River restoration in London:
A 20 year review

Photo: River Wandle at Wandle Park, Croydon.

Commissioned by Catchment Partnerships in London.
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The Catchment Partnerships in London (CPiL) is hosted by Thames21, bringing together partnerships on rivers throughout the capital to enable shared action to protect, enhance and deliver cleaner, more vibrant and accessible rivers for all.

Members of CPiL include: the Environment Agency, Greater London Authority, Groundwork, London Wildlife Trust, North West Kent Countryside Partnership, The Rivers Trust, South East Rivers Trust, Thames21, Thames Chase, Thames Estuary Partnership, Thames Landscape Strategy, Thames Strategy Kew to Chelsea, Zoological Society London.

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Foreword

Considerable advances have been made in the restoration and enhancement of London's rivers over the last 20 years. Through a combination of environmental legislation; improved wastewater treatment; reconstructed drains and sewers; and much goodwill and partnership working, we have seen a significant improvement in London's rivers.

Nevertheless, many of London's rivers are still confined and constrained by the heavily engineered channels that were constructed in the second half of the 20th century to combat flooding. Also, as habitats improve, the impact of other environmental pressures such as water quality and quantity become more apparent.

The 21st century will likely be shaped by climate change and the need for more sustainable approaches to urban living. The challenge is to restore and improve London's rivers further, in ways that: manage flood; support sustainable regeneration; improve wildlife habitat; and, by so doing, contribute to a better quality of life for Londoners.

To help inspire this ambition, this 20 year review highlights existing opportunities for enhancement of London's rivers and streams and uses case-studies to demonstrate how projects can be progressed. It is hoped this will ensure a legacy in which revitalised water courses play an essential role in a sustainable future for London.

Introduction

Excluding the Thames, there are over 600km of river in London and these waterways have been fundamental in the economic and cultural development of our capital city. However, as London expanded, the primary functions of many rivers were reduced to waste disposal and flood protection and drainage. Even in recent history, rivers have been viewed as an environmental hazard and wider environmental benefits were ignored and diminished.

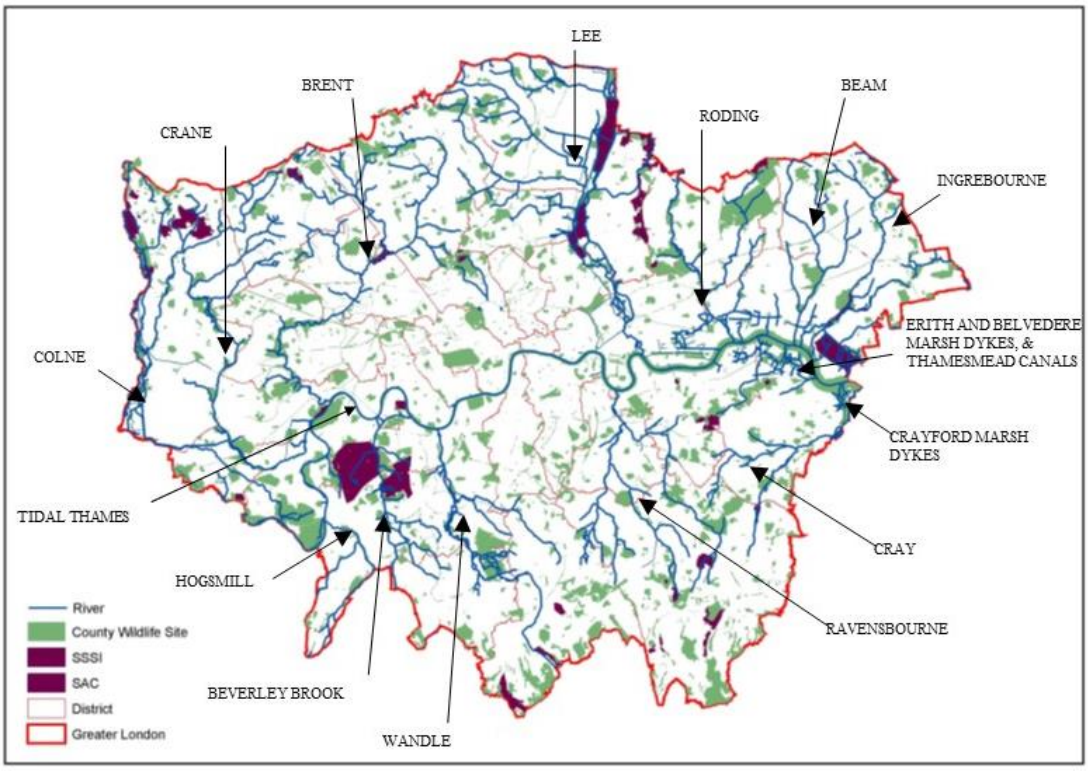

Figure 1. Map of London showing the tributaries of the Thames, as well as designated sites across Greater London.

The pressures affecting water quality and quantity are interrelated and interdependent. Simplistic approaches to resolve specific issues often have unplanned consequences. For instance culverting such as that in Wandle Park Croydon, increased flood risk and contributed to poor water quality. Over the last 20 years river restoration initiatives across London have sought to address the environmental decline, through integrated solutions and community engagement. In 2013 DEFRA launched a policy framework to encourage the wider adoption of an integrated Catchment Based Approach (CaBA) to improving the quality of our water environment.

The Catchment Based Approach (CaBA)

The CaBA embeds collaborative working at a river catchment scale, delivering a range of environmental, social and economic benefits, as well as protecting our precious water environments. Catchment partnerships work to actively involve communities and other stakeholders in restoring their local rivers, tackle pollution, manage invasive species, and improve access to rivers. This approach yields multiple benefits including;

- improvements to water quality,
- enhanced biodiversity,
- reduced flood risk,
- resilience to climate change,
- more resource efficient and sustainable businesses,
- health and wellbeing benefits for local communities as they engage with, and take ownership of their local river environment.

The Catchment Partnerships in London (CPiL)

CPiL consists of representatives of partnerships operating on rivers throughout the capital. CPiL brings the partnerships together to exchange experiences and share solutions; work together to tackle London-wide issues; and have a more powerful, combined voice on issues affecting all. The group is chaired by Thames21 and members consist of representatives of the partnerships plus other organisations with shared interests and who contribute actively to this work.

Greenspace Information for Greater London CIC (GiGL)

GiGL have provided mapping data for the location of the river restoration sites and biological improvement works. GiGL is the capital's environmental records centre; a community interest company that works with partners across the voluntary, private and public sectors, including the Environment Agency, Greater London Authority and Zoological Society of London (ZSL).

GiGL manages a variety of datasets about London's wildlife and green infrastructure including survey observations and policy designations. Much of the data on species found in London is generated by volunteers; including expert natural historians and the wider public.

GiGL works with the London boroughs to reflect their data and policy in London-wide datasets. Many councils partner with GiGL to access the shared information and inform land management and planning. Rivers in London are well represented in London's local wildlife sites (Sites of Importance for Nature Conservation). Records on London's biodiversity action plan species, including the rivers action plan, are highlights of the species records database.

London Wide Summary

River restoration is achieved when there is a significant increase in the diversity of ecologically beneficial river features. It can include improved floodplain connectivity and the restoration of river function through restoring essential physical or biological processes, including flooding, sediment transport and species migration..
In addition, river restoration across London has done much to reconnect communities to the ecological, cultural and heritage value of their local rivers. This reconnection process has been essential in delivering restoration, through both demonstrating the value of rivers and empowering the local communities into action.

Table 1. River Restoration across London 2000 to 2019

Number of Projects	**111**
Length of river restored	38,831m
Number of tidal projects	16
Number of deculverting projects	8
Number of projects creating wetland in excess of 1 ha	4 projects delivering 18ha in total
Length of river	600 km (660km incl. Tidal Thames)

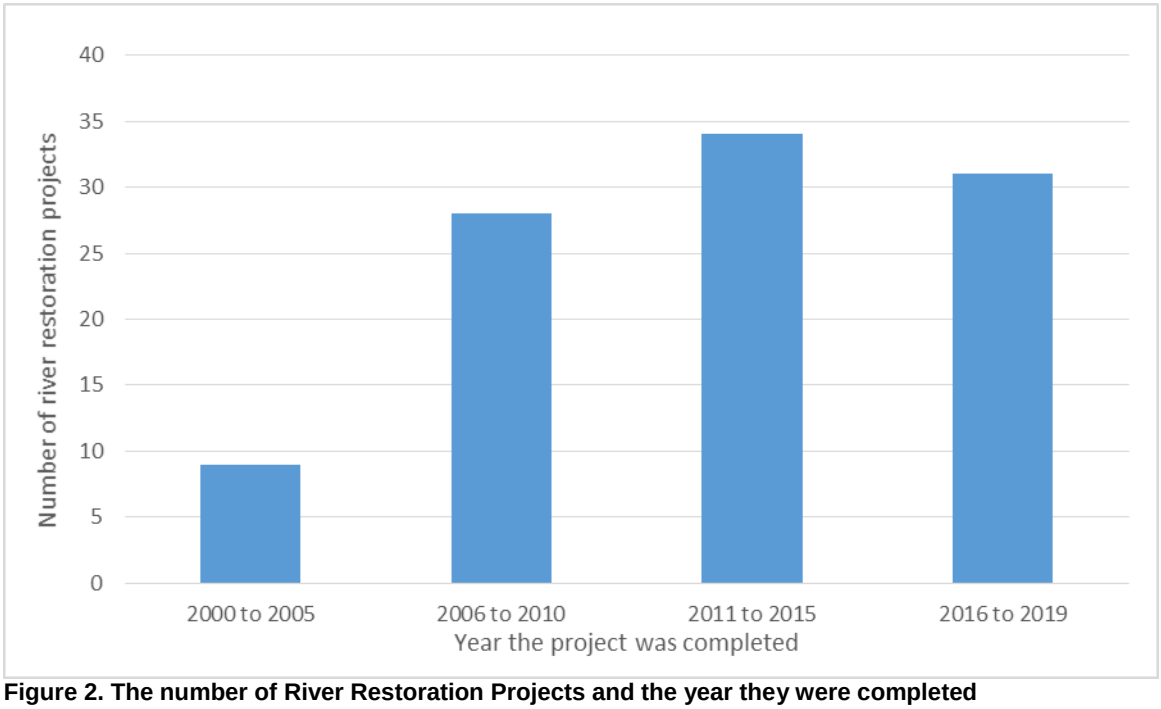

Figure 2. The number of River Restoration Projects and the year they were completed

Since 2000, approximately 39 km of river has been restored, which represents approximately 6.5% of the total length of rivers in London, excluding the tidal Thames. The length of river restored is in line with aspirations within London Plan targets of 15km by 2015 and 25km by 2020 being met. However since

2010 the length of river restored per year has remained constant, with on average just below 3km restored per year. A continuation of this rate of delivery would result in just over 20% of length of river restored by 2050.

Figure 3. Map showing the location of River Restoration projects and the length of river restored at that location

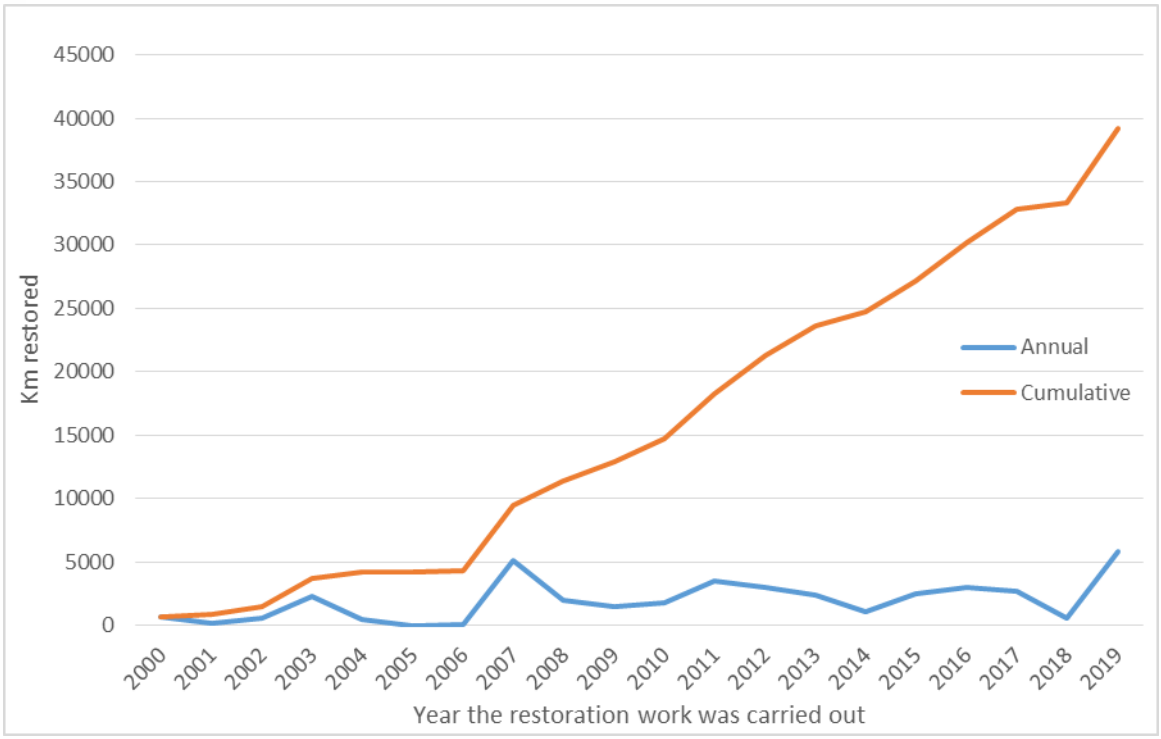

Figure 4. The length of river restored both annually and cumulatively since 2000

The majority of river restoration schemes are delivered by catchment partnerships in collaboration with riparian owners. They focus on existing public open spaces and the removal of weirs and barriers. Replacement of concrete channels with effective and sympathetic natural designs through flood schemes and urban regeneration are still relatively uncommon, but provide a significant beneficial environmental impact.

Objectives for delivery are varied (see Table 2) and include primary and secondary objectives.

- Primary objectives directly deliver the requirements of funding streams and are supported with quantifiable benefits. .

- Secondary objectives incorporate anticipated benefits supported by local knowledge but are not usually as easily quantified as primary objectives.

Currently societal drivers usually fall within secondary objectives resulting in an evidence gap in quantifying benefits. However this may begin to change as the national ambition for nature recovery begins to include the health and resilience of the wider environment.

Flood risk is described as both a primary and secondary objective, with both formal flood risk schemes with quantified benefits, and smaller projects that for instance, increase storage but reduction of flood damage is not quantified.

A good example of this would be the Bury Lodge Wetland Case Study where the project delivered on flood storage but the reduction in flooding and damage could not be quantified.

For the purpose of this assessment, the drivers have been brigaded into the themes of flood risk, wildlife, societal and development.

Table 2. Description of objectives for restoration projects

Theme Title	Description of projects included.
Flood risk	Specific flood schemes where the reduction of flood risk was quantified. Schemes that improved floodplain connectivity or increased channel capacity through the removal of a redundant structure, but the impacts are not quantified.
Wildlife	Schemes that restored riverine and flood plain habitats and improved habitat connectivity.
Societal	Schemes providing improved access to nature, and driven by specific community requirements.
Development	Major schemes driven through the regeneration process.

Since 2010, there has been a decline in schemes with flood and societal drivers. This reflects the challenge for project proposals to meet both the availability of funding streams, and the difficulty in aligning funding streams to deliver multi benefit projects. It is also likely to reflect the difficulties in quantifying the flood risk and societal benefits of small schemes, at both a project and catchment level, and availability of funds to refurbish existing schemes.

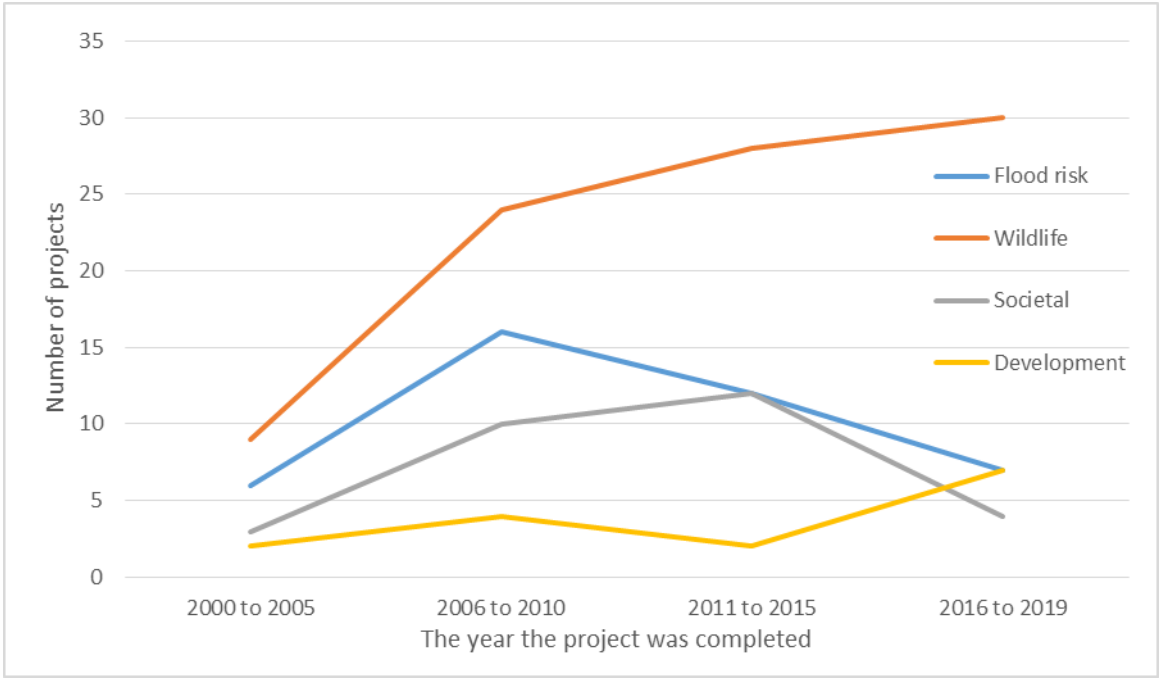

Figure 5. The driver behind the river restoration projects that took place in their respective years.

Community Engagement

River restoration is recognised as being a catalyst for community engagement and inclusion. Community engagement in turn, has increased restoration delivery in a mutually supporting cycle. Through their involvement, the benefits recorded by communities and involvement include:

- Improved access to nature
- A voice and ability to input into design and get involved in the delivery
- Education and training in the subjects of river management, and environmental and ecological monitoring.

There is data on individual schemes and catchment initiatives, however it has not been possible to provide a London wide overview, due to data gaps. Available data has shown a significant growth in participation, which is considered to be an important factor in both identifying and delivering projects. London wide data has shown project delivery has expanded across London, covering all major catchments. This is seen as both an indicator of community engagement but also demonstrates the potential for the programme to engage with diverse communities.

The majority of the restoration projects are located in existing open space. Projects within the built environment were either confined to in-channel works with restricted benefits or were associated with regeneration, providing opportunities for creating new green space. These initiatives were able to provide a greater range of benefits, when linked to wider catchment initiatives, such as restoration strategies or footpaths/cycleways which can be found in the catchment plans.

New Approaches to Flood Risk Management

Historically flood risk was managed by increasing the speed of water downstream through engineering straight channels, and reducing friction with the replacement of natural banks with concrete channels. However in London, urban density generally increases downstream. Also the proximity of buildings result in significant constraints in the maintenance and adaptation of artificial channels to cope with projected increase in frequency and severity of storms due to climate change.

With increased storminess, there is a move to slow water upstream to reduce flood peaks downstream. This approach is entitled Natural Flood Management, where natural processes are used to reduce the risk of flooding, through slowing water. Examples of Natural Flood Management techniques include, restoring bends in rivers, restoring floodplain, and changing the way land is managed so soil can absorb more water.

Natural flood management is most effective as part of a catchment approach where peaks from different tributaries can be managed and the combination in benefits of smaller projects better understood. Natural Flood Management not only reduces flood risk it can also achieve multiple benefits for people and wildlife, helping restore habitats, improve water quality and contribute to making riverine ecology more resilient to the impacts of climate change.

Key Facts

- Excluding tidal flooding, since 2000 there have been 31 projects that have contributed to sustainable flood management through restoration of flood plain, provision of flood storage, and culvert and weir removal.
- 1,661 properties have had flood risk reduced.
- The present flood risk will increase unless we take radical steps involving many organisations.
- Many areas can suffer from flash floods. This means that surface water, sewer and fluvial flooding can occur within minutes of heavy rainfall. Flooding can therefore occur at any time of the year and there is very little time to provide flood warnings.

The Thames Regional Flood and Coastal Committee has funded a project to map Natural Flood Management opportunities across the Thames catchment. This will help Lead Local Flood Authorities realise the opportunities in their areas and help inform the Regional Flood and Coastal Committee where investment in Natural Flood Management will have the most benefit.

Case Studies

Lost Effra
London Wildlife Trust has been working closely with local communities and local authorities to create rain gardens that are both practical and beautiful in a key flood risk area of the catchment of the 'lost' River Effra (Herne Hill, Loughborough Junction, Brixton). These wildlife-rich gardens (and other interventions such as de-paving and living roofs) soak up rainwater, making the area more resilient to flooding while improving neighbourhoods for wildlife and enabling people to take action in their own gardens and community spaces.  Photo: London Wildlife Trust

Timescale	**Beam Washlands. Dagenham.**
2008-2012	A formerly bleak spot with antisocial behaviour issues has been transformed into 13 hectares of precious habitat with reedbed, wet woodland, ponds, lowland acid grassland and wet fen areas. Approximately one kilometre of river has been improved for wildlife – restoring parts of both the Wantz stream and the River Beam. This schemes reduced the flood risk to 660 properties.  Photo: Environment Agency - Today Beam Parklands flourishes with green and blue after its rewilding.

Adapting to Climate Change

Changing water temperatures and flows, plus the increased impact of extreme events and sea level rise will alter species distribution and community composition. In London the impacts are likely to be amplified due to the impact of the urban heat island and the compounding impact of other pressures such as habitat loss and diffuse pollution, which further weaken both species' and communities' ability to adapt.

It is estimated that over 70% of London's Thames tributaries flow through either culvert or concrete/steel channels. The lack of habitat availability, roughness and depth of diversity hinders the ability of species to move in response to changing conditions and reduces the chances of species surviving extreme events.

River restoration increases habitat availability by removing obstructions and creating new habitat. Increased habitat complexity and restoring floodplain connectivity can help species survive extreme events by creating refuge areas. These interventions also slow the water in the channel, reducing biological wash out. However, improving resilience is rarely a driver for restoration. Having improved greenspace resilience to climate change, would make a positive contribution to both site prioritisation and project development.

Research has shown that wetlands are important habitats for storing carbon and potential habitats. The contribution of the river restoration programme to offsetting carbon emissions has not been calculated, but is likely to become an increasing important consideration in attaining net zero carbon.

Table 3. Carbon Stock by Broad Habitat Type. Natural England (2012) Carbon storage by habitat Research: Review of the evidence of the impacts of management decisions and condition of carbon stores and sources. Report NERR043

Habitats	Carbon stock in soils ($t\ Cha^{-1}$)	Carbon stock in vegetation ($t\ Cha^{-1}$)
Dwarf shrub Heath	88	2
Acid grassland	87	1
Fen, mash and swamp	76	?
Bog	74	2
Coniferous woodland	70	70
Broad leaf, mixed & yew woodland	63	70
Neutral grassland	60	1
Improved grasslands	59	1
Arable and horticulture	43	1
Coastal margins (UK)	48	?

Key Facts

- Increased chance of milder, wetter winters, hotter, drier summers, increasing frequency and intensity of extremes.
- Winter precipitation is expected to increase significantly
- Summer rainfall is expect to decrease significantly
- But when it rains in summer there may be more intense storms
- London will continue to experience sea level rise.

Case Studies

Timescale	Mayes Brook Climate Change Park
2008-2011	Once hidden from public view behind metal fencing, restoration work here has rejuvenated the site. By releasing sections of the Mayes Brook from a straight channel into a new winding course that flows through 1.5ha of new floodplain, this formerly overlooked river, is now the centrepiece of Mayesbrook Park. This restored river is more resilient to climate change pressures such as drought and flooding.  AFTER – The river is given new life as it meanders proudly through the Mayesbrook Park grassland.

Greater Thames Migratory Fish Roadmap
Headed up by the Thames Estuary Partnership the Greater Thames Estuary Fish Migration Roadmap project utilises a 'whole system', sea-to-source approach. Similar to an underground or road network it looks at rivers as interconnected migratory routes. By considering and identifying rivers as 'Highways', 'A-roads' and 'B-roads', barrier locations and river network connectivity can be easily visualised on one or more rivers, or in entire catchments. This can help reprioritise barriers and provide a blueprint to follow strategic steps that can help open up entire rivers. The Roadmap also contributes to the data needed for both statutory monitoring and community-based environmental action and promotes the building of relationships across stakeholders and communities on the freshwater and marine boundary. For more information visit: fishroadmap.london.

Access to Nature and Community Inclusion

Urban environments contain the highest densities of people with more than 80% of the UK population now living in cities. Yet these environments are also recognised as some of the most stressful to live in. The UK's lockdown to control the spread of COVID-19 served to highlight the value of access to quality green space for communities' health and wellbeing. Contact with nature has been shown to improve health and wellbeing in a number of ways including providing natural and social connections, sensory stimulation, increasing activity and providing a means of escape from daily stress.[1]

Restoring rivers improves the quality of urban green spaces by providing natural, wildlife rich areas that can be enjoyed by all ages and backgrounds. There are documented examples of restoration being the catalyst for increased park use and reduced anti-social behaviour[2]. The restoration projects stimulate community action and rewilded environments become valuable spaces for education and skills development, such as environmental monitoring.

There has been a significant increase in volunteer numbers and volunteering opportunities across London. South East Rivers Trust figures are considered typical and show a 673% increase in volunteers since for the period 2013 to 2019, with an increase in number of 1467 people. There has also been an increase in citizen science initiatives; in 2019, ZSL managed 4 projects, engaging 245 volunteers.

The delivery of restoration projects has extended across London to encompass every major catchment, with on average, restoration projects being delivered on between 5 and 6 catchments per year. This provides an opportunity to engage with a diverse range of communities.

[1] London Greenspaces Commission Report. August 2020, GLA.
[2] Quercus Project Report.(2009). London Borough of Lewisham.

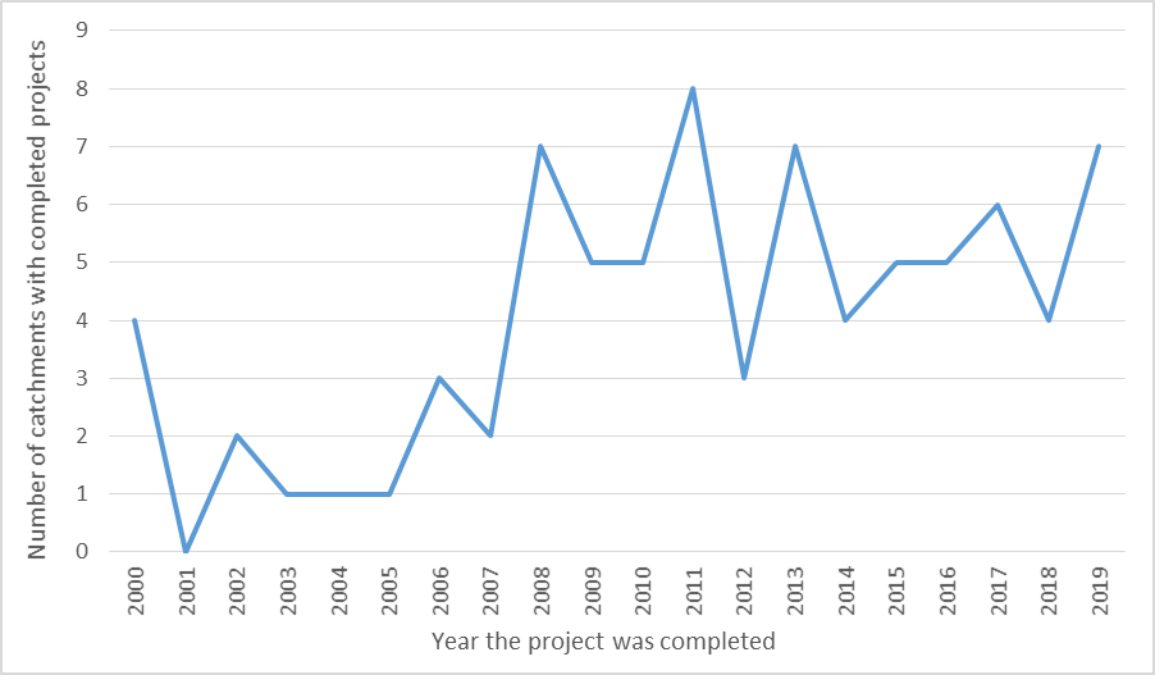

Figure 6. The number of catchments with completed restorations projects each year.

Key Facts

- More than 90% of restoration projects are located in accessible open space.
- Half of all major rivers will have a restoration project on them each year.
- There has been a significant increase in both the number of volunteers and range of volunteering opportunities.

Case Studies

Timescale	Sutcliffe Park
2002-2004	The Quaggy was previously buried but was daylighted as part of a flood and major landscaping scheme within Sutcliffe Park, resulting in rich biodiversity and habitats. The improvements have attracted new visitors, resulting in more health benefits for more people. 83% of visitors feel differently in the park now the River Quaggy runs through it.  Source: EA. Quality of Life, Health and the Environment Agency

Timescale	Community River Restoration
2019- 2020	As part of a Thames Water funded programme, the South East Rivers Trust have delivered a series of community river restoration projects to enhance river habitats, create channel diversity and engage people with their local rivers. Volunteers attended interactive workshops to develop their understanding of river restoration techniques and learn how to carry out a basic river survey. Using these new skills, volunteers actively participated in designing small river restoration projects on three south-west London rivers: the Hogsmill, the Beverley Brook and the Wandle.  These smaller interventions focused on techniques such as narrowing the river channel by creating berms and installing large woody material to create variation in depth and flow. They have provided an opportunity for local people to learn new skills and deliver practical improvements on these heavily modified, urban rivers. https://www.southeastriverstrust.org/hogsmill-river-restorers-2019/ https://www.southeastriverstrust.org/eat-sleep-restore-repeat/

Sustainable Regeneration

Providing high quality green space in existing urban environments and new developments, is at the heart of sustainable regeneration. There is growing recognition of the link between deprivation and poor quality environments and so an increase in community led initiatives leading to enhancement and creation of green spaces can become a catalyst for regeneration in urban areas.

Rivers are important wildlife and heritage assets. River restoration as part of sustainable regeneration reinforces local identity that can help stimulate environmental, economic and community regeneration. Restoration projects provide an opportunity to create high quality green space in highly urban environments. They also provide physical habitat and heritage links, providing a focus for wildlife and for recreational activities. The range of benefits can be widened by linking into catchment initiatives, such as riverside walks, or habitat improvement strategies. This integrated approach can deliver benefits far beyond the immediate footprint of the development too, for instance by removing barriers for fish migration.

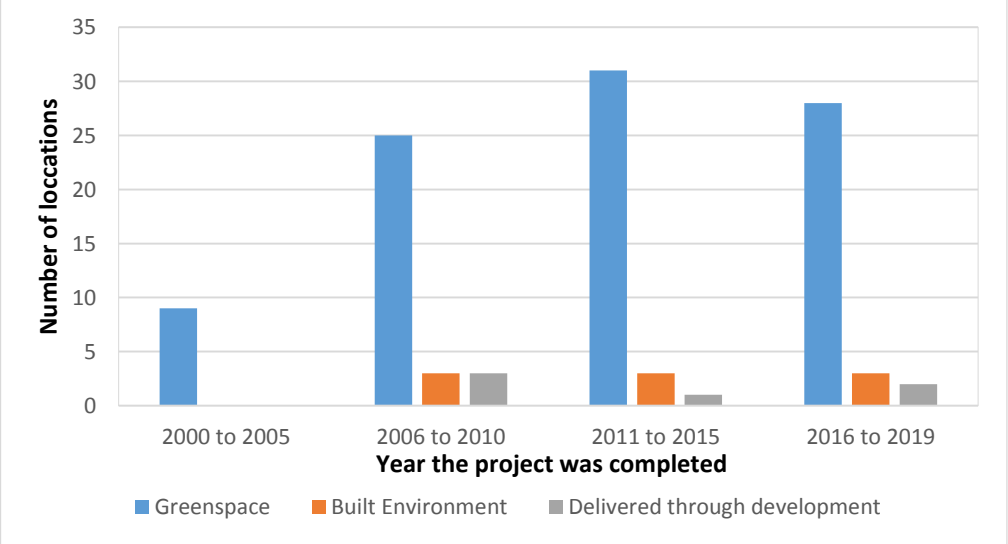

Figure 7. Original location type and drivers behind Project Restoration projects excluding the Thames.

Key Facts

- Excluding the tidal Thames, approximately 10% of projects are not in existing open space, with the majority of these being delivered through development.
- Rivers are now central to new development with many developments restoring and rehabilitating them as flagship features of their development.

Case Studies

Timescale	Cornmill Gardens, Lewisham
2007	A master plan was developed for the whole site. The concrete walls of the river were removed and replaced with more natural re-graded banks interspersed with steps and wooden platforms to improve river bank access. 

Biodiversity

Excluding the tidal Thames, London's rivers are broadly classified as chalk or clay depending upon the principle geology of the catchment. Typically the majority of in-channel habitat and adjacent river corridor habitat features have been removed or modified, damaging the river ecology and fragmenting the wildlife corridor.

River restoration addresses this damage by creating the physical conditions for flora and fauna to establish, such as reed beds or gravel shoals. It also aims to remove obstructions to species movement such as weirs, culverts and concrete channels. Restoration also improves floodplain connectivity and the restoration of river function through restoring essential physical or biological processes, including flooding, sediment transport and enables species movement.

Habitat improvement and creation is the biggest driver for river restoration, improving river habitat as well as associated habitats such as ponds, reedbeds and wetlands. Associated habitats have their own intrinsic value, but may also support river improvement by improving the quality of, and regulating the run off from urban areas into rivers. The majority of associated habitat is less than 1ha, and figures are not available for in combination areas, however for schemes delivering over 1ha, a total of 18ha of priority habitat have been recorded.

Flagship Species

Habitat improvement is one driver for species distribution, with water quality and invasive species being other important factors, potentially limiting the effectiveness of habitat improvements. To provide an overview of the impact on species, an assessment of the London Biodiversity Partnership flagship species was used, focusing on species that were highly mobile and surveyed regularly. These species were considered to provide a London wide perspective, and records better reflected distribution rather than survey effort.

A comparison of pre and post 2000 distribution data for kingfisher, grey wagtail and Daubenton's bat indicate a significant improvement in the distribution of species. The maps below confirm the spread of these species and can be seen as a gross indication of improved habitat quality. However in the same period water vole populations have declined primarily due to the impacts of American mink.

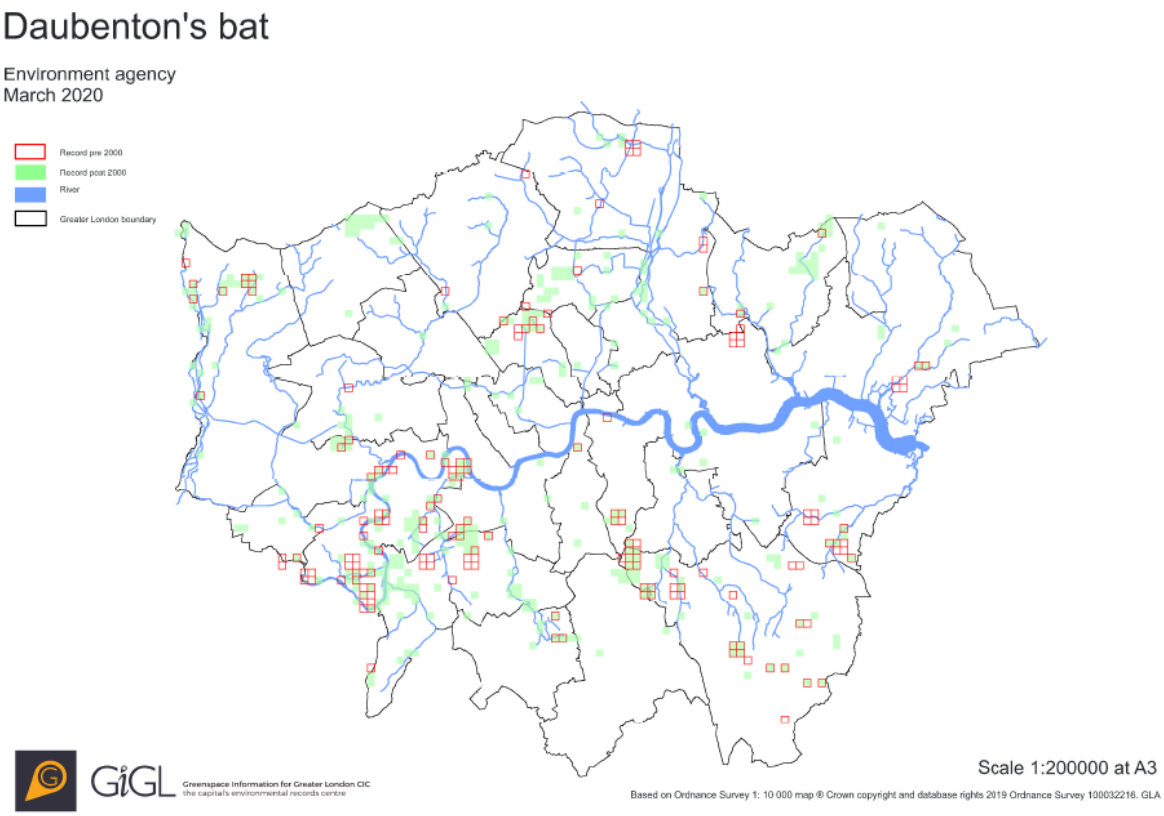

Figure 8. Map showing the locations of Daubenton's Bat pre and post 2000.

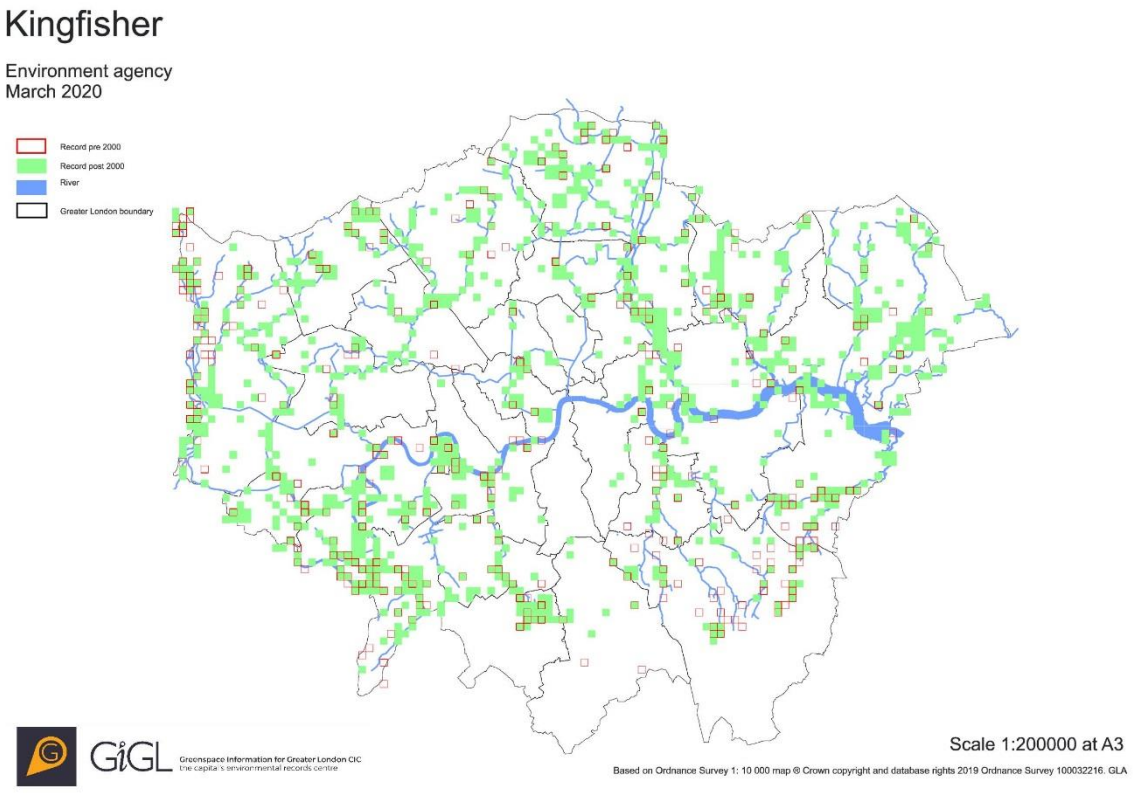

Figure 9. Map showing the locations of Kingfisher pre and post 2000.

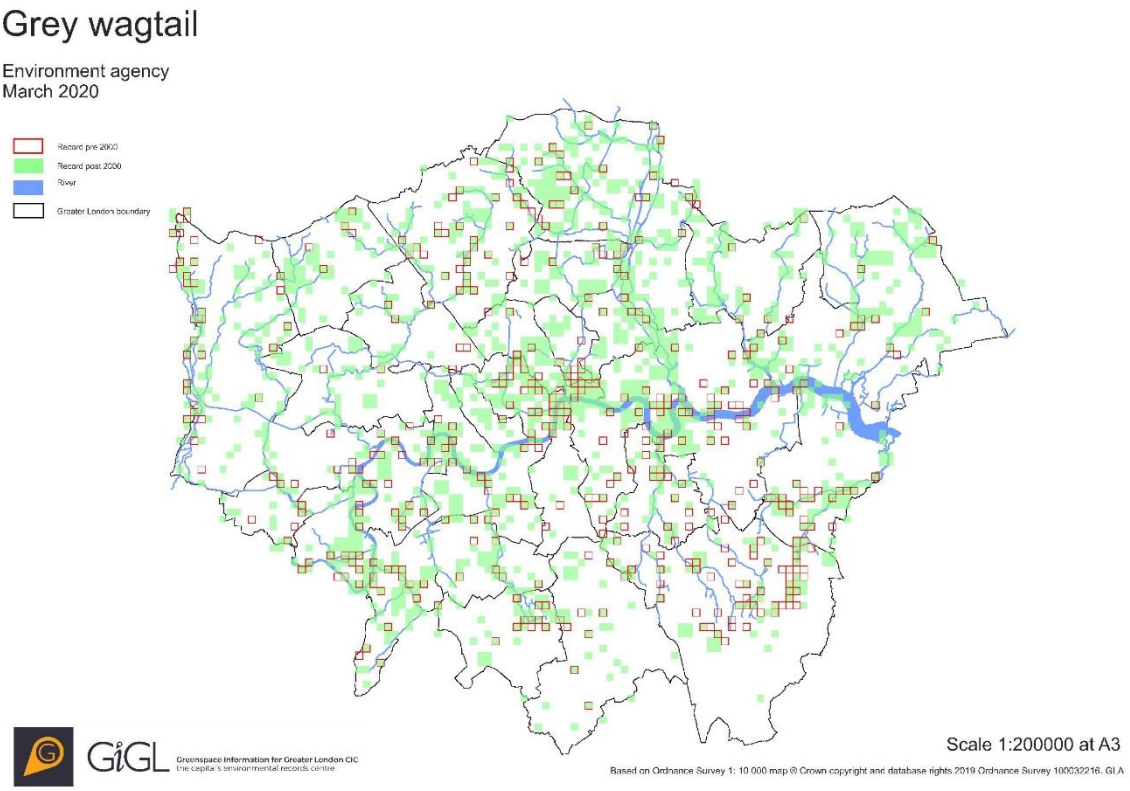

Figure 10. Map showing the locations of Grey wagtail pre and post 2000.

Case Study

Riverfly Monitoring Initiative

Throughout London, communities are engaged in monitoring the health of their local river and acting as alarm systems for pollution events by regularly sampling the invertebrates that live in them. The Riverfly monitoring initiative is a national scheme that brings together trained volunteers, conservation charities, the Environment Agency and river management groups for the benefit of our rivers.

Initiated on the River Wandle in 2008, Riverfly monitoring schemes are now running on most of London's rivers. They are coordinated by the Zoological Society of London, South East Rivers Trust and Thames21.

Volunteers being trained to monitor the health of the Hogsmill River

Conclusions

Since 2000, approximately 39km of river has been restored, which equates to approximately 6.5% of the total length of river (excluding tidal Thames). London Plan targets of 15km by 2015 and 25km by 2020 have been met. Since 2010 the length of river restored per year has remained constant, at an average of just below 3km/pa. A continuation of this rate would result in just over 20% of length of river restored by 2050. With the proposed minimum delivery of 5km per year from 2025, restoring a third of the length of London's rivers by 2050 becomes a feasible target.

Several case studies have shown that major river restoration schemes in public open space have increased visitor numbers and in some instances reduced anti-social behaviour. However since 2010 there has been a decline in the number of schemes that identify flood and societal benefits as key drivers. This likely reflects available funding streams and difficulties in quantifying the flood and societal benefits of smaller community-driven projects. New systems to quantify and measure benefits are needed, along with tools to identify opportunities for delivering wider benefits.

Individual restoration projects have significantly reduced flood risk to properties. However it has been difficult to quantify the cumulative impacts of multiple smaller schemes. Also, there is anecdotal evidence that restoration has reduced the impact of damaging events, and supported speedier recovery, however further research is required to quantify these benefits.

The benefit of habitat creation to offset carbon is likely to become increasingly important, but to date has not been a significant consideration.

River restoration has been a catalyst for community engagement and inclusion, and this in turn, has increased restoration delivery. Community benefits and involvement have included access to nature, input into design and delivery of schemes, river management, and environmental and ecological monitoring.

With the growth of community involvement, river restoration projects have extended across London to encompass every major catchment, with restoration projects taking place in between 5 and 6 catchments per year on average. River restoration is an ideal vehicle for engagement with a diverse range of communities.

Excluding the tidal Thames projects, just over 90% of river restoration projects took place in existing open space. Projects in more built-up environments were either confined to restoration within the river with restricted benefits or were associated with urban development. River restorations associated with new development provide a way to create much needed green space in highly

urbanized areas, and linking to catchment wide initiatives can provide benefits beyond the footprint of the development.

River restoration has helped flagship species such as the kingfisher increase their distribution across London. However other aquatic species have suffered over the same timescale, demonstrating that habitat is only part of the solution; water quality and quantity also plays a huge role. When habitat is no longer a limiting factor for species distribution, it improves our understanding of the impact of water quality and quantity on species.

Recommendations

Between 2000 and 2010 the delivery of river restoration across London increased, enabling the ambitious targets for 2015 and 2020 to be met. However since then, the rate of delivery has slowed, and the funding drivers have continued to focus on ecological improvements. CPIL recommends increasing the rate of delivery to a minimum of 5km per year by 2025. This will require additional community collaboration and new partnerships with key sectors such as health, to secure the new sources of investment needed.

Specific projects have demonstrated that river restoration can provide significant social and economic benefits, however these factors rarely drive programme development. Approaches are needed to quantify the environmental, social and economic benefits of restoration at both a project and catchment scale to deliver better integrated outcomes.

River restoration contributes to improving ecological resilience and offsetting carbon, however these benefits have not been a driver in programme development. To maximize the benefits, this needs to become a major consideration in the development and delivery of river restoration across London.

London-wide figures are not available, but evidence from individual projects demonstrate a range of societal benefits from river restoration projects. Both the geographical spread and range of benefits provided, demonstrate that river restoration can contribute to key London planning targets such as equal access to nature, reducing health inequalities and greater social inclusion.

The majority of river restoration projects have taken place in existing, often low quality open space, enhancing and improving the quality and improving access to nature by increasing biodiversity. A smaller number or projects were delivered as part of regeneration and development projects, and these type of river restorations provide a unique opportunity to create new areas of green space in built-up urban environments. When linked to wider catchment initiatives, river restoration in built-up urban areas can deliver a range of benefits.

Habitat is just one of the factors that determines the distribution of species. Improving habitats enables more Londoners to experience iconic species such as kingfishers, and the opportunity to understanding the impact of other damaging pressures is improved. Citizen science programmes have played an important part in measuring impacts on specific species and understanding change through catchment wide surveillance initiatives.