with public transport systems, improving passenger experience, and partnership with developers who see the value in water transport to paying for piers and terminals.

Case 5: Thames Clipper ferries

The Thames in London has historically been used for passenger transport though, as with many cities, the introduction of fast, flexible metro and rail reduced the importance of this. As the city expanded to the eastern docks, water buses were introduced; after a failed start, the Thames Clipper service has grown since 1999 to carry 10m passengers in 2015. The most important driver was the Olympics mega-event which focused attention on the river and led to ferries being integrated with the public transport system (Case 4)

The success of the Thames Clipper service is that it is reasonably well integrated with, and supported by, the wider network, has adequate capacity for its core commuter market, and attracts, rather than competes with, tourist traffic. Bignon & Pojani (2018) identify 'institutional will' and alignment of governance of transport systems and the river as a key factor in the success or otherwise of water transport. In London, river ferries fit within the Mayor's vision and broader economic plan for London's waterfront regeneration, the London River Action Plan. Support and access to funding stemmed from this central vision and discourse about the centrality of the river to the city (Tanko and Burke 2017)

The Clipper service continues to expand, with a recent £5.5m Royal Wharf Pier being paid for by Royal Wharf's developer; the river as a transport link is a key factor in the delivery of their 3400-home development. While many ferry piers are simple pontoons, Royal Wharf Pier has been integrated to the project, designed as both transport infrastructure and high quality public space (Future of London, 2019).

Away from larger rivers, urban towpaths – once associated with water transport – have been rediscovered in recent years, as have the linear parks formed by many urban river corridors. Paths alongside canals and rivers can provide attractive and useful motor-traffic free connective routes for commuter and recreational cycling, transferring the primary direct use of the waterway corridor to the land.

Cities seeking to encourage modal shift have an incentive to support waterway corridor improvements. Waterside paths provide useful off-road connectivity; however much of their attractiveness to users comes from the water corridors as blue-green routes. The Canal and River Trust (CRT), which manages approximately 2000 miles of waterways within England and Wales, including the waterways of several major cities, highlights that integrating towpaths into transport routes can help communities engage with local waterway landscapes both built and living, and that towpath improvements can help deliver wider regeneration, community and health strategies (CRT, 2013).

Case 6: Partnering for canal towpath improvements

In guidance for towpath design (CRT, 2013), CRT advise that proposals for changes to towpath infrastructure should consider how to provide benefits to nearby schemes, including creating and improving links to businesses, schools, residential areas, development sites, and links to national sustainable transport networks and routes. By creating more ways on and off the towpath and removing boundaries, the canal and towpath can be better integrated into the surrounding urban fabric. This improvement to the cycling and walking infrastructure with associated increased use can have health and crime-reduction benefits. CRT has drawn on funding and partnerships for wider transport, health and regeneration initiatives to upgrade towpaths for walking and cycling.

CRT has partnered with Sustrans, a UK cycling and walking advocacy charity, to promote the upgrading of towpaths across England and Wales. More locally, Birmingham was one of 8 cities awarded government funding for improving cycling in 2013. The 'Birmingham Cycle Revolution' has seen 30 miles of towpaths upgraded (four other upgraded green routes follow existing non-navigable watercourses) (BCC 2020a). The success of the towpaths as cycle routes has been an unanticipated challenge for pedestrian users; as multiuse towpaths are typically narrow, careful design is needed to minimise user conflict. Further integration of blue corridors as "active travel routes, recreational spaces and ecological corridors" is supported through the Birmingham Walking and Cycling Strategy (BCC 2020b, p21).

Another example is the Towns Fund, government funding in England targeted at sustainable economic regeneration, including connectivity. CRT has worked with local authorities to integrate towpath and lighting improvements for local connectivity into many of the successful proposals. The partnership working demonstrates the added value that can be achieved by integrating urban waterways into local regeneration.

3.3 Local leisure and tourism

Urban waterway leisure and tourism can take many forms, including walking and cycling. Holiday hire boats and day hire provide a significant contribution to local and national economies, as does holiday accommodation with water views. Watersports, including canoeing and paddle boarding, are popular on both static and flowing waterways. Sailing and rowing are also common on urban reservoirs and docks which host watersports clubs providing sports access for all ages of urban populations. Fishing clubs own rights over many stretches of urban waterway. Case 7 outlines how angling communities (as with other water-focused communities) deliver social value and can also be instrumental in promoting the importance of water quality and water access within the wider development agenda.

Case 7: The value of recreational angling to urban waterways

Recreational angling is the most popular participation sport in Britain and an easy-to-access urban waterway leisure activity promoted by CRT and the Environment Agency (EA). With over a million rod licences issued, it contributes £1.46 billion to the economy and supported 27,000 full time equivalent jobs (EA, 2018).

Brown et al (2012) identify a range of social benefits from angling, including community-building through volunteering in clubs and societies, engagement of excluded young people, mental health benefits and learning about habitats, species lifecycles and water. Their review highlighted how angling acts as a 'gateway' to connecting with nature for many urban dwellers and how this contributes to public engagement with waterway health, habitats and appearance. Projects such as 'Trout in the Town' have, over a decade of action with angling and other community groups, supported the cleanup of and growing pride in many urban rivers (Pike and Gaskell, 2019)

The EA (2018) found that a clean and attractive environment with minimal disturbance was more highly valued by anglers than the size and abundance of fish. Angling clubs, with their knowledge of and passion for local rivers, are instrumental in wider projects to improve rivers and catchments. The Salford Friendly Anglers Society, for example, has developed into a significant lobbying group and partner in the environmental revival of the River Irwell catchment (encompassing Manchester, Bolton and Rochdale). Through opening and maintaining channels of communication with landowners, utilities, known polluters and the Environment Agency, as well as monitoring and restocking waters and promoting fishing for all, the Society has raised the profile of urban waterways as local leisure destinations. (SFAS, 2021)

Pressure of use in many areas can create tensions between users, something that managers of waterways and those encouraging their use must consider. Riverside paths and canal towpaths are traditionally narrow and do not always lend themselves to widening due to built heritage concerns and surrounding development; the conflicting needs and preferences of fishermen, cyclists and walkers present waterside design and management challenges. Equally, leisure fishing on narrow waterways is not normally compatible with watersports or leisure boating.

Active waterways are themselves an attraction, with honeypot visitor sites developing around flights of locks or areas of watersports activity. The improvement in water quality, activity and aesthetics attracts waterside bars, restaurants and housing. Where space is made by water for parks and leisure activities, urban areas benefit from the cooling effects of water (Hathaway and Sharples, 2012). Enhancing access (whether physically or through improved wayfinding) can integrate urban waterways within their wider environments; Case 8 shows how one London borough is attempting to integrate waterways that were often formerly private and 'hidden' into a wider blue-green network.

Case 8: Enhancing access to waterspace in Tower Hamlets, London

The borough of Tower Hamlets in London lies on the Thames and at the heart of the London Docklands; it also encompasses the Hertford Union and Regent's canals. The Canary Wharf in the 1980s and subsequent office and residential-led regeneration have reused the formerly disused commercial docks, albeit with variable levels of access and use of the water itself. Waterspace forms a large element of the Borough's open space and is well used for watersports and local recreation. With projected large-scale housing growth and population growth, development is becoming denser; there are also high levels of deprivation with associated health and wellbeing challenges.

The Tower Hamlets Water Space Study (LUC, 2017) mapped access, use and character of the borough's waterspaces. The study highlighted where and how access could be improved for a range of users and how waterspaces could be linked with other blue-green assets, integrating them into London's Blue Ribbon network. This strategic approach to maximising the social value of urban waterways was integrated into the new Local Plan (Tower Hamlets, 2020). Tower Hamlets council has prioritised the many waterspaces for leisure and recreation, aiming to ensure that development does not encroach upon them and to increase the 'active frontage' by ensuring that new development is set back from the water to enhance accessibility by all users. As well as design guidance and development control restrictions, relatively simple interventions such as improved signage and information have highlighted the value and potential of the borough's waterways for local recreation.

3.4 Health and Wellbeing

The health associations with urban water have – in most developed nations – changed over the past century. Controlling disease, providing potable water and managing waste in growing urban areas are no longer the priority of UK urban waterways managers, though in the growing megacities of the world they remain very much so. However, much of the extant and aging infrastructure (such as the Thames

embankment containing 19thC sewers, or the culverting of urban streams) is a legacy of these earlier priorities.

Nowadays the benefits of blue-green spaces for health and wellbeing are well documented, particularly around mental health and the benefits of exercise, pathways to deliver environmental and quality of life benefits for local communities and the capability of these spaces to maintain and enhance ecosystem services for environmental quality (Markevych et al, 2017). Natural capital approaches to modelling the economic values of greenspace to support decision-making have also been developed (for example, Vivid Economics, 2017) and blue spaces specifically are becoming increasingly the focus of research. White et al (2020) synthesise evidence to conclude that access to safe, clean and attractive blue spaces leads to a range of potential health and well-being benefits for a wide range of people. Giorgiou et al (2021) draw on White et al's model to highlight the mechanisms linking access to blue space with health as: increased physical activity; improved social interaction such as spending quality time with others; increased psychological wellbeing with reduced stress and anxiety, and environmental factors such as urban cooling.

Quantifying the value of preventative health values offered by access to urban waterways for public and private bodies seeking 'value for money' is challenging as the research approaches outlined above do not fit well with the clinical evidence-driven decision-making approaches of much of the health service funding. However a driver for developing a robust evidence base about the value of waterways to wellbeing has arisen from the need to secure funding for CRT waterways, now in the charitable sector. Case 9 outlines how the Canal and River Trust have strategically repositioned themselves as a 'waterways and wellbeing' charity. The growing body of evidence being produced and promoted by CRT on the health and wellbeing benefits of water can inform decision-making that affects urban waterways more widely.

Case 9: Rebranding the Canal & River Trust as a wellbeing organisation

In 2012 ownership and operation of the majority of navigations in England and Wales (2000 miles) was handed from a Government quango to an independent charity, Canal & River Trust (CRT), with government funding of approximately 1/4 of its £200m annual operating budget assured until 2027. A forthcoming review of this government funding and pressure for CRT to become more self-sustaining has led to a heightened impetus to demonstrate 'value' to policymakers and funders with limited resources. (CRT, 2017a).

In 2018 CRT rebranded itself as a charity for 'waterways and wellbeing' with the strapline "Making Life Better by Water". Having previously focused on water users it had identified that 90% of its user base was land-based. Opportunities were plentiful for urban waterways in particular to help address growing policy concerns at national and local levels about the costs to society and the NHS of conditions associated with deprivation and with sedentary lifestyles such as obesity, diabetes, heart disease and poor mental health. Over eight million people live within 1 km of a CRT waterway (CRT, 2019) and canals pass through many of the country's most deprived areas. This figure does not include the thousands of miles of other waterways, managed by the Environment Agency and other authorities, that run through Britain's urban areas.

To support arguments for integrating waterways into urban regeneration and to access new sources of funding, CRT embarked on a programme of evidence-building to support the case that 'life is better by water'. The link to health and wellbeing - and the tying of waterways research to health statistics - has repositioned the perception of inland waterway and raised the profile of urban waterways among policymakers and the public. Making waterways relevant, with clear evidence, to local government

priorities around local health and wellbeing outcomes helps build partnerships that have wider social, environmental and economic benefits.

3.5 Heritage and community

‘Heritage’ in its broadest sense encompasses built, natural and cultural resources valued by people for reasons beyond mere utility (English Heritage, 2008); urban waterways are a heritage resource which has evolved over centuries of continuous social and economic development. Ownership, management and uses have fundamentally changed and the legacy of former uses forms part of the value of what is now seen as a public resource with a huge range of users.

Waterway infrastructure, architecture and buildings associated with former commercial uses form part of many modern urban environments, from converted warehouse apartments to historic lock structures and urban towpaths. However waterways heritage is more than architecture and engineering. The Inland Waterways Association Heritage Report (2020) highlights that small details such as mooring bollards, or rope marks from horse-drawn travel, form part of the heritage landscape, as do working or converted vessels on navigable waterways. Heritage and cultural skills relating to operating or maintaining structures and vessels also form part of the waterways heritage; in Britain traditionally painted canal boats are a feature of urban waterways which appear in tourism and waterside development marketing.

Waterways often form part of the ‘essence’ of a place; rivers have shaped the development of cities and even where these are now buried street names are reminders of their existence. Fleet Street in London follows the culverted river Fleet, while Floodgate Street and Duddeston Mill Road in Birmingham are associated with the River Rea which is largely hidden by 19thC development. Restoring the natural processes of urban rivers engages communities with local natural heritage. This, however raises questions of how controlled these processes should remain in a changed landscape and ‘what are we restoring to?’ (Tapsell, 1995)

Many waterspaces that are now integral parts of the cityscape and valued for aesthetic and wellbeing services only exist due to the actions of small communities who colonised them when they were disused and forgotten urban spaces and fought for their preservation. Nowadays intensive housing and office development still threatens the heritage of and potential access to waterfronts. There is a need to frame heritage in the current policy ‘language’ in the short term by identifying how heritage can contribute to other values, without losing sight of other aspects of its value to society. Case 10 below illustrate different approaches; the common theme is a small group of activists seeking to make a case for waterway values not otherwise identified by decision-makers.

Case 10: Disused wharves as community moorings

Battlebridge Basin near Kings Cross in Central London is now a sought-after residential mooring space and the visual focus for surrounding developments. In the 1970s it avoided infilling for development when the London Narrow Boat Association negotiated a 1000 year lease for moorings, dredged it and ensured a historic listing (Battlebridge Moorings, 2015).

Urban Moorings is a Community Infrastructure Company started by a small group of residential boaters and roving canal traders. The group took on a derelict and heavily overgrown wharf site in Wolverhampton in 2016, leasing land from CRT and Wolverhampton City Council that had little development potential due to access challenges. Their aim was to create community moorings, services for boats, shared workspaces and a publicly-accessible urban greenspace and environmental volunteering opportunities in an otherwise industrial area. The aim is ‘slow regeneration’ which

integrates the site with local areas. Towpaths opposite the site benefit from passive surveillance and planned local redevelopment from an aesthetically improved canalside. (Urban Moorings 2021)

The Surge Cooperative aims to open up over 40 disused and underused wharves on Bow Creek in east London in order to create live-work moorings for large boats, preserve heritage structures and to ensure land access for local communities is not compromised by development that permanently closes the waterfront. The speed of development in the surrounding area risks re-forming the riverside making it hard to later re-integrate moorings; Surge have therefore mapped policy and opportunities for each wharf, highlighting how moorings can add value and interest to the growing riverside developments (Surge, 2018). Case 13 outlines how a demonstration project has helped the identified value gain traction with policymakers and developers.

3.6 Flood management and environmental enhancement

Natural regulating services provided by waterways include drainage, pollution dilution, flood alleviation and water quality. In many cases the ability of waterways to deliver these services has been compromised by previous uses and modifications. The channelling of many urban rivers and brooks to manage flooding and to release development land has removed many of the natural functions. Issues such as surface flooding and environmental quality are often caused by a combination of factors sitting within different policy and legislative silos, making resolution challenging to manage across organisations.

However, new flooding challenges have been the driver for many river rehabilitation projects; these have offered the opportunity to add value based on new consideration of the multiple natures and needs of waterways; the ‘rediscovery’ of long-hidden waterways reveals values that were not previously evident. Improved understanding of flood management and drainage as well as cross-agency thinking can bring ecosystem service values of urban waterways to the fore (Petts et al, 2001; Everard and Moggridge, 2012).

Exemplar projects have helped demonstrate successes and develop models for cross-organisational working. The River Restoration Centre is a centre of expertise which champions restoration works, supports project work nationwide and holds a repository of good practice case studies (RRC 2021). A number of these fall within the Ravensbourne catchment in south London. Case 11 outlines one of these. While flood management was the impetus for restoration projects the benefits to biodiversity and social wellbeing have drawn ongoing community engagement over subsequent decades, with the formation in 2012 of the Ravensbourne Catchment Improvement Group and development of the Ravensbourne Catchment Plan.

Case 11: River Quaggy, South London

The River Quaggy had, over many decades of urban development, been largely culverted. As a ‘flashy’ fast-changing river with the flood plain obstructed, it frequently flooded surrounding homes and shopping areas. A flood alleviation scheme was used as an opportunity to restore the river’s natural form, flow and wildlife potential while making it more attractive for local people to use; the alternative would have been widening and deepening the existing culverted channel. The project demonstrated how flood solutions can also become a valuable – and valued – local environmental and community resource. (EA, ND; RRC, 2008).

In phase 1 of the project a 500m stretch of the river Quaggy through Sutcliffe Park was deculverted and re-meandered to flow more slowly along its original route; the park was also lowered and re-shaped to create a floodplain and additional 85,000 cubic metres of flood storage capacity. Integral to this redesign of the park were wildlife-rich backwater areas and ponds; boardwalks were installed to

encourage local community access to the new waterspaces. Since completion in 2004, the park has become an important area of natural beauty, wildlife habitat, and recreation. Visits have increased significantly with people staying longer. Subsequent phases and other Ravensbourne catchment restoration projects have had similar community, wildlife and flow effects.

Partnership between a whole range of organisations including councils and community groups to design and develop spaces was one of the most important aspects of the scheme which won several awards. Community involvement in designing multifunctional waterspaces and the visible benefits of a more attractive riverside has been key to ongoing appreciation for the wider, less visible, values the scheme has delivered. Many of the lessons learnt at the Quaggy River were put forward as examples of best practice to be used elsewhere, including in the surrounding Ravensbourne catchment.

The flood management, drainage, biodiversity and community benefits to urban areas of allowing rivers to function more naturally are increasingly being demonstrated by river restoration and renaturalisation projects worldwide. The London Rivers Restoration Group (LRRG) has called for further 'rewilding' of rivers to help London adapt to the threats of climate change including floods, droughts, heatwaves and poor air quality. 27km of rivers in London have been improved since 2000; the LRRG have identified a further 100km that could be rewilded (Thames21, 2019)

3.7 Regeneration and reuse of urban waterway corridors

The uses of urban waterways in Britain have changed significantly from their industrial and transportation past; changes in environmental policy and broader awareness of the services waterways can deliver have improved water quality and encouraged development to face towards rather than away from water. The legacy of former uses has in many cases become socially valued heritage. The multiple values outlined in the sections above are all tied to the value of water in urban regeneration and waterways are increasingly being treated as a subject of policy in their own right rather than their varied services falling within unconnected policy silos.

In many cases, new uses have had nothing to do with the waterway (eg the new office and residential uses of London's Docklands among many other former waterfront regeneration schemes), with the possible exception of securing added value by proximity to, or views of, water. Gibbons et al (2019) identify a slight increase in value due to water proximity; however the quality of the water environment appears to be more important. A recent report focused on Making the Most of London's Waterways (Future of London, 2019a) demonstrates the importance of a joined up approach and making water central to an area's design to help ensure and maintain this quality environment. This can be through showcasing and celebrating the natural functions of green-blue infrastructure (as in Case 14) or on promoting existing waterways as central to the character of an area, as in Camden, London's Conservation Area (Future of London, 2019a)

Case 12: Integrated design in Paddington Basin, London

This half-mile long near-derelict basin in central London was designated for regeneration in 1998; since then the Paddington Partnership has coordinated over 45 schemes across the site. With the backing of local developers, it has overseen issues affecting site-wide development such as wayfinding, public realm improvement, and business improvement districts. (Future of London, 2019b). 1000m of new towpath, four new bridges and a floating public park have facilitated public access. Boat hire, watersports and a range of business and visitor moorings as well as nearby residential moorings make the waterspace busy and of interest to visitors. 'Bubble curtain' water aeration systems installed throughout the arm serve a dual purpose of improving water quality in an otherwise stagnant area and preventing the migration of weed and litter to the end of the basin around the floating park. The park, conceived when passers-by started sitting on temporary pontoons

used during construction (Future of London, 2019b), was an innovative way to make use of waterspace, provides greenspace, seating and water views to soften a 'hard' urban form, and is noticeably cooler in summer than surrounding public spaces.

While previous hospital development alongside the basin turned its back to the water, all new development has been designed to face the water, opening up wide waterside footpaths and creating water-facing cafes and restaurants. The basin remains disconnected from surrounding areas, closed in by railway lines and pre-existing development; the next stage in the scheme is to improve wayfinding and links to surrounding areas as regeneration continues.

Paddington Basin's attractiveness is largely due to the presence of boats and the adjacent Little Venice area is known for its colourful houseboats which form a tourism destination. Whereas moorings used to occupy small pockets of canalside, boat numbers on London's CRT-managed waterways doubled between 2010-2020 to over 4000 (CRT, 2021); the total number of boats is estimated by Future of London (2019) to be nearer 5000 when Port of London and other waterways are included. Increases in numbers of residential boats on London's waterways have been linked to the rising cost of housing in the capital, yet permanent moorings are also scarce and expensive. The proportion of boats with no home mooring in London has quadrupled to over 2000 since 2010 (CRT, 2021); most of these are residential. While the growing peripatetic community in and around the city's canals, docks and rivers poses challenges for mooring space and services, the presence of boats is an attraction for walkers and visitors to the city's watersides and the increased use of towpaths by the boating community provides a sense of natural surveillance and safety on watersides that were previously underused and empty.

Case 13: Moorings as both housing and cityscape feature

Developer drawings of waterside proposals tend to include attractive images of boats, yet the needs of water users are rarely incorporated into designs. Where watersides are currently underused, inaccessible or unattractive, it can be hard for decision makers to envisage potential benefits. Piecemeal development can mean that these are lost forever. However, active consideration at the outset can ensure that the waterway and moored boats are integrated into design; these can also support aspirations for affordable housing in the city. London's Mooring Strategy (CRT 2017b) seeks to increase the number of available moorings through partnerships with local authorities and developers as regeneration progresses.

Surge Cooperative (see Case 10) have evaluated disused docks along Bow Creek for the added benefits moorings can offer the many developments proposed for the riverside (Surge Co-op, 2018); at present the river is mainly sheer-sided, inaccessible and low in biodiversity, with almost no craft. Surge identify the aesthetic value and passive surveillance benefits of having waterside residents, as well as the wider community and biodiversity value of having a water-dwelling community invested in the health and surroundings of the river. A demonstration project, Cody Dock, transformed a derelict and contaminated 'forgotten wharf' into an active hub for education projects, environmental volunteering and skills, with a waiting list of volunteers. In 2018, with the benefits of the project well-established, planning permission was received for expanded boat maintenance facilities, work and exhibition space, and live-work moorings. The success of a demonstration project alongside explicit policy support for active water use will, Surge anticipate, help persuade developers to better consider moorings within their plans. (Future of London, 2019)

The climate emergency and growing evidence of the economic and social benefits of working with water have led to policy changes such as the Natural Capital approach embedded in the new UK 25 year Environment Plan (HM Govt 2018) and a new Scottish policy framework for water-resilient places

(Scottish Government, 2021). This new approach can enable development that works with, rather than against, water in urban areas, as in the case of Glasgow's underused canalside.

Case 14: Glasgow's Smart Canal unlocking regeneration potential

The North Glasgow Integrated Water Management System – or Smart Canal - partnership between Scottish Canals, Glasgow City Council, Scottish Water and developer partners has seen the 'unlocking' of sites for approximately 3000 homes by integrating the canal with surface water management. The Forth and Clyde canal through Glasgow has minimal boat use although it is funded to maintain navigation; consideration of additional uses was needed to maintain funding support. The previously industrial surrounding area of North Glasgow has remained undeveloped in regeneration efforts to date due to surface water issues and limited capacity in the combined sewer system.

The scheme has required installation of sensors combined with weather predictions; a forecast of heavy rain triggers a controlled drop in the level of a 20 mile reach of the canal by up to 10cm into nearby rivers. Floodwater is then diverted via the canal and a network of sustainable urban drainage systems from local areas, preventing flooding in 110 hectares of land which can thus be developed in the city for more than 3000 homes. The canal is, effectively, a large surface water pond fully integrated within a wider SUDS system which is also being promoted as a leisure and wellbeing asset for the new developments. The explicit use of the canal for flood alleviation has secured the future of an otherwise underused waterway. It has been highlighted by the Scottish Government as an excellent example of where organisations have come together to deliver joint outcomes.

4 Conclusions – embedding multiple values in policy decisions

While urban waterways deliver (or potentially deliver) many ecosystem services to the towns and cities that they flow through, the 'unseen' long term and unquantifiable nature of these means that - in themselves - these services may not be valued or even noticed by the individuals and organisations who make decisions about funding and infrastructure. At the same time control and influence over waterways and their corridors tends to be fragmented between agencies with very different priorities, such as flood management, transport, economic regeneration or heritage. Even where services are identified by advances in scientific knowledge or by communities, and valued by certain stakeholders, these stakeholders may not have the power to change policy or influence uses of waterways. To bring the services provided by waterways firmly onto the urban policy agenda decision makers need to be persuaded of how actions meet wider political and policy objectives.

The cases outlined in this chapter have shown where planning for water has been most effective, multiple values have been brought together and multiple agencies have typically been in play. Factors for successfully bringing the values of water into decision-making for urban waterways and their corridors can be summarised as follows.

- **Knowledge and understanding** of the multiplicity of services an urban waterway can potentially deliver. Not all values are immediately obvious to non-experts and some services may be dependent on others. A checklist of services – whether or not these can be measured – brings these into the decision-making process.
- **Visibility of urban waterways and their benefits** to local stakeholders. While the process of renaturalising an urban stream may bring many ecological and downstream environmental benefits, the visual impact of a more attractive, safer, cleaner, more accessible environment is key to local community perceptions of the value of the waterway. This personalisation of value has been seen to affect behaviours and can be used as a hook for further education.

- **Cross-disciplinary thinking** about the interaction of different urban waterway values to identify common or conflicting values, priorities and actions affecting urban waterways. Just as siloed thinking about the functions and values of urban waterways created some of the current inappropriate infrastructure, creative and cross-disciplinary approaches to resolving urban drainage, recreation, development and other urban issues can maximise the values to urban areas of their waterways.
- **Multi-agency working** to identify policy synergies and develop policy actions that can maximise the 'unlocking' of benefits. Equally, understanding of mutual priorities and cooperation between agencies with control or influence over urban waterways can minimise adverse effects arising from conflicting priorities.
- **Policy, regulatory and financial interventions** to promote healthy waterways and the value of these to urban environments. Ecosystem services and water-sensitive design approaches may not be obvious to decision makers and may well require initial and maintenance funding. In addition, expertise and policy silos can be hard to break down. Where parties are forced to collaborate or there is an economic incentive to think more widely about value synergies, progress is made.

Waterways are complex, multifaceted and multivalued entities. Particularly within crowded urban environments waterways compete for space and policy attention, yet urban waterway benefits – or dangers - are perceived in different ways by different stakeholders. Crucially, many services that waterways provide - and many ways that they are valued by different publics - are poorly understood by decision-makers and thus poorly considered. These include the less quantifiable regulating and supporting services that urban waterways provide as part of the water cycle as well as even less tangible cultural values such as sense of place. A key element in ensuring the multiple values of water are effectively embraced within decision-making for urban futures across policy silos is therefore creating sufficiently powerful narratives of the values of the visible, tangible aspects of water – urban waterways – to ensure they are noticed and valued.

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