



FIVE YEARS, FIVE RIVER BASINS

FUNDING FRESHWATER CONSERVATION THROUGH THE HSBC WATER PROGRAMME



From 2012 to 2017, WWF teams in the Ganges (Ganga), Mara, Mekong, Pantanal and Yangtze river basins worked to conserve freshwater ecosystems and the benefits these deliver to communities and businesses as part of the HSBC Water Programme.

This report summarises the approaches taken within WWF basin programmes. More detailed case studies about many of the activities described in the report have also been produced – download them here:

www.wwf.org.uk/fiveyearsfiveivers



Author: WWF-UK, 2017

Acknowledgments: Although WWF-UK wrote and published this report, and played a management, advisory and coordination role for the HSBC Water Programme, the report describes work undertaken in the river basins by the WWF teams in Brazil, Cambodia, China, India, Kenya, Laos, Tanzania, Thailand and Vietnam.

CONTENTS

INTRODUCTION	4
The Ganga, Mara, Mekong, Pantanal and Yangtze river basins: A snapshot	6
WWF’s freshwater work in the context of the Sustainable Development Goals	8
PART 1: PROTECTING FRESHWATER HABITATS AND SPECIES	12
Biodiversity conservation in protected areas	12
Conservation of freshwater species	19
In summary: Habitats and species protection	25
PART 2: SECURING ENVIRONMENTAL FLOWS AND WATER QUALITY	26
An evidence base to guide action on flows	26
Environmental flows secured	33
Water quality tackled at source	37
In summary:Environmental flows and water quality	42
PART 3: IMPROVING WATER GOVERNANCE	45
Stakeholders working together	46
Collective action with the private sector	53
The management and use of rivers	57
Advocacy and policy influencing	62
In summary: Water governance approaches	66
CONCLUSION	68
Sucess factors...	68
... and common challenges	72
Where will we go from here?	75

INTRODUCTION

WWF’s vision is of a future where people and nature thrive. When it comes to fresh water, we’re striving for a world where the water needs of both human societies and the environment are met. We believe the way to achieve this is through integrated, equitable and sustainable management of freshwater resources, and we’re working in river basins throughout the world to create this change.

This report summarises WWF’s freshwater conservation approaches in five river basins – the Ganga (Ganges), Mara, Mekong, Pantanal and Yangtze – over five years of a programme funded by HSBC. WWF has been working in partnership with HSBC for 15 years; the latest programme – the HSBC Water Programme – was a US\$100 million initiative also funding Earthwatch and WaterAid, the first phase of which ran from 2012 to 2017.

‘HEALTHY RIVERS, HEALTHY BUSINESSES, HEALTHY COMMUNITIES’

The five river basins WWF worked in as part of the HSBC Water Programme are collectively home to more than a billion people and are some of the planet’s most biodiverse areas. The Ganga, Mara, Mekong, Pantanal and Yangtze river basins are in many ways representative of the problems facing freshwater ecosystems worldwide. The threats they face include over-abstraction, infrastructure development, overfishing and pollution from urban, agricultural and industrial sources. These challenges are primarily driven by economic development, population growth, urbanisation, climate change and poor governance.

Freshwater ecosystems and human societies are now interdependent. WWF’s approaches in the five HSBC Water Programme river basins reflected this mutual reliance and involved working with governments, companies and local communities both to protect freshwater ecosystems and to ensure that freshwater resources continue to deliver benefits to human societies, their communities and businesses.

SETTING THE SCENE

Work WWF has undertaken in the five river basins as part of the HSBC Water Programme is one piece of a bigger WWF freshwater puzzle. Before the programme described here, HSBC funding had already supported WWF’s work in the Yangtze for 10 years and in the Ganga and Pantanal for five years. Furthermore, although most of the activities described in this report were primarily funded by HSBC, they form part of wider WWF national or basin-specific freshwater strategies that are funded from many other sources. In addition, the strategies implemented in the five river basins have drawn from WWF’s worldwide freshwater conservation work over the past few decades.ⁱ

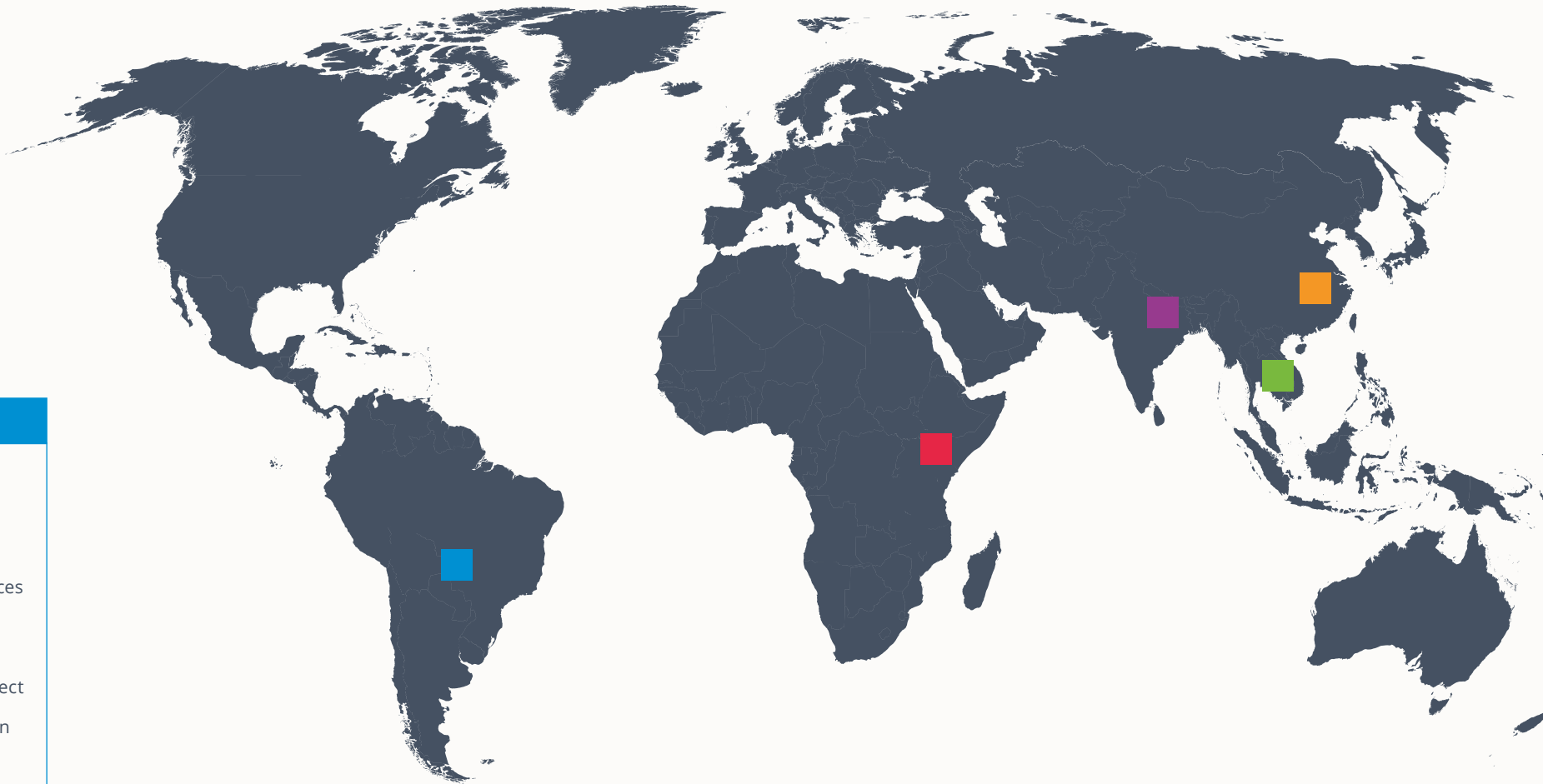
ⁱWWF’s global work on fresh water is summarised on the [WWF International](#) website.



Tara Devi inspects her wheat crop in Adalpur village, Uttar Pradesh, India. Tara is one of the local farmers now using organic fertilisers and pesticides made from locally-available ingredients such as buffalo urine and manure, gram flour, jaggery and neem leaves. Increased yields have convinced many farmers to adopt the practices; for Tara, a government health worker, the link between water quality and human health has also been a motivating factor.

IMAGE: © THOMAS CRISTOFOLETTI / RUOM FOR WWF-UK

THE GANGA, MARA, MEKONG, PANTANAL AND YANGTZE RIVER BASINS: A SNAPSHOT



PARAGUAY RIVER AND PANTANAL WETLAND (BRAZIL)

Basin area: 1.1 million sq km
Population: > 8 million
Main threats: Infrastructure (dams)
Pollution from urban sources
Unsustainable agricultural practices

Areas of work:
WWF created a political agreement involving the public and private sector and civil society to protect the Pantanal wetland’s headwaters. In addition, WWF supported spring restoration and sanitation improvements and reached millions through a communications campaign.

MARA RIVER (KENYA AND TANZANIA)

Basin area: 13,750 sq km
Population: > 1 million
Main threats: Over-abstraction of water
Unsustainable agricultural practices
Pollution from tourism facilities and urban and industrial sources
Climate change

Areas of work:
WWF strengthened the capacity of water user groups, restored riverbanks, improved farmers’ land management practices, involved hotels and mines in pollution control practices, started a transboundary water allocation dialogue and helped to protect vital wetlands.

GANGA RIVER (INDIA)

Basin area: 1 million sq km
Population: > 600 million
Main threats: Over-abstraction of water
Infrastructure (dams and barrages)
Pollution from urban and industrial sources
Unsustainable agricultural practices
Mining (sand and aggregates)

Areas of work:
The Rivers for Life programme covered: habitat and biodiversity conservation, targeting seven key species; sustainable water management, via environmental flows; water stewardship and urban water management; and climate change adaption work aimed at local farmers.

MEKONG RIVER (CAMBODIA, LAOS, THAILAND AND VIETNAM)

Basin area: 800,000 sq km
Population: > 70 million
Main threats: Infrastructure (dams)
Mining (sand and aggregates)
Overfishing
Climate change

Areas of work:
WWF supported community-based fish conservation and alternative livelihoods; studied the river’s biodiversity and the impact of human activities on the river and delta; and undertook analysis to demonstrate the dependency of economic sectors and society on the river system.

YANGTZE RIVER (CHINA)

Basin area: 1.8 million sq km
Population: > 400 million
Main threats: Infrastructure (dams and barrages)
Pollution from urban and industrial sources
Unsustainable agricultural practices
Mining (sand and aggregates)

Areas of work:
The programme’s vast scope included: sustainable aquaculture and agriculture; a protected area network and nature schools; finless porpoise conservation; environmental flow releases; water stewardship collective action with SMEs; and integrated river basin management.

WWF'S FRESHWATER WORK IN THE CONTEXT OF THE SUSTAINABLE DEVELOPMENT GOALS

In 2015, the global community committed to the Sustainable Development Goals (SDGs) – an unprecedented international effort to balance the environmental, social and economic dimensions of sustainable development. The SDGs are formed of 17 goals and 169 targets signatories have committed to deliver by 2030. In terms of fresh water, all of WWF's work as part of the HSBC Water Programme contributed to delivering target 6.6 (on water-related ecosystems), and much of it to delivering target 6.5 (on integrated water resources management). Here are selected examples of programme contributions to the SDGs:



TARGET 6.3: WATER QUALITY AND WASTEWATER

In India, WWF worked to reduce the water quality impacts of the metalware and leather sectors. WWF piloted a counter-current metalware rinsing process combined with small-scale effluent treatment plants. WWF tested clean technologies in tanneries and set up a platform for international leather buyers to engage with their suppliers. See page 38.



TARGET 7.2: RENEWABLE ENERGY

WWF urged decision makers to take an integrated view of economic development in the Mekong river basin. Although campaigns failed to prevent the construction of two dams in Laos, WWF also continued to push for demand management, alternative renewable energy sources instead of dams and for strategic, basin-scale hydropower planning. See page 35.



TARGET 11.4: CULTURAL AND NATURAL HERITAGE

WWF instigated the Pantanal Pact, a political agreement between the public and private sector and civil society. The Pact aims to protect the headwaters of this incredibly biodiverse World Heritage site. Civil society and governments at municipal and state level have provided funding and in-kind support for conservation interventions. See page 50.



TARGET 15.1: TERRESTRIAL AND FRESHWATER ECOSYSTEMS

In China, WWF worked in partnership to protect the Yangtze finless porpoise by participating in censuses and translocations, raising awareness and funds and supporting protected areas (PAs). The WWF-initiated Yangtze Basin PA Network was consolidated: 252 PAs, covering 29 million hectares, are now members of the Network. See page 17.



TARGET 16.7: PARTICIPATORY DECISION-MAKING

In the Mara river basin, WWF helped establish, build the capacity and strengthen the legitimacy of water user groups, which are mandated by law and have devolved responsibility for water resources management. There have been several instances of water user groups intervening to reduce tensions between different water users. See page 49.



TARGET 2.3: AGRICULTURAL PRODUCTIVITY AND INCOMES

WWF helped improve land management practices in over 500 Mara basin farms to reduce soil erosion. The farmers benefited from improved yields and increased incomes. Milk production doubled thanks to the availability of Napier grass, planted to reduce erosion; the grass also has the added benefit of being drought resistant. See page 40.



WWF addressed the challenges posed by the booming aquaculture sector in the Yangtze river basin in several ways. One approach involved setting up pilot projects to demonstrate integrated practices and standards for aquaculture. At the Hongxianxi co-operative, one of the projects, a traditional feeding method – based on feeding grass to carp – was revived by poor farmers.

IMAGE: © WWF-UK



SHARED LEARNING

Although each set of programme activities was unique to the particular basin's social, political and economic context, working in five river basins as part of a portfolio programme provided opportunities for cross-programmatic learning regarding shared solutions, opportunities and challenges. HSBC Water Programme basin teams shared their knowledge and experiences in person via workshops and study visits as well as remotely, for example through webinars and publications.

In addition, the HSBC Water Programme included a global innovation and research component that developed new concepts, trialled new approaches within the basin programmes and helped to fill gaps in knowledge. Basin teams undertook innovative research relating to, for example, supply chain mapping (see page 55) and sediment transport (see page 31). The programme funds were used to commission research linked to the benefits healthy rivers provide to society (see page 58), to publish a series of reference publications about river basin management (see page 62) and to produce a primer about infrastructure.¹

Finally, funding from the programme – and our experiences in the river basins – also contributed to WWF research about [free-flowing rivers](#) and [water stewardship](#). Lessons learned from the HSBC Water Programme basins and from WWF-UK fed into the WWF global network's work on fresh water and facilitated engagement with and dissemination to other international organisations and fora.

REPORT STRUCTURE

To enable freshwater ecosystems to sustain people and nature, freshwater habitats and species need to be protected. In turn, this entails maintaining or restoring the hydrological integrity and quality of freshwater ecosystems. Delivering this requires good water governanceⁱⁱ at local, national and international levels. These are the stated outcomes of WWF's global freshwater strategy (2015-20), which we have also used to structure this report.

Part one of the report details the approaches we've taken to protect freshwater habitats and species, including within protected areas and via research about, and in-situ conservation of, freshwater species. Part two outlines the work that basin teams carried out to restore the integrity of freshwater ecosystems, including activities to define and implement environmental flows and improve water quality. Part three summarises WWF's work on improving water governance, through multi-stakeholder partnerships, collective action involving the private sector, better river management and policy advocacy. Finally, the report's conclusion lays out some of the success factors and challenges common across the Ganga, Mara, Mekong, Pantanal and Yangtze river basin programmes.ⁱⁱⁱ

ⁱ See page ww for information about good water governance.

ⁱⁱ Many basin activities and examples cut across more than one theme. In this report, we've had to make some arbitrary decisions as to which is mentioned where.

PART 1: PROTECTING FRESHWATER HABITATS AND SPECIES

Collectively, the five HSBC Water Programme river basins cover more than 4.7 million square kilometres (equivalent to around four times the size of South Africa) and include some of the world’s most biodiverse ecoregions.² The Pantanal is the world’s largest wetland and is home to nearly 5,000 animal species. The Mara river basin’s iconic savannahs support an incredible diversity of large mammals. Species such as the golden mahseer (*Tor putitora*) and the Ganges river dolphin (*Platanista gangetica*) are found in the Ganga river. The Mekong river is second only to the Amazon in terms of number of fish species. Finally, more than a million migratory waterbirds overwinter in the Yangtze river basin’s wetlands – they are emblematic of its rich biodiversity.

Despite this incredible diversity, some of the facts about the HSBC Water Programme river basins’ habitats and species make for sobering reading. Some of the basins’ best-known species are listed as ‘critically endangered’ by the IUCN, including the Yangtze’s endemic finless porpoise (*Neophocaena asiaeorientalis* ssp. *asiaeorientalis*), the Mekong river subpopulation of the Irrawaddy dolphin (*Orcaella brevirostris*) and the Ganga’s gharial crocodile (*Gavialis gangeticus*).³ As well as providing habitats for these species and many more, the Ganga, Mara, Mekong, Pantanal and Yangtze river basins are also home to over one billion people who depend on rivers to provide them with drinking water, fish, irrigation water, water for industrial processes, spiritual sustenance and countless other benefits.

In addition to working to secure environmental flows and water quality (see pages 26-42) and improve water governance (see pages 45-66), the HSBC Water Programme basin teams also directly intervened to protect freshwater habitats and species. In partnership with the public and private sector, as well as local communities, the programmes helped create and improve the management of freshwater protected areas, undertook research to improve knowledge about freshwater species and implemented actions to bolster their recovery.

BIODIVERSITY CONSERVATION IN PROTECTED AREAS

Protected areas (PAs) are among the most widely used conservation instruments worldwide. Providing they are systematically planned and effectively managed, freshwater PAs can provide ecosystem services, frequently beyond their boundaries.⁴ Examples include supporting ecological functions like fish spawning and, for wetlands, flood control, groundwater replenishment and water purification. Activities that threaten freshwater biodiversity – such as fishing, sand mining and navigation – are often prohibited or controlled within PAs.

As part of the HSBC Water Programme, WWF teams in the five river basins contributed to the designation of many new PAs. They also helped to develop management plans aimed at improving the effectiveness of existing PAs, created links between PA staff to build capacity, and implemented a number of different activities within them. Conservation within PAs has formed an important subset of wider WWF basin strategies whose other facets – including for example management at the basin scale, environmental flow assessments, multi-stakeholder work and reducing diffuse pollution – are also explored in this report.

APPROACH TAKEN BY THE BASIN PROGRAMMES

GANGA

WWF worked towards the development of management plans for two PAs in partnership with the government. In a departure from existing practice, the management plans cover aquatic habitats and biota as well as terrestrial ones. One of these PAs is the location for gharial and turtle reintroductions.

MARA

Recognising the importance of the Enapuiyapui swamp for the flow of the Mara river, WWF-Kenya helped develop a participatory management plan for the forest in which it is located, and built the capacity of the local communities who are working to implement the plan.

MEKONG

As well as supporting a number of Ramsar site designations, WWF teams in the Mekong have played a key role in PAs where community-based fishery management is taking place. This has involved building communities’ patrolling and enforcement capacity and bringing together governments and communities.

PANTANAL

PAs in the Paraguay river basin were found to provide insufficient coverage: 5-11% of the basin, failing to encompass the most hydrologically and ecologically important regions.⁵ The Pantanal Pact (see page 50) did not entail creating new PAs but rather took a strategic approach aimed at key headwater areas.

YANGTZE

WWF brought Yangtze river basin PA stakeholders together to improve engagement and build capacity. Our two main approaches were the Nature School platform and the Yangtze Basin Protected Area Network. We also ran a study to monitor management effectiveness within PAs.

CREATING PROTECTED AREAS

Although WWF does not have the legal authority to create protected areas (PAs), we have contributed to the designation of multiple freshwater PAs via data provision, capacity building and policy advocacy. In the Mekong for example, community-based fishery management, entailing the creation of areas where fishing is controlled or prohibited, is a widely-used conservation approach. It is enshrined in national law in Laos and Cambodia. WWF has collected socio-economic and biodiversity data, supported implementation of area management plans, provided training and equipment to community patrols and river guards, and – most importantly – built consensus between governments and communities.

WWF's input has led to the designation of several Ramsar sites. In Vietnam, we nominated the Lang Sen Wetland Reserve and U Minh Thuong National Park as Ramsar sites; these are respectively some of the region's best remaining examples of natural riverine forest and peat swamp forest.⁶ WWF-Vietnam also provided support to U Minh Ha National Park to facilitate its Ramsar designation by establishing a biodiversity monitoring system. In China, Shengjin lake and Chen lake were designated as Ramsar sites; the government designated Chen lake based on the success of its WWF-instigated Nature School (see page 17). WWF was also engaged in advocacy relating to PA creation, for instance through lobbying for the consideration of Tonlé Sap lake in Cambodia and part of the lower Songkhram river basin in Thailand as Ramsar sites.

A small fence of reeds and string marks a turtle nest in the Ganga river basin, India. Rescued from river sandbanks where they would otherwise be destroyed by seasonal riverbed farming activities, the turtle eggs are carefully repositioned within fenced and guarded nesting sites. Upon hatching, they spend some months maturing in nurseries and are then released within the Hastinapur Wildlife Sanctuary, a protected area along the banks of the Ganga river.

IMAGE: © SIMON DE TREY WHITE / WWF-UK

MANAGING PROTECTED AREAS

We were also instrumental in developing management plans aimed at improving the effectiveness of existing freshwater protected areas (PAs). Indeed, although PAs (including Ramsar sites) provide a legal framework in which to operate, their designation alone is insufficient: effective management, better coordination, sufficient staff capacity, financial resources as well as engagement with local communities and other stakeholders are also required. In the Mekong, WWF contributed to the creation of management plans for several Ramsar sites; the Stung Treng site plan has been used to guide stakeholder efforts in managing and conserving fresh water not only in the Stung Treng wetland but also within the Mekong flooded forest.

WWF-Kenya, along with other stakeholders, developed a management plan for the Kiptunga forest – in which the Enapuiyapui swamp is located – which was adopted by the government. The swamp is the source of one of the Mara river’s tributaries, and one of the main sources of water supporting the region’s iconic grassland habitats, but it suffers from the consequences of poor management of surrounding land. WWF helped form a multi-stakeholder conservation committee, including local communities, that is implementing an action plan which includes controlled grazing. We ensured the plan included water resources management and helped to build capacity within the local community to apply an ecosystem-based approach.

In India, WWF worked to develop management plans to conserve aquatic biodiversity and habitats in two protected stretches covering 255km of the Ganga river (near Hastinapur and Narora). We did this jointly with the Uttar Pradesh Forest Department and in consultation with local stakeholders. The plans focus on terrestrial management but also include provisions for species recovery, with a particular focus on aquatic species. The inclusion of aquatic species is novel: management has to date tended to focus solely on terrestrial habitats and biota. With our partners, we have been releasing turtle hatchlings and juvenile gharials within one site, the Hastinapur Wildlife Sanctuary. It is intended that the implementation of the management plan will help protect habitats and species, thus boosting turtle survival rates and helping to establish a breeding gharial population.

WWF ASSESSED HOW EFFECTIVELY CHINA’S EAST DONGTING LAKE NATURE RESERVE WAS BEING MANAGED USING AN ESTABLISHED TRACKING TOOL. AT THE TIME OF WRITING, INITIAL INDICATIONS SHOWED THE RESERVE WAS WELL ABLE TO DEAL WITH EMERGING THREATS.

CASE STUDY

LINKING PROTECTED AREA STAKEHOLDERS

WWF initiated the Yangtze Basin Protected Area Network (YBPAN) in 2004 and we contributed to its development as part of the HSBC Water Programme. The YBPAN aims to facilitate and enable more effective conservation management of wetland protected areas (PAs) through mobilising and linking stakeholders, sharing experiences and building capacity. One of the main benefits of the YBPAN is that members gain access to capacity building, information, knowledge- and experience-sharing opportunities; the network meets annually and there are regular technical workshops and training sessions. WWF is the network’s main technical support provider, and more than 3,000 wetland managers, government officers and YBPAN staff members have received training to date, increasing their capacity to engage in wetland conservation. Government buy-in to the concept has enabled it to expand well beyond its original scale.

WWF also helped to bring together staff from existing and proposed Ramsar sites in the Mekong to help share information about biodiversity monitoring among other things. In Cambodia, WWF supported networking between community fisheries to facilitate sharing and learning and hence better enforcement of controls on fishing.

WORKING WITHIN PROTECTED AREAS

Many of WWF’s conservation interventions took place within freshwater protected areas (PAs). These are detailed in the rest of this report. They included, for example, Yangtze finless porpoise translocations to protected oxbow lakes (see page 24). In several instances, the creation and management of PAs entailed curtailing certain activities linked to local peoples’ livelihoods within PAs, primarily fishing. We therefore implemented a number of activities to help create alternative livelihoods (see page 23), although such approaches remain challenging.

PAs can be a vehicle for awareness raising and practical engagement of local stakeholders. In the Yangtze basin, WWF initiated the Nature School concept: these are platforms for engagement and outreach, education, awareness-raising, capacity building and training to support more effective and participatory conservation management of individual PAs. Nature Schools have been established in 50 wetland PAs to date; they are aimed

THE YANGTZE BASIN PROTECTED AREA NETWORK (YBPAN) STARTED WITH A WWF-INITIATED PILOT IN 2004. BY 2016 IT HAD 252 MEMBER PAs, BETWEEN THEM COVERING 29 MILLION HECTARES. THE CHINESE GOVERNMENT SET UP THREE NEW PA NETWORKS IN OTHER PARTS OF CHINA BASED ON THE SUCCESS OF THE YBPAN.

CASE STUDY

at adults and children and seek to engage a wider set of stakeholders including NGOs, the business sector and the general public. Nature Schools provide an opportunity to boost environmental awareness and create behaviour change, particularly in the context of the projected intensifying urbanisation in parts of China: the proximity of urban areas to PAs is set to increase significantly by 2030.⁷

Work within PAs can also build experience and relationships that can lead to up-scaling. For example, the Uttar Pradesh government asked us to expand our turtle conservation work (see page 23) on more stretches of the Ganga river based on the success of an existing partnership.

KEY INSIGHTS

- Failure to consider freshwater ecosystem characteristics (most importantly spatial and temporal connectivity, i.e. flow regimes) and broader river basin contexts often hampers the ability of terrestrial PAs to conserve aquatic features within them.^{8 9 10 11}
- WWF programmes regularly monitor PA management effectiveness in recognition of the fact that freshwater PA designation can in itself be insufficient. However, further research is needed to determine whether better management actually leads to positive conservation impacts.¹²
- Working within specific areas is particularly appropriate in light of time and resource constraints. PAs can also showcase demonstrable results and build partnerships that can facilitate influencing and lead to up-scaling.
- Designing PAs so as to directly improve livelihoods and food security (rather than solely as biodiversity conservation tools) and ensuring effective engagement with local communities helps to secure community and government support and foster successful PAs.
- PAs are a vital conservation instrument, but conservation of habitats and species located outside of PAs – as well as threat mitigation – is also critical.

CONSERVATION OF FRESHWATER SPECIES

Most of the HSBC Water Programme activities ultimately contributed to biodiversity conservation. However, several of the basin programmes – in particular the Ganga, Mekong and Yangtze, where aquatic species face more immediate threats – also included activities more directly focused on protecting particular species in the short term.

We undertook research to better understand species occurrence, abundance and behaviour in order to tailor the design and location of conservation activities as well as to provide information for awareness raising and evidence to support advocacy. For some of the most threatened species, WWF intervened directly, for example by relocating individuals or nests. The basin programmes also worked to reduce some of the direct threats to species and their food sources.

APPROACH TAKEN BY THE BASIN PROGRAMMES

GANGA	WWF took the lead on designing and partnered with the Uttar Pradesh state government to conduct two Ganges river dolphin censuses; we initiated otter and mahseer atlases; collected turtle eggs and released their hatchlings; and reintroduced, tagged and monitored gharials.
MARA	The Mara programme did not work directly with freshwater species. However, activities aimed at improving water quality, allocation and management all contributed to securing freshwater ecosystems and hence to the protection of connected terrestrial ecosystems such as the Serengeti and Maasai Mara.
MEKONG	Cutting-edge techniques helped isolate environmental DNA in river water samples to detect and identify seldom-seen species. Fishing controls and bans in selected locations contributed to the recovery of fish stocks, while community patrolling and gillnet removal helped protect the Mekong Irrawaddy dolphin.
PANTANAL	Although the Pantanal basin programme did not include activities specifically targeted at conserving particular freshwater or other species, all of the work done by WWF and our partners contributed to preserving the Pantanal wetland and the wealth of freshwater and terrestrial species that depend on it.
YANGTZE	WWF and our partners implemented a finless porpoise conservation strategy including translocations to protected oxbow lakes. Porpoises also benefited from community patrolling to curb illegal activities in Dongting lake, while finless porpoises and waterbirds were the subject of regular surveys.

IMPROVING KNOWLEDGE ABOUT FRESHWATER SPECIES

To be most effective, species conservation programmes need to be designed based on evidence. Obtaining this information can be particularly challenging in freshwater environments, not least in some of the HSBC Water Programme basins where the rivers are long, deep and turbid and have multiple tributaries and/or connected lakes and wetlands. Population numbers of some of the most threatened species are so low that detecting them can be a challenge in itself. Lack of information about species' current geographical spread and population size, among other things, can be a major constraint to conservation. To remedy this, WWF-India started producing atlases about otters and golden mahseer based on secondary information from literature reviews, expert input and WWF field site reports.

WWF PARTNERED WITH A LABORATORY TO SAMPLE AND ANALYSE MEKONG WATER FOR TRACES OF EDNA FROM VARIOUS SPECIES, INCLUDING THE MEKONG GIANT CATFISH (*PANGASIANODON GIGAS*). ONCE COMMON, IT IS NOW RARELY CAUGHT BY FISHERMEN AND LACK OF DATA ABOUT THE SPECIES (INCLUDING ITS MIGRATION) HAMPERS CONSERVATION EFFORTS.

CASE STUDY

Local fishers collect small fish from their nets on an island inside the Ramsar protected area, Stung Treng, Cambodia.

IMAGE: © THOMAS CRISTOFOLETTI / WWF-UK



Censuses conducted using recognised methods provide data about species abundance and range and, when repeated consistently across seasons and locations, allow population trends to be derived. However, censuses are time-consuming and complex, particularly given the involvement of different government agencies and, on occasion, problems relating to consistency of stretches covered and methods used.

In China, WWF involved local communities in waterbird surveys to obtain data and also raise awareness of the value of the birds and the impact of farming and other activities on them. WWF-India undertook its own seasonal surveys of aquatic species on certain river stretches. As part of the HSBC Water Programme, it also ran two Ganges river dolphin surveys in collaboration with the Uttar Pradesh state government, and an otter distribution survey. Other basin programmes also partnered with government agencies to survey Yangtze finless porpoise and Mekong Irrawaddy dolphin populations (for which photo-identification is used to count individual dolphins). Partnering with governments often enables censuses to happen, but it also lends results legitimacy and is efficient given the resource-intensive nature of population surveys.

Radio telemetry studies provide information about species (for example their dispersal and migration patterns), and can help verify the success of reintroduction and translocation initiatives, by providing information about behaviour and health. As part of the HSBC Water Programme, biometric data about Ganga gharials was collected, while nine gharials were radio-tagged in partnership with research institutions. Necropsies are also an effective tool for improving understanding of species physiology as well as for providing vital information about cause of death for conservation planning purposes. WWF-Cambodia continued to commission necropsies of Mekong Irrawaddy dolphins, confirming gillnet entanglement as the current prime cause of adult mortality.¹³

MITIGATING THREATS TO SPECIES AND THEIR FOOD SOURCES

We instigated several activities with the aim of addressing specific threats to freshwater species, the ecosystems they live in and the food sources they depend on. Creating and better managing freshwater protected areas, within which damaging activities such as unsustainable fishing or sand mining can be controlled, is often central to addressing specific threats to species, as are things like improved planning and management of dams (see pages 31-36).

In several HSBC Water Programme basins, some of the threats to freshwater species are linked to livelihood-based activities within local communities – primarily things such as riverbed farming and fishing. In response, WWF raised awareness within communities about the impact these activities have on freshwater biodiversity. For example, in the Ganga river basin, we worked to increase understanding about entanglement of gharials in fishing nets and the destruction of gharial basking sites and turtle nesting sites through riverbed farming practices. Some of the riverbed farmers became actively involved in turtle conservation by spotting and reporting nests for rescue. In the Mekong, in addition to controlling fishing via community-based fishery management, we also reduced fishing pressure on the river by supporting the development of alternative livelihoods including ecotourism and agriculture.

As well as site-specific interventions, we also sought to reduce threats to freshwater biodiversity via basin-level planning: WWF has created tools and approaches to improve the planning, design and operation of planned dams in the Mekong in order to reduce their impact on dolphins and migratory fish among others. In addition, the Ramganga river basin management plan included provisions for the protection of freshwater species among other things (see page 58), while environmental flows work in the Yangtze (see page 35) was partly aimed at maintaining adequate water levels in the wetlands that more than a million migrating waterbirds depend on.

INTERVENING TO BOLSTER SPECIES RECOVERY

For some species, total population numbers are so low and/or rates of population decline so rapid that measures to, for example, improve water quality or mitigate threats to their habitats and food sources are insufficient on their own. In several cases WWF intervened directly to boost population numbers or reduce mortality for certain species.

In India we worked on the conservation of three freshwater turtle species that nest within sandy river banks and on river islands. Around 50 local farmers contributed to conservation efforts by identifying nest locations and notifying us or the government of their presence. Since eggs are laid at night, it is invaluable to have local eyes on the ground before tracks are disturbed. Eggs were then relocated to riverbank hatcheries by highly-trained staff. Turtle hatchlings – a total of 1,151 as part of the programme – were then released back into the river once they reached a size that makes survival more likely.

COMMUNITY-BASED FISH CONSERVATION IN THE MEKONG ENTAILS THE CONTROL OR BAN OF FISHING IN COMMUNITY-MANAGED AREAS AND AIMS TO REDUCE THE BYCATCH OF IRRAWADDY DOLPHINS AND PRESSURE ON FISH STOCKS. INITIAL INDICATIONS REVEALED POSITIVE IMPACTS ON DOLPHIN MORTALITY AND ON FISH CATCHES (SIZE AND SPECIES DIVERSITY).

CASE STUDY 

In China, the Yangtze finless porpoise was the main focal species of the Yangtze programme. Its population is in accelerating decline (14% per year): according to the 2012 census approximately 1,000 porpoises remain, roughly evenly split between the main stem of the river and two lakes connected to it (Poyang and Dongting).¹⁴ The small total population and rapid rate of decline prompted the government, WWF and other partners to implement a conservation strategy involving the translocation of porpoises to protected areas within oxbow lakes. Five translocated porpoises established the population in the initial oxbow lake (Tian-e-Zhou) in 1990. The population there subsequently grew to 60 in 2015, a net growth of 108% (excluding the multiple subsequent translocations).¹⁵ This translocation strategy was extended to two other oxbow lakes as part of the HSBC Water Programme.

DURING THE HSBC WATER PROGRAMME, YANGTZE FINLESS PORPOISES WERE TRANSLOCATED TO OXBOW LAKES – EIGHT TO HE-WANG-MIAO AND 11 TO XIJIANG – AS PART OF A CONSERVATION STRATEGY AIMING TO ESTABLISH BREEDING POPULATIONS IN PROTECTED AREAS WITHIN OXBOWS, AWAY FROM THEIR CURRENT HIGHLY-THREATENED HABITATS.

CASE STUDY

KEY INSIGHTS

- Data regarding freshwater habitats and species is deficient compared to that of terrestrial ecosystems.¹⁶ This poses a particular challenge for freshwater conservation, which requires data about the abundance, occurrence and behaviour of species and about threats to habitats in order to design effective and evidence-based species conservation programmes.
- To help fill this gap, WWF’s species-specific work involved gathering and consolidating data. Approaches included: producing atlases; population surveys; radio-telemetry studies; analysing environmental DNA; capturing biometric data; and necropsies.
- In several basins, the magnitude of in-situ threats and the severity of population declines required urgent conservation actions in addition to longer-term conservation of core habitats. These strategies included captive hatching and rearing of turtles in India and translocations of Yangtze finless porpoises to protected oxbow lakes.

IN SUMMARY: HABITATS AND SPECIES PROTECTION

Conservation of freshwater habitats, species and freshwater ecosystem functions was the main goal for all five of the HSBC Water Programme basin programmes. In response to declining species numbers and pressing threats, WWF teams working on the Ganga, Mekong and Yangtze also implemented activities directly aimed at conserving particular freshwater species within these rivers in the short to medium term.

Freshwater protected areas (PAs) are vital for systematically targeting conservation within some of the most important locations in terms of habitats, biodiversity and ecosystem services provision. Working within these specific areas is particularly appropriate in light of time and resource constraints. PAs were created, managed and connected in order to support species conservation. For instance, they hosted translocated Yangtze finless porpoises and were the site of turtle hatchling releases in the Ganga. In addition to PAs, basin programme teams also undertook research to support the design of evidence-based conservation strategies.

The species conservation work that happened as part of the HSBC Water Programme was done in partnership not only with governments but also with the private sector, other NGOs and local communities. Much of WWF’s species conservation work could not have happened without the approval, involvement and resources of governments within the respective countries. Furthermore, collaboration with governments has been one of the main avenues for scaling up species conservation initiatives in the Ganga, Mekong and Yangtze.

Work on habitats and species outside PAs is also crucial. It is vital for conserving areas that aren’t delineated or legally protected but are key from a biodiversity and ecosystem services provision point of view. Indeed, freshwater ecosystems are dynamic and pollution, infrastructure and other threats have upstream and downstream implications. Meanwhile, working outside PAs is important for addressing large-scale and diffuse threats, such as agricultural pollution, as well as system-scale drivers, such as economic development, which requires appropriate planning to take advantage of opportunities and mitigate negative impacts. The HSBC Water Programme basin programmes’ work on such wider conservation approaches is further described in the rest of this report.

PART 2: SECURING ENVIRONMENTAL FLOWS AND WATER QUALITY

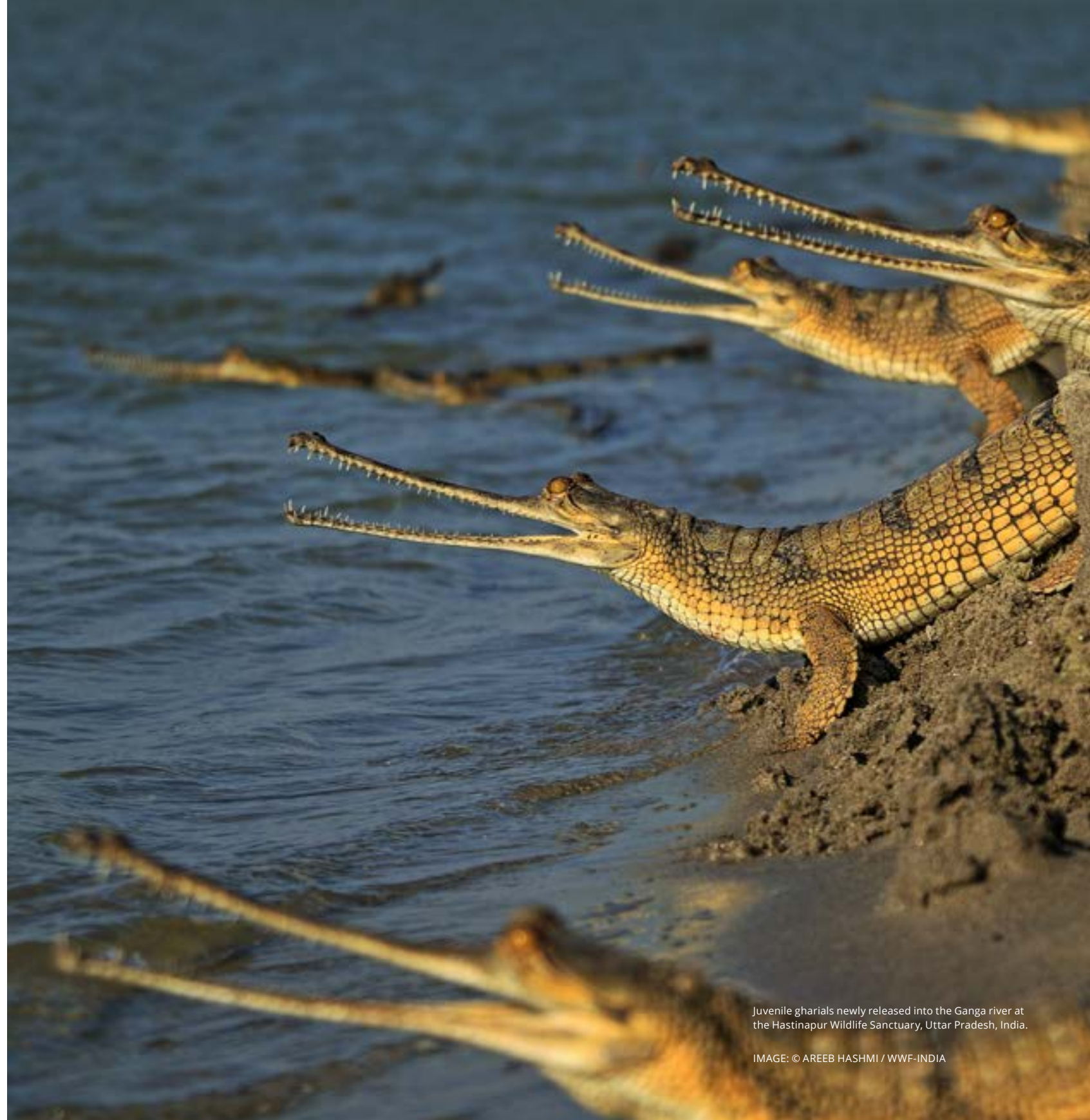
Water flows beyond administrative boundaries. This simple fact creates one of the biggest challenges in freshwater conservation. It means that while freshwater protected areas play a vital role, they and other site-specific conservation initiatives must be part of an effort to improve freshwater habitats on a wider scale by securing environmental flows, including through the improvement of water quality.

Flow is often the main controlling factor of biodiversity in freshwater systems, determining the physical characteristics that enable aquatic life to establish itself and proliferate. It creates aquatic habitats, carries nutrients downstream, triggers reproduction of fish and other species, provides access to floodplains and flooded forests, and flushes sediment and pollutants through the system.¹⁷ Protecting or enhancing freshwater biodiversity and habitats therefore depends on understanding and restoring a river's natural flow regime. There are a number of definitions of environmental flows, but essentially they “describe the quantity, timing, and quality of water flows required to sustain freshwater and estuarine ecosystems and the human livelihoods and well-being that depend on these ecosystems.”¹⁸

Securing environmental flows entails not only implementing flow releases and considering environmental flows within water allocation planning, but also tackling different sources of water pollution. This part of the report details the work done in the HSBC Water Programme basins to assess environmental flows and the impact of dams, to implement environmental flows and to address point-source and diffuse pollution.

AN EVIDENCE BASE TO GUIDE ACTION ON FLOWS

A river system has many different societal uses, from fisheries and providing water for domestic use to power production and navigation. These uses affect natural flow regimes and therefore the services that society derives from river systems. Society therefore has to decide how to balance the protection and use of rivers; the process of environmental flows helps to facilitate this.



Juvenile gharials newly released into the Ganga river at the Hastinapur Wildlife Sanctuary, Uttar Pradesh, India.

IMAGE: © AREEB HASHMI / WWF-INDIA

Environmental flow releases from dams and barrages as well as other activities linked to restoring natural or semi-natural flow regimes in river basins build upon research relating to the environmental flow requirements of freshwater habitats and species, as well as the likely impact of activities that change the quantity, quality and timing of flows.

The HSBC Water Programme teams sought to better understand the hydrological systems, the current state of water abstraction and use, as well as the potential impacts of infrastructure in the river basins in which they operated. The information obtained supported strategic targeting of programme focus areas, advocacy for improved planning of dams and water allocation, as well as the implementation of environmental flows.

APPROACH TAKEN BY THE BASIN PROGRAMMES

GANGA

WWF conducted an environmental flow assessment for the Ramganga river, hydrogeological mapping of the basin, as well as a trade-off analysis for the operation of the Kalagarh dam which analysed the implications of releasing environmental flows on the river flowing downstream.

MARA

WWF facilitated reviews of environmental flow requirements and water abstraction surveys in order to inform the situational analysis of water requirements in the basin. This will inform a transboundary water agreement between Kenya and Tanzania, ensuring sufficient flows within and across borders.

MEKONG

Research linked to the impact of dams on sediment flows and migratory fish helped inform policy advocacy work in relation to economic development, as well as WWF's campaign against the construction of two main stem dams on the lower Mekong, which will disrupt the river's natural flow regime.

PANTANAL

The hydrological analysis undertaken as part of the programme identified the sub-basins within the Paraguay river basin that contributed the most significant inputs in terms of run-off volume. Combined with an ecological risk assessment, this analysis of flows helped determine the programme's focus areas.

YANGTZE

Studies were done to determine the environmental flow requirements of species that have high biodiversity value, e.g. waterbirds and the critically endangered Yangtze sturgeon (*Acipenser dabryanus*),³ and of those that are also vital for the economy and peoples' livelihoods, such as carp species.

ASSESSING ENVIRONMENT FLOWS

Methods of assessing environmental flows vary: some are rapid, based on hydrological modelling or extrapolation methods; others are more intensive, involving significant fieldwork and multi-disciplinary specialist teams.¹⁹ An environmental flow assessment should be as much a social process as a technical one: required flows won't be implemented unless people understand the importance of environmental flows and agree that flows should be left in the river. Assessments must include socio-cultural and livelihood aspirations for flows (alongside ecosystem and biodiversity needs) and must involve representatives from different groups that use the river.

WWF-India adapted the holistic Building Block Methodology²⁰ used in other parts of the world to take into account the important cultural and spiritual values of the Ganga and Ramganga rivers. The approach included both social and technical aspects: it asked society to consider what it wanted from the river (for example to support culture, livelihoods and biodiversity), and then conducted technical investigations into past, present and desired river condition to provide hydrological parameters that would support these choices. The approach involved a multi-disciplinary team of scientists and engaged basin stakeholders. Local communities – the Ramganga Mitras (see page 48) – were also involved: river levels and water quality were among the things that Mitras monitored during participatory river health assessments.

Environmental flow assessments should be done as part of an overall flow implementation strategy and as part of water allocation planning to ensure that the necessary agreements (and abstraction rules) are in place to ultimately implement environmental flows. In the Mara river basin, WWF facilitated environmental flow assessments and abstraction surveys as part of the groundwork for a transboundary flow agreement between Kenya and Tanzania. At present, there is no agreement on how much water should flow over the border from Kenya to Tanzania, and there are insufficient mechanisms in place to safeguard environmental flows in both countries. As a result of joint meetings and the critical role played by WWF, a consensus was reached by all key stakeholders on the need to develop a transboundary water allocation plan, rather than separate national ones. In 2015, the governments of Kenya and Tanzania signed an accord on the management of the Mara river basin.

WWF-INDIA ASSESSED ENVIRONMENTAL FLOWS AND COMPLETED A TRADE-OFF ANALYSIS FOR THE RAMGANGA RIVER. THE NEXT STEP WILL INVOLVE ADVOCACY FOR DEMONSTRATING THE IMPLEMENTATION OF ENVIRONMENTAL FLOWS, TO TEST THE FRAMEWORK FOR ENVIRONMENTAL FLOW RELEASES AND MAP THEIR BENEFITS AND COSTS.

CASE STUDY



The Sopheak Mitt waterfall, a few kilometres from the border with Laos, Stung Treng, Cambodia. Over 100 dams are being built and planned within the Mekong river basin, with potentially devastating cumulative impacts on water flows, sediment transport and migratory fish species, and associated ecosystem services. WWF's research on dams is informing policy advocacy work to balance economic development with ecosystem function.

IMAGE: © THOMAS CRISTOFOLETTI / WWF-UK

UNDERSTANDING THE IMPACT OF DAMS

Dams have major implications for environmental flows.¹ Dams profoundly modify rivers' hydrological and sediment dynamics. They cause channel erosion downstream, and nutrients and sediment are kept behind dams and are prevented from reaching downstream rivers and deltas, leading to serious impacts on fluvial and coastal geomorphology. Dams also impede or prevent the migration of fish: this leads directly to the decline and even extirpation of many species.

WWF carried out research to better understand and communicate the impact of dams. This included research into the implications of main stem dams (among other factors) on sediment flows and geomorphology in the lower Mekong as well as research into – and advocacy around – the impacts of a proposed dam where Poyang lake drains into the Yangtze river. For several basins, including the Ganga, Mekong and Yangtze, dams have negative implications for migratory aquatic species, creating genetically isolated populations and blocking migratory feeding and spawning patterns.

Some of the research on species the basins undertook, for example using environmental DNA in the Mekong basin (see page 20), was aimed at better understanding the potential and actual impact of dams and other infrastructure on these species. Multi-partner research, including WWF, also took place in the Yangtze on the impact the existing Three Gorges Dam is having on ecologically- and economically-important species.

WWF STAFF IN THE MEKONG CONTRIBUTED TO RESEARCH AIMED AT BETTER UNDERSTANDING SHORELINE CHANGES IN THE MEKONG DELTA AND ATTRIBUTING THESE TO HUMAN-INDUCED CAUSES OF REDUCED SEDIMENT LOAD IN THE MEKONG RIVER. THESE INCLUDE DAMS AND MINING OF RIVERBED SAND FOR USE IN CONSTRUCTION.

CASE STUDY 

WWF endorses safeguards around the environmental and social impact of dams, a number of which have emerged at the international level in the last decade or more. These include the [World Commission on Dams guidelines](#) and the [Hydropower Sustainability Assessment Protocol](#) (HSAP), a tool to benchmark the sustainability of a hydropower project. The pressure exerted by such safeguards obliges dam developers to improve their social and environmental procedures and performance. WWF used HSAP and the [Rapid Basin-wide Hydropower Sustainability Assessment Tool](#) (RSAT) in the Mekong. Civil society in Vietnam, having been trained by WWF on the use of these tools, gained better understanding of the challenge surrounding hydropower. WWF also worked to improve the operation of existing dams so that they can deliver environmental flows downstream (see page 35).

KEY INSIGHTS

- Environmental flow assessments are only the first step of a wider process and should ultimately contribute to achieving the implementation of environmental flows. Assessments and their follow-up require long-term funding and technical support.
- Above all, environmental flow assessments should be a social process: reaching the implementation goal requires understanding of the rationale for and importance of environmental flows on the part of river basin stakeholders. Success is more likely if environmental flow implementation is embedded in river basin management and water allocation processes and if stakeholder support is mustered through engaging them in decision-making and highlighting the importance of environmental flows in delivering societal benefits.
- Although the positive and negative impacts of dams on the environment have been well-researched on a global level, there remain basin- and site-specific knowledge gaps regarding the impacts of dams on sediment loads and migratory species, for example. WWF carried out research to help fill some of these gaps with the aim of informing advocacy as well as programme planning.
- Understanding the factors underpinning dam-related decision-making (e.g. those linked to the political economy) is also critical.

ENVIRONMENTAL FLOWS SECURED

While environmental flow assessments help determine what flow regimes are needed to achieve certain river conditions, implementing environmental flows is about actually getting water to flow down the river at the desired volume and time. Implementation of environmental flows, requiring multi-stakeholder and political buy-in, is the more important but also the more challenging task of the two, which explains why assessment of environmental flows is far ahead of implementation worldwide. The political nature of decisions about water allocation is likely to be the main reason why environmental flow allocations have yet to be implemented in many parts of the world.²¹

Implementation of environmental flows is in its early stages in the Yangtze and the Ganga river basins. Demonstrations took place, as the teams worked with dam operators to incorporate the release of environmental flows into the operational procedures for water infrastructure, but further monitoring is needed to assess the impact of these tests and refine the methodologies. WWF also worked to consider flow regimes, and the human activities that might impact these, on a wider basin scale.

CONSIDERING FLOW REGIMES AT A BASIN SCALE

The most effective way of achieving environmental flows implementation is to embed the process within river basin planning and management, which should balance the use of the river with its protection.¹⁹ This requires: a basin-scale understanding of where the priorities lie for protection and what the water use needs are; basin-scale planning and operation of water infrastructure; a comprehensive water allocation regime; and regulations for water use and discharge that are properly enforced.

Examples of where WWF took this basin-scale approach to environmental flows include the Mara and the Pantanal. Conservation measures under the Pantanal Pact included spring protection and on-farm soil management, which will help regulate the flows of the Paraguay river’s headwater streams that provide 30% of the flow to the Pantanal wetland – thereby helping to maintain its natural flow regime.⁵ In the Mara, we sought to consider flows for the entire river basin by taking a transboundary approach to water allocation, with the involvement of both Kenya and Tanzania.



The Three Gorges Dam, Hubei province, China. More than two kilometres long, it is the world's largest dam in terms of installed capacity. Since 2011, WWF has been working with the dam's operating company to ensure environmental flows are released from the dam at critical times of the year for the spawning of four species of carp.

IMAGE: © WWF-UK

In terms of water infrastructure planning, our approach has been to investigate and promote alternatives to dam development, such as alternative sources of renewable energy and measures to manage water and energy demand. Where dam building has been identified as the best option for meeting development objectives, we then advocate for the strategic planning of multiple dam projects at the system scale. Where dams already exist, we are promoting assessment of them at the basin scale, and operation of infrastructure to optimise benefits and reduce impacts. Consideration of multiple projects is important because although water infrastructure projects are often executed individually, their impacts (and benefits) are cumulative.²² WWF staff from the Mekong team were involved in studies linked to the system-scale planning of dams. In addition, the 'Mekong River in the Economy' work (see page 60) also took a basin-scale approach to economic development and water resources management.

IMPLEMENTING ENVIRONMENTAL FLOW RELEASES

WWF teams worked to improve the operation of dams so that they release environmental flows at critical times for freshwater ecosystems while maintaining their hydropower generation, flood protection and irrigation functions.

We have been working with the Yangtze Three Gorges Dam's operating company (and other partners such as research institutes) since 2011 to ensure environmental flows are released from the dam at critical times of the year for the spawning of four species of carp. This approach is also beneficial for the dam operators, as it allows flushing of sediment that has built up behind the dam and would otherwise hamper operations. Monitoring of the six environmental flow tests conducted has shown carp egg and fry numbers have reached record post-impoundment levels. In October 2015, the government included carp spawning as one of the dam's main functions, along with flood control and hydropower generation, within its operating regulations. Further collaboration and testing is required to optimise the dam's operation for the conservation of sturgeon, waterbirds and wetlands, among other things. Following a previous programme where more than 50 lakes were reconnected to the Yangtze river by opening sluice gates, WWF has also been working to ensure the Tian-e-Zhou oxbow's sluice gate is operated in a way that improves water quality for the Yangtze finless porpoise.

WWF-India's ongoing work on flows builds on a demonstration of environmental flows during the 2013 Kumbh Mela, a socio-cultural festival that attracted millions of people. At the festival, WWF was able to monitor the results of the practical demonstration.

WWF-India also ran a water-use efficiency pilot within farms that irrigate their land using water diverted from the Ramganga river into a network of canals. We aimed to show that, through a package of agricultural techniques including water-use efficiency, it is possible to increase yields while using less water. We aim to use the findings from this pilot to feed into a planned environmental flows demonstration in the Ramganga river, by showing government authorities how less water can be diverted from the river to the irrigation canals. The process proved challenging, particularly given the extent of existing committed water uses and the political economy of water in Uttar Pradesh state. In addition, there are challenges linked to irrigation water-use efficiency more generally, given the lack of evidence that such interventions reduce overall water consumption – and indications that they may actually increase consumption.²³

WWF-INDIA - WITH THE PARTICIPATION OF STAKEHOLDERS - CONDUCTED A RAPID ASSESSMENT OF THE FLOWS REQUIRED TO MEET PEOPLES' SOCIO-CULTURAL ASPIRATIONS DURING THE KUMBH MELA FESTIVAL, AS WELL AS BIODIVERSITY NEEDS. FOR OVER 90% OF THE KUMBH'S DURATION, THE ACTUAL FLOWS MET THE RECOMMENDED AND DESIRED FLOW LEVELS.

CASE STUDY

KEY INSIGHTS

- It is better to demonstrate environmental flows in practice than to spend significant time conducting assessments and WWF should take advantage of opportunities to restore and demonstrate river flows. Even if only temporary, such demonstrations can help decision-makers and stakeholders understand the practicalities of the trade-offs involved.
- Especially in over-allocated rivers, implementation of environmental flows requires difficult decisions and actions, such as reducing water use or building additional storage.
- Critical to the successful implementation of environmental flows is sufficient stakeholder participation in setting flows, to raise awareness of their benefits and secure buy-in for achieving them.
- Environmental flows need to be embedded in the larger context of strategic basin management as their implementation will require a multi-sectoral, multi-disciplinary approach.
- The operations of existing dams can be changed to achieve environmental flows. Good monitoring is absolutely essential when environmental flows are demonstrated in order to understand effects and inform planning of future flow releases.
- Approaches that support the strategic planning of multiple dams in a river basin help to achieve a broader range of benefits to society.

WATER QUALITY TACKLED AT SOURCE

While maintaining or restoring environmental flows can also play an important role in preventing further concentration of pollutants in receiving waters (particularly in the short term), pollution should ideally be managed at source.

Water quality is primarily affected by point-source (i.e. identifiable source) and nonpoint (diffuse) pollution, which comes from a wider area and for which sources are harder to identify. The five HSBC Water Programme basins addressed point-source pollution mostly originating from industry, as well as diffuse pollution primarily from agriculture and aquaculture.

APPROACH TAKEN BY THE BASIN PROGRAMMES

GANGA	WWF worked with partners to address some of the many causes of poor water quality. These include pollution from the metalware and leather sectors, which discharge effluent high in acids, heavy metals, cyanides and organic pollutants, as well as pollution from agriculture and urban areas.
MARA	Pollution from hotels and lodges as well as small and medium-sized gold mines impacts water quality in the Mara river basin. WWF worked with both sectors to help reduce this impact and also worked with hundreds of small-scale farmers to reduce soil erosion and the run-off of agrochemicals.
MEKONG	Pollution from chemical fertilisers and untreated sewage is polluting Thailand's Bueng Khlong Long reservoir. WWF helped set up a water management committee made up of local villagers which monitors water quality. And we're working with farmers and villagers to improve practices and reduce pollution.
PANTANAL	Agriculture-related deforestation and ensuing soil erosion, as well as the lack of adequate urban sanitation, are the primary water quality challenges in the Pantanal headwaters. The Pact partners helped farmers restore degraded springs and municipalities improve wastewater treatment.
YANGTZE	Much like the Ganga, the vast Yangtze river basin suffers from many different types of pollution. As part of the HSBC Water Programme, WWF tackled diffuse pollution primarily from aquaculture and agriculture and point-source pollution primarily from industrial sources such as the textile and dyeing sector.

TACKLING POINT-SOURCE POLLUTION

Although it is somewhat easier to locate the origin of point-source pollution – compared with diffuse pollution – addressing it can also be challenging. For instance, the pollution can originate from many small sources. This is the case in Tanzania, where small-scale miners use cyanide and mercury as part of the gold extraction process, with a cumulative impact on the river and the Mara wetland downstream.

Similarly in India, WWF’s efforts to encourage the uptake of cleaner production in the metalware and leather tanning sectors were complicated by the often small scale of industrial units, down to ‘micro’ businesses (essentially household units). There, WWF’s approach combined cleaner technology pilots with training workshops, awareness raising, direct engagement and advocacy work with buyers and green finance scheme providers (see page 55).

The establishment of mechanisms that facilitate collective engagement in water stewardship initiatives (see page 53) is more effective than working with individual companies, particularly for industrial sectors with many micro, small and medium enterprises. WWF-China focused on industrial parks: these cluster together enterprises that share a single wastewater treatment plant and are headed by a committee that monitors compliance of each facility’s effluent with standards. As such, industrial parks are an ideal platform for collective action.

In many countries, the main problem is not a lack of regulations controlling effluents, but rather a lack of enforcement. In the Mara for instance, hotels were shown to not be compliant with existing standards for effluent discharge, providing an inroad for WWF to promote the construction of wetlands for natural wastewater treatment. Regulatory environments also sometimes challenged our ability to implement sustainable solutions to water management.

Although WWF’s efforts to control point-source pollution primarily focused on industries, several initiatives also sought to reduce the impact of pollution from urban areas. For example, WWF-India prepared an integrated urban water management framework for Moradabad, which aims to reduce the pollution load from the city. In Brazil, WWF helped put in 40 bio-septic installations to reduce pollution from untreated sewage while also providing organic fertiliser for local farmers. These tangibly demonstrated to local stakeholders some of the actions that can be taken to reduce impacts on the environment as well as local peoples’ health.

THE RAMGANGA RIVER IS PARTICULARLY POLLUTED DOWNSTREAM OF MORADABAD, IN PART DUE TO LARGELY UNTREATED EFFLUENT DISCHARGE FROM THE CITY’S METALWARE SECTOR. TO REDUCE POLLUTION FROM THE SECTOR, WWF PILOTED A COUNTER-CURRENT PROCESS FOR RINSING THE METALWARE, COMBINED WITH SMALL-SCALE EFFLUENT TREATMENT PLANTS.

CASE STUDY

ADDRESSING DIFFUSE POLLUTION

Precisely because it is diffuse, non-point pollution is hard to tackle; this is even more the case in areas where landholdings are small or where there are numerous small-scale aquaculture units, multiplying the number of producers whose practices have to be changed. Where the HSBC Water Programme basins primarily worked to reduce diffuse pollution (namely parts of the Mara, Ganga and Yangtze river basins) arable and fish farming tends to be small-scale. For example, in the Mara river basin, the area farmed per family unit is 0.8 hectares. In the Mara and Pantanal, WWF sought to reduce soil erosion on farms, since sedimentation is the primary issue in these river basins (see page 40).

Though focused on agriculture and aquaculture respectively, the approaches followed in the Ganga and the Yangtze programmes had some similarities. Both chose simple and cost-effective methods that used locally-available know-how, materials and techniques and could also rapidly demonstrate effectiveness. In China, standards for aquaculture built on existing good practices within aquaculture companies and cooperatives, among other things. In India the climate-smart agriculture practices were based on expert recommendations. Both programmes also focused on creating pilot programmes for training and uptake of improved methods by farmers, to show their effectiveness via demonstrations, including peer-to-peer.

Both the Yangtze and Ganga programmes sought to scale up the impact of the pilot programmes. In China, WWF partnered with several city- and county-level fishery bureaus to deliver training based on the new standards, reaching over 73,000 aquaculturists. We also sought to work with the Yangtze Fishery Administration Office to achieve impacts at a basin-wide scale. In India, we presented a set of climate change adaptation recommendations – based on experiences in 39 pilot villages – to district administrations for inclusion in their district plans. To date, one Uttar Pradesh district has included the bulk of our recommendations and two districts are considering them.

WWF ADOPTED A MULTI-PRONGED APPROACH TO ADDRESS THE CHALLENGES POSED BY THE BOOMING AQUACULTURE SECTOR IN THE YANGTZE RIVER BASIN. WITH OUR PARTNERS, WE DEVELOPED AND PROMOTED A SERIES OF INTEGRATED PRACTICES AND STANDARDS FOR AQUACULTURE AND ALSO CONNECTED PRODUCERS WITH RETAILERS AND CONSUMERS.

CASE STUDY

REDUCING EROSION THROUGH LAND MANAGEMENT

Teams from several HSBC Water Programme basins helped farmers reduce soil erosion through improved land management. Indeed, sediment can be considered a pollutant when its production rate exceeds that originating from natural erosion processes.²⁴ This is the case in both the Mara river basin and the Pantanal wetland. Soil erosion and land degradation have a negative impact on freshwater species and ecosystems. They change flow regimes by creating more run-off and increased peak flows, and affect downstream water quality for drinking or industrial uses (e.g. small hydropower dams). They also have an impact on soil productivity on the farms themselves.

In both basins, we tried to establish these land management activities as Payment for Ecosystem Services (PES) schemes. Ecosystem services are benefits derived from the environment, and include supporting (e.g. soil formation, nutrient cycling, etc.), provisioning (e.g. food and water supply, etc.), regulating (e.g. climate regulation, water purification, etc.) and cultural services (e.g. for recreation, spiritual activities, etc.).²⁵ In the context of river basins, PES schemes use funds provided from water users (including governments) as an incentive for land users to improve their land management practices and therefore deliver improved freshwater outcomes such as improved water quality and flow.²⁶

In the Mara, we helped more than 500 farming families take up soil and water conservation measures in sub-catchments identified as key soil erosion hotspots (confirmed by a sediment coring study²⁷). To scale this work up, we worked to establish a direct incentive mechanism linking the farmers to downstream beneficiaries – for example, a hospital that would benefit via the reduced maintenance costs for its small hydroelectric dam.

In the Pantanal headwaters, we enabled the delivery of land management improvement projects in two municipalities. The aim is that these will be PES projects funded by Brazil’s National Water Agency (ANA) through its Water Producers Programme, whereby ANA provides funding to contribute to establishing a sustainable incentive scheme for riparian vegetation preservation and restoration in recognition of the societal benefits created by preserved water flows and quality.

AS PART OF THE PANTANAL LAND MANAGEMENT INITIATIVE, FARMERS FENCED OFF SPRINGS FROM CATTLE ACCESS AND REPLANTED NATIVE VEGETATION. TO DATE, 70 SPRINGS HAVE BEEN RESTORED AS PART OF THE SCHEME AND 81 FARMERS HAVE BEEN INVOLVED.

CASE STUDY

KEY INSIGHTS

- Collective action offers an opportunity to overcome the technical and logistical challenges linked to having multiple small industrial point sources of pollution.
- WWF’s focus on simple and cost-effective methods, using local ingredients or materials and often based on local knowledge, drove uptake of improved arable and fish farming practices, as did the emphasis on tangible benefits for producers.
- Pilot programmes were able to reach thousands, particularly if accompanied by peer-to-peer training and influencing. However, in order to achieve meaningful river basin-level upscaling, policy advocacy and partnerships with the public sector are essential. Partnerships with technical institutes and umbrella industrial bodies help reach more producers and promote effective methods.
- The long-term sustainability of PES schemes is still uncertain, particularly when they depend on finite funding, or where demonstrating immediate benefits to downstream river users is challenging. However, initial indications are that WWF’s support for farmers in reducing soil erosion and chemical run-off successfully demonstrated to farmers the cost-effectiveness and on-farm benefits of such approaches, suggesting that funding from downstream beneficiaries may not actually be required.

IN SUMMARY: ENVIRONMENTAL FLOWS AND WATER QUALITY

A recurring theme throughout WWF's freshwater work (and this part of the report) has been the need to involve stakeholders, including (crucially) the public sector but also a wide range of other actors, in environmental flow assessments and efforts to restore flows. Indeed, what may at first glance seem like a purely technical process is ultimately one that has to be grounded in the social sphere or else risk never moving beyond theoretical exercises. Similarly, initiatives aimed at reducing point-source and nonpoint water pollution require involvement from the wide range of stakeholders who are involved in creating the pollution and can take steps to address it.

As such, this part of the report on environmental flows links well to the following one about water governance – including its section on multi-stakeholder processes, basin-scale management and policy advocacy, which is often underpinned by research undertaken to better understand environmental flows and water quality and the impact of human activities on them.

Farmer Nancy Rono collects fodder for her cow in Bomet County, Kenya. Nancy is one of hundreds of farmers whose land management practices WWF has helped to improve in the Mara river's upper catchment. Techniques have included fencing off springs, planting ground cover crops, contouring steep slopes and planting napier grass buffer strips, which have the advantage of being drought resistant.

IMAGE: © JONATHAN CARAMANUS /
GREEN RENAISSANCE / WWF-UK



PART 3: IMPROVING WATER GOVERNANCE

There are too many definitions of water governance to list. Broadly speaking, these mention political, social, economic and administrative systems and processes, as well as the formal institutions and informal arrangements (and the relationships between these) that are involved in the process of dealing with water resources and services. Definitions also mention that governance isn't synonymous with government, politics, policy or management, although these form part of it.^{28 29}

Of perhaps more interest than definitions are the emerging discussions about the principles of water governance and the indicators that allow progress in this arena to be measured. The OECD's water governance principles – to which WWF is a signatory – are clustered according to efficiency and effectiveness as well as trust and engagement. They pick up on growing calls for transparency and accountability as well as the involvement of non-state actors in decision-making.³⁰

WWF's work on water governance as part of the HSBC Water Programme mirrors the vast and all-encompassing nature of the topic. It also reflects how our approaches support the OECD water governance principles, for example in terms of managing water at appropriate scales, encouraging cross-sectoral coordination, building the capacity of responsible bodies, adopting innovative governance practices and promoting stakeholder engagement. This part of the report details WWF's work on: multi-stakeholder initiatives, including with the private sector; the management and use of rivers; and influencing decision-making via policy advocacy.

STAKEHOLDERS WORKING TOGETHER

Typically, multi-stakeholder partnerships (MSPs) bring stakeholders from several sectors together to work on a common problem. Timespans vary, as do the degrees of structuring and formalisation.³¹ MSPs formed an integral part of the work in each of the five basins included in the HSBC Water Programme. However, the diversity of the challenges faced by the different basins, the differences between their stakeholders and the unique political, economic and societal circumstances within the basins meant that each approached MSPs in a different way. Some MSPs operated at local scales while others were national-level. For all of the basin programmes, the key building blocks were: involving the right actors, building stakeholder capacity and creating legitimacy for the MSPs.

THE WATER OBSERVATORY, WHICH WWF INITIATED, BROUGHT TOGETHER 50 KEY INSTITUTIONS AND COVERED 20 OF BRAZIL'S 26 STATES. IT AIMS TO BE AN EVIDENCE-BASED, SOLUTIONS-LED AND PARTICIPATORY MECHANISM FOR ASSESSING THE EFFECTIVENESS OF WATER GOVERNANCE IN BRAZIL, BASED ON A BESPOKE SET OF OBJECTIVE INDICATORS.

CASE STUDY

APPROACH TAKEN BY THE BASIN PROGRAMMES

GANGA

Mitras (friends of the river) are an MSP that we initiated. Mitras helped protect the Ganga and Ramganga rivers through sustainable farming, awareness raising and biodiversity monitoring, etc. The number of Mitras reached the thousands and they started to become better organised and federated.

MARA

The Mara's local water resource management institutions are legislatively-mandated groups of water users, riparian land owners and other stakeholders operating at sub-catchment level. The programme helped to establish and register associations, built their capacity and strengthened their legitimacy.

MEKONG

WWF started asking stakeholders to collectively address water risk in the Mekong region in order to mitigate the risks and maximise the benefits associated with economic development. In Vietnam, WWF also planned an MSP to strengthen civil society engagement in water resources management.

PANTANAL

Civil society, the private sector and government signed up to the Pantanal Pact, which aimed to protect 747km of the wetland's headwaters. The Pact was created through collaborative consensus between the actors involved, and the Mato Grosso state government started to lead its implementation.

YANGTZE

A multi-stakeholder approach was taken for most of the Yangtze programme's work. The most salient example was the water stewardship work around Tai lake, involving several stakeholders, including companies from key sectors who have an impact on the lake and river, and also depend on them.



Kenyan legislation makes provision for Water Resource User Associations (WRUAs), while in Tanzania the equivalent are Water User Associations (WUAs). The legislation mandates the devolution of water resources management to these water user groups, which bring together key basin stakeholders. WWF helped establish and register associations, built their capacity and strengthened their legitimacy.

IMAGE © KATE HOLT / WWF-UK

KNOWING WHO TO INVOLVE

Some stakeholders have more power than others, whether because of their authority (e.g. government) or their economic influence (e.g. some private sector actors). This needs to be accounted for when setting up and running MSPs. It can be both a risk (for example leading to policy capture^{iv}) and an opportunity. A key first step is stakeholder analysis, which maps actors, their power, influence and the relationships between them, and helps determine intervention points. Engagement strategies need to account for the diversity within groups of actors – for example, the private sector can encompass everything from household workshops to multinational companies.

To be fully effective, MSPs should involve all relevant basin stakeholders.³¹ For the HSBC Water Programme basin teams, private sector engagement was sometimes a challenge (see pages 53-56). Engaging with the public sector can create impacts at scale: for instance in China, strong government support for the Tai lake MSP was central to its success. However, in practice it is not without its challenges. For example, WWF often relies on relationships with elected and unelected government officials who can drive progress forward but whose turnover is high. Institutionalising support helps, but engagement with the public sector is complex and requires constant adaptive management. Similarly, reliance on government funding can slow things down.

Communities need to be involved in MSPs, not least because they live close to rivers, depend directly on them, have an impact on them, and are impacted by their health. Capacity building and empowerment are needed for communities to participate in MSPs effectively, as detailed in the next section.

WWF frequently plays a convening and facilitation role within MSPs. MSPs are fundamental to our ambition to look at water risks and strengthen governance on a river basin scale, by getting actors who live and work in a river basin to work together.

EMPOWERING AND BUILDING CAPACITY

Formal structures can themselves empower MSPs: in the Pantanal, the formation of Pact decision-making bodies allowed the sharing of responsibilities and encouraged collaboration across sectors. Conversely in India, while each Mitra group’s advisory committee has a decision-making function, the Mitras decided not to create formal roles

^{iv} Policy capture occurs when a small (usually powerful) group’s interests dominate and influence policy-making at the expense of other stakeholders’ interests.

‘MITRAS’ ARE FRIENDS OF THE RIVER AND PART OF AN MSP INITIATED BY WWF-INDIA. THESE STAKEHOLDERS COME FROM ALL WALKS OF LIFE: MOST OF THEM ARE FARMERS, DOMESTIC USERS OF WATER, TEACHERS AND STUDENTS. MITRAS VOLUNTEERED THEIR TIME AND UNDERTOOK A NUMBER OF ACTIVITIES SUPPORTING RIVER BASIN CONSERVATION.

CASE STUDY

(e.g. chair, secretary) to avoid unhealthy power dynamics. Aggregation or federation of MSPs is vital to achieve impacts at scale. Kenya’s Water Resource User Associations were established at sub-catchment scale but an umbrella body also enabled them to have influence at the national level.

Empowerment and capacity building help balance power differentials and improve the effectiveness of an MSP. Structured situational analyses of MSP capacity can help plan capacity-building activities according to need; in the Mara basin, the team systematically and regularly assessed the capacity of water user groups.^v Training was then provided on topics including conflict resolution, finance, fundraising, advocacy and institutional capacity to fill gaps. WWF teams also provided MSPs with technical information and skills to create awareness, involve groups in water resource protection, obtain useful data and support advocacy.

Individual MSP members who were particularly engaged and influential – ‘champions’ – were an asset in many of the HSBC Water Programme basins’ MSPs, not least the Ganga. They helped bring new members on board and increase external recognition of the MSP by providing a voice for the movement. Other avenues exist for motivating, empowering and providing incentives to MSPs. In the Mara, public recognition created motivation and provided incentives to take action: awards were given out at the annual Mara Day celebrations. Demonstrating early successes is also important: facilitating tangible river protection actions the Mitras could become involved in (such as clean-up drives or wetland surveys) was a key factor in boosting the momentum of the MSP.

FOSTERING LEGITIMACY AND INFLUENCE

Supportive government policies can help but aren’t a panacea. Kenya and Tanzania’s Water Acts mandate the existence of water user groups but have not necessarily given them the legitimacy and influence that they require. In addition, there is no legal obligation for these governments to support the water user groups financially.

MSPs can help address this problem by bringing legitimacy and influence, particularly at a wider basin or national scale. In particular, by involving varied stakeholders, the MSP can prevent issues being dismissed as marginal, and participation of certain actors – such as the public or private sector, civil society or technical organisations – can even lend the MSP legitimacy. In the Yangtze, partnership with academic institutions

THE MARA’S WATER USER GROUPS ILLUSTRATE HOW TIME-CONSUMING MSP PROCESSES ARE. INITIALLY, IT WOULD TAKE AROUND 13 YEARS FOR NEW GROUPS TO BECOME SELF-SUSTAINING. WITH EXPERIENCE, THE TEAM REDUCED THE TOTAL TIME TO APPROXIMATELY SIX YEARS – A BIG IMPROVEMENT, BUT STILL A LENGTHY PROCESS.

CASE STUDY

^v Kenyan legislation makes provision for Water Resource User Associations (WRUAs), while in Tanzania the equivalent are Water User Associations (WUAs). WWF uses the term ‘water user groups’ to encompass both.

(which often work as trusted advisers to the government) partly came from necessity, because strict controls make this one of the only ways to obtain data. However, it also came from a desire to bring their considerable expertise, rigour and relationship networks to bear.

The Pantanal programme is a perfect example of how an MSP process in itself can bring legitimacy and translate into tangible action. Initially, an ecological risk assessment and hydrological and socio-economic analyses provided a strong evidence base for the targeting of activities. The Pantanal Pact was then created through collaborative consensus by a group of around 70 people from different stakeholder groups, which created buy-in, ownership and trust, and helped convince participants within and outside the MSP of its legitimacy.

CIVIL SOCIETY, THE PRIVATE SECTOR AND GOVERNMENT CREATED AND SIGNED UP TO THE PANTANAL PACT, COMMITTING TO IMPLEMENT ACTIONS TO PROTECT THE WETLAND'S HEADWATERS. SEVERAL SIGNATORY MUNICIPALITIES CREATED NEW LAWS AS A RESULT, DEMONSTRATING THE MSP'S INFLUENCE.

CASE STUDY

KEY INSIGHTS

- MSPs are particularly vital for water resources management, given the grave challenges facing freshwater ecosystems, the multiplicity of actors who have an impact on them – and are impacted by them – and the shared nature of water risks.
- Knowing who to involve in an MSP is vital; stakeholder analysis enables engagement strategies to account for actors' diversity. Some stakeholders have more power than others: this can be a risk but also an opportunity, as in the case of WWF's convening power. Public sector engagement can create impacts at scale but also has drawbacks.
- Legislation doesn't necessarily create space for MSPs in decision-making. Structuring MSPs can help foster empowerment, legitimacy and influence.
- Capacity building avoids setting less empowered groups up for failure and is particularly important for communities, who should be key MSP members. Empowering some doesn't necessarily mean taking power away from others.³¹
- Quick wins, public recognition, and the involvement of 'champions' can bolster MSP membership, motivate stakeholders and demonstrate successes. Evidence, technical partnerships, and demonstrating results also legitimise MSPs.
- Expectations should realistically reflect the time needed for MSPs to be self-sustaining.

Pied Avocets (*Recurvirostra avosetta*) in flight.
East Dongting Lake, Hunan Province, China.

IMAGE © WWF-CANON / YIFEI ZHANG





A decorative metalware item is rinsed in Moradabad, Uttar Pradesh, India. WWF helped metalware production units adopt cleaner production practices, including a counter-current rinsing method that reduces effluent volumes.

IMAGE: © THOMAS CRISTOFOLLETTI / RUOM FOR WWF-UK

COLLECTIVE ACTION WITH THE PRIVATE SECTOR

Businesses face physical, regulatory and reputational (and ultimately financial) water risks.³² Physical risks include poor water quality for processes and insufficient supply. Regulatory risks can for example be linked to inconsistent regulation or unanticipated changes to regulations. Reputational risks happen when businesses are linked to the impacts of poor management practices. WWF's water stewardship framework encourages the private sector to take part in collective action as one of the responses to these risks. Collective action means companies think

beyond their own operations and supply chains and engage with other stakeholders to improve the governance and management of shared water resources – and, by doing so, reduce the associated risks for all stakeholders.³²

This section highlights the work we have done with the private sector in terms of inclusion within multi-stakeholder initiatives, installation of green technologies and training on sustainable practices, as well as larger-scale efforts to look at private sector water risk from basin scale and international perspectives.

APPROACH TAKEN BY THE BASIN PROGRAMMES

GANGA

The focus was on the metalware and leather sectors in two major production centres, working with often very small enterprises. In addition to implementing cleaner technology, the programme used international leather buyers to leverage change and started working with financial institutions.

MARA

WWF linked small-scale farmers with local companies and started helping gold mines in Tanzania relocate or improve their production practices. In addition, several hotels and lodges constructed wetlands that naturally treat their effluent before it is released into the Mara river.

MEKONG

WWF's aim is for the private sector to take direct action to improve practices, as well as to work collectively to influence governments in the region, in response to the shared and growing nature of water risks as well as the continuing drive for economic growth.

PANTANAL

The main impact that the private sector has on water resources is through agriculture, primarily cattle ranching as well as large soy and sugarcane plantations. One of the country's largest producers of ethanol and sugar signed up to the Pantanal Pact, but engagement with other producers remained elusive.

YANGTZE

Whether it was improving practices within aquaculture companies, leveraging international brands for cleaner production in their supply chains or working with multiple companies at the industrial park scale, work with the private sector was strongly embedded within the programme, as detailed in this section.

INTEGRATING THE PRIVATE SECTOR WITHIN MSPS

In all the river basins WWF worked in as part of the HSBC Water Programme, many key stakeholders are from the private sector: their activities have a major impact on water quality and flows and they also indirectly or directly depend on these. As such, it was imperative for multi-stakeholder initiatives to include private sector actors.

The private sector was involved in the basins’ MSPs in different ways: a company signed up to the Pantanal Pact, while many industrialists became Mitras in India; in China, collective action was piloted in a textile industrial park. WWF worked with the private sector at a variety of scales: within particular companies, industrial parks or sectors (e.g. agriculture, industry and aquaculture) to improve production practices; nationally or regionally, highlighting the importance of water in the economy; and using the leverage of international supply chains and finance mechanisms.

IMPLEMENTING SUSTAINABLE PRACTICES

Water stewardship often (but not always³²) starts with a private sector actor making its own operations more sustainable. Several basin teams in the HSBC Water Programme included activities aimed at improving the practices of specific companies, industries or sectors. In the Mara basin, WWF helped specific private sector actors reduce their environmental impact through the promotion of sustainable practices. For instance, several hotels constructed wetlands to treat their wastewater, while more than 500 small-scale farming families implemented erosion control measures on their farms to reduce the river’s sediment load. Several aquaculture companies within the Yangtze basin implemented sustainable aquaculture standards that were created largely based on their own know-how.

Several of the programme basins’ water stewardship initiatives focused on micro, small and medium enterprises (MSMEs). MSMEs represent a critically important sector to work with. They account for the largest proportion of industrial operations and are collectively major users and polluters of water. But, individually, they have the least capacity and resources to allocate to improving their environmental performance and engaging with water stewardship.

IN THE YANGTZE, WORK WITH SMES CENTRED ON THE TAI LAKE BASIN NEAR SHANGHAI, WHERE WE TOOK A COLLECTIVE ACTION APPROACH AND FOCUSING ON INDUSTRIAL PARKS (LOCALISED ENTERPRISE CLUSTERS). WE WORKED IN PARTNERSHIP TO PILOT CLEANER PRODUCTION WITHIN A TEXTILE AND DYEING INDUSTRIAL PARK.

Success factors for the MSME work included building a business case that was responsive to the MSMEs’ priorities, offering solutions and working with business networks or associations to help develop trust-based relationships. In the Ganga basin, we focused on working with MSMEs within the metalware and leather tanning sectors, both of which discharge highly polluting effluent.

LEVERAGING THE PRIVATE SECTOR’S INFLUENCE

In several instances, the HSBC Water Programme basin teams looked beyond their river basin, their region and sometimes even their country in order to leverage change. WWF mapped the leather and metalware supply chains for several locations within the Ganga basin to identify major buyers and better understand the sectors’ functioning. The team then started working with major leather buyers in developed countries to positively influence the practices of their local suppliers in India: we established a platform for the international buyers to coordinate collective efforts to reduce water pollution and water risks in their Indian supply chains.

This is a novel approach for WWF and could be a model for other areas with which multinational business sectors have important supply chain links. A caveat is that multinational buyers can’t always mandate changes from their local suppliers, as some may be powerful in their own right; suppliers themselves need to be convinced of the economic benefits of cleaner production.

Financial institutions are another leverage point for promoting water stewardship within the private sector. Public and private financial institutions can influence production practices via their lending policies and can provide the financial support companies need to invest in cleaner technologies. For MSMEs, the implementation of water stewardship projects can be particularly challenging: banks and other financial institutions often associate MSMEs with high financial risk, so it can be difficult for them to obtain affordable loans. They are thus in particular need of support from innovative financial mechanisms.

SUPPLY CHAIN MAPPING ALLOWED WWF TO IDENTIFY THE MAJOR INTERNATIONAL COMPANIES BUYING LEATHER FROM IN AND AROUND THE CITY OF KANPUR IN INDIA. A BUYERS’ PLATFORM WAS THEN ESTABLISHED TO COLLECTIVELY LEVERAGE CHANGE WITHIN LOCAL SUPPLYING COMPANIES.

In India, we were actively engaged in advocacy work with green finance scheme providers in relation to our work on leather tanneries. Many government-operated green finance schemes could be better utilised by tanneries if they were more aware of their existence and better able to access them. We aimed to increase understanding among green finance scheme providers of the needs of local industry, to achieve corresponding improvements in the design and relevance of new schemes for MSMEs.

KEY INSIGHTS

- Engagement with the private sector must be based on dialogue and collaboration, rather than one-way information transmission. Collective action seeks to integrate the private sector within multi-stakeholder governance initiatives.
- MSMEs are critically important to work with. They account for the largest proportion of industrial operations and are collectively major water users and polluters. However, individually, they are the least able to improve their environmental performance.
- Understanding private sector actors’ priorities helps tailor approaches. It is essential to develop a strong business case that outlines benefits, payback periods and returns on investment. A focus on solutions is also vital, as is creating ownership within the private sector, which shouldn’t see environmental problems purely as a governmental responsibility.
- Working with local business networks or associations, such as chambers of commerce, can help develop trust-based relationships with companies. Local business models, such as industrial parks, can provide an avenue for and maximise the reach of water stewardship initiatives.
- Non-local actors, such as international buyers or financial institutions, can be leveraged to support the implementation of local water stewardship projects.

THE MANAGEMENT AND USE OF RIVERS

Much as developing a strong business case for sustainability is required to get the private sector on board, governments also need to understand the benefits of integrated, equitable and sustainable management of rivers. The HSBC Water Programme basin programmes encouraged governments to take a basin-scale approach to river management. WWF teams also undertook research aimed at focusing interventions within key target areas and at highlighting the interconnections between rivers and human societies. These approaches are detailed in this section of the report.

Framing river management and use around basin-scale, benefits-led and evidence-based approaches is important for better engagement of decision makers. We identified this engagement as key to meeting conservation objectives. Some of the policy influencing activities that took place as part of the HSBC Water Programme are detailed on pages 62-65.

APPROACH TAKEN BY THE BASIN PROGRAMMES

GANGA

WWF created a river basin management plan for the Ramganga, which is a 20-year plan for its development, management and conservation. In it, we and other stakeholders set out a vision for the future of the basin and an action plan for reaching the necessary objectives.

MARA

WWF initiated a multi-stakeholder process to produce the river’s first transboundary water allocation plan, based on evidence from abstraction measurements. The aim is for the plan’s implementation to reduce the risk of future over-abstraction of water in key target areas within the Mara river basin.

MEKONG

WWF commissioned a study to quantify and characterise the economic dependence of the lower Mekong region’s countries on the river. The study will be used as an advocacy tool, demonstrating to the public and private sector the need for sustainable and integrated regional planning and development.

PANTANAL

The policy advocacy approach and geographical focus of the Pantanal Pact were based on a strategic assessment. Analyses identified the most vulnerable headwaters and those contributing the most significant flows to the Pantanal wetland, confirming the need for a basin-wide governance approach.

YANGTZE

WWF worked to influence many stakeholders and policy platforms within the Chinese government to push for integrated and sustainable water management within critical areas. Influencing of decision-making took place at all levels, from counties to economic development zones to the national level.

MANAGING RIVERS AT THE BASIN SCALE

The HSBC Water Programme basin programmes considered habitats, flows and governance at a river basin scale, following hydrological boundaries. Several programmes operated within a wider WWF landscape scale. For instance, WWF-Kenya and WWF-Tanzania’s work in the Mara river basin was included under our transboundary Mau-Mara-Serengeti landscape programme, which focuses on forests and flagship species as well as water. Following a landscape approach enables us to establish effective ecological networks as well as to consider issues (e.g. water use needs) holistically within geographically-defined areas.

Several programmes also focused on improving overall river basin management. The ‘Mekong River in the Economy’ report (see page 60) looked beyond political boundaries by taking an integrated view of development and governance in the lower Mekong region. In the Mara river basin, WWF helped water user groups develop sub-catchment management plans, which analyse and address water resource issues in an integrated manner, through the lens of the entire sub-catchment.

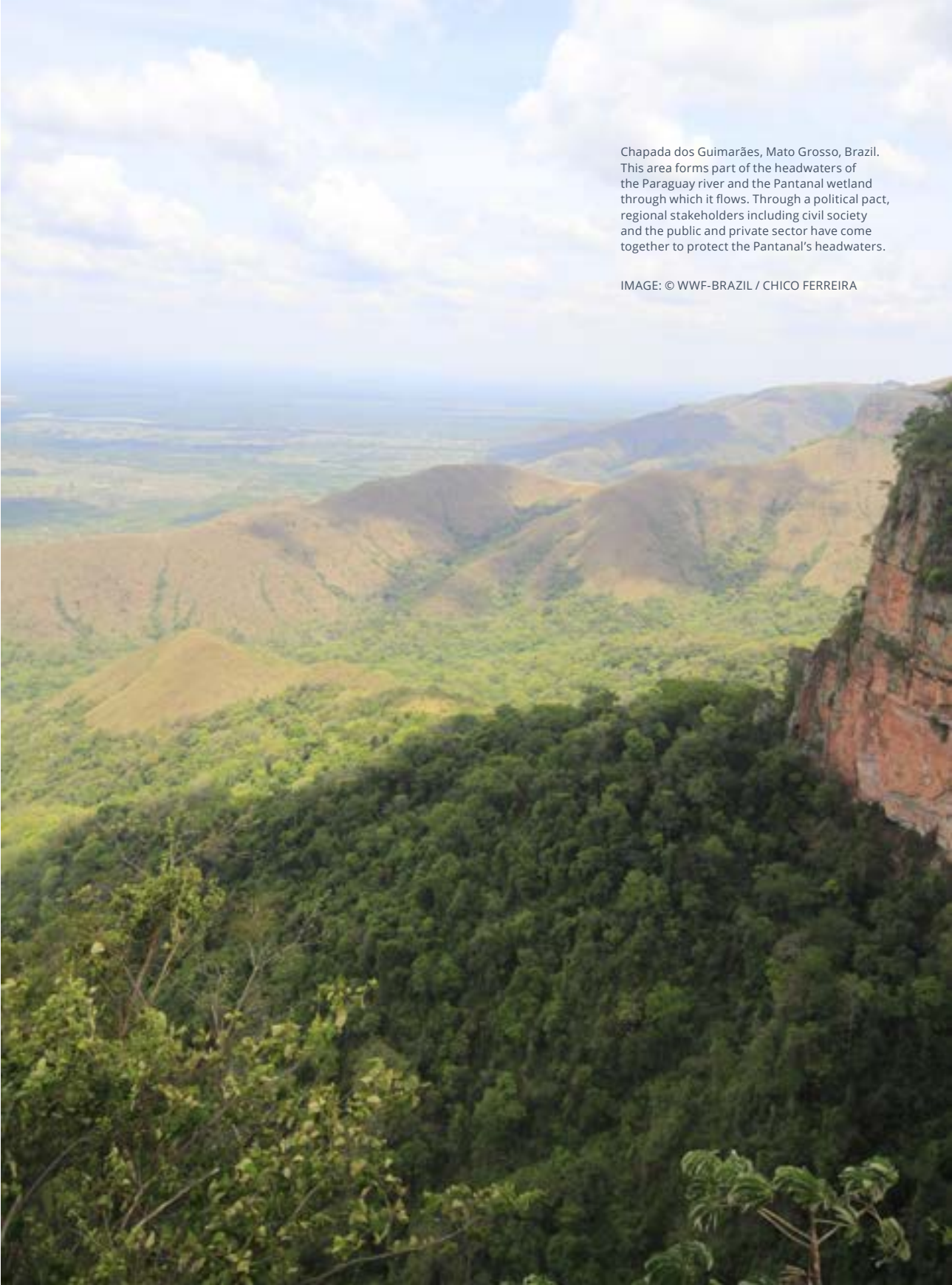
At the time of writing, WWF-India was in the advanced stages of creating a river basin management plan (RBMP) for the Ramganga river, following extensive stakeholder consultation. The RBMP describes the current status of the basin and the challenges facing it. It also describes a vision for the future of the basin, supporting goals and objectives as well as a strategy and action plan for reaching these. Finally, WWF-China worked with academic and government partners to roll out the adoption of an integrated river basin management model in Dongting lake and the Chishui river.

BENEFITING FROM HEALTHY RIVERS

Research undertaken as part of the HSBC Water Programme sought to help strengthen the argument for protecting rivers by demonstrating the link between healthy rivers and the benefits these afford human societies. Evidence pointed to the wide array of social, economic and strategic benefits rivers provide, with infrastructure and institutions determining provision of and access to benefits, in turn shaped by power and politics. Lack of integrated planning can cause rivers to be managed to deliver a narrow range of benefits, with associated negative impacts on river health and human societies. An example is rivers managed for hydropower generation, focusing on water flows rather than quality and failing to consider the benefits of fisheries and sediment transport.³³

THE RAMGANGA RBMP IS A LONG-TERM PERSPECTIVE PLAN FOR THE INTEGRATED DEVELOPMENT, MANAGEMENT AND CONSERVATION OF THE BASIN'S WATER RESOURCES. PREPARED BY WWF, IT FOLLOWS GUIDELINES FROM THE GOVERNMENT OF INDIA AND IS CONSISTENT WITH THE EXISTING GANGA RBMP.

CASE STUDY



Chapada dos Guimarães, Mato Grosso, Brazil. This area forms part of the headwaters of the Paraguay river and the Pantanal wetland through which it flows. Through a political pact, regional stakeholders including civil society and the public and private sector have come together to protect the Pantanal's headwaters.

IMAGE: © WWF-BRAZIL / CHICO FERREIRA

As part of the review of the evidence base for the links between healthy rivers and societal benefits, WWF and the Overseas Development Institute (ODI) developed a framework that conceptualises the interactions between river health, ecosystem services, societal benefits, and the drivers and pressures that threaten rivers. WWF and ODI field-tested this framework in the Ramganga river basin. Benefits perceived by stakeholders included irrigation, riverbank farming, fishing, bathing, sand mining, and spiritual use. Findings introduced the concept of river health thresholds: as-yet unknown points beyond which stakeholders believe benefits are compromised. These vary depending on the benefit: for instance, many people who use the river as part of socio-cultural rituals felt that this use would continue no matter how polluted the river becomes – a benefit for which there is perhaps no threshold.³⁴

CONSIDERING THE ROLE OF RIVERS IN ECONOMIES

WWF has pioneered the development of ‘Water in the Economy’ narratives that highlight the interconnections and interdependencies between rivers and national or regional economies, demonstrating the economic and social consequences of current and future potential mismanagement. The Mekong river was an ideal study subject, because of fast-paced economic growth in the region accompanied by looming decisions around hydropower development, industrial expansion and fisheries. Moreover, the inability of NGOs to influence the construction of several hydropower dam projects highlighted the need for evidence-based decision-making involving multiple stakeholders. It also highlighted the fundamental need for NGOs to influence political and economic decision-making more effectively, for example via dialogue processes and collective action.

The ‘Mekong River in the Economy’ report, published in 2016, aims to reframe the debate around development and water resource management, guiding policy makers towards an integrated view of development and governance in the region. The report lays out the benefits of integrating planning, highlighting the major risks and opportunities for different sectors, and illustrating how one actor’s development decisions are felt through the entire river system.³⁵ WWF started using this report to lobby the public and private sector for sustainable and integrated regional development.

WWF COMMISSIONED A REPORT³³ PROVIDING AN EVIDENCE BASE FOR THE WIDE RANGE OF SOCIAL (INCLUDING HEALTH AND LIVELIHOODS), ECONOMIC (FOR EXAMPLE ENERGY AND INDUSTRY) AND STRATEGIC BENEFITS (SUCH AS FOOD SECURITY AND CLIMATE RESILIENCE) RIVERS ARE THOUGHT TO PROVIDE TO HUMAN SOCIETIES.

REPORT 

THE ‘MEKONG RIVER IN THE ECONOMY’ REPORT³⁵ HIGHLIGHTS THE RIVER’S CENTRAL ROLE IN THE REGION’S ECONOMY, FOR EXAMPLE IN TERMS OF AGRICULTURE, ENERGY PRODUCTION AND FISHING.

REPORT 

KEY INSIGHTS

- Rivers provide a wide range of social, economic and strategic benefits to human societies. Their management needs to facilitate balanced trade-offs between all benefits rather than focusing too narrowly on certain benefits at the expense of others and of river health.
- Governments need information and evidence to understand the benefits of sustainable and integrated management of rivers. Studies quantifying the interconnections between rivers and political economies can help guide policy makers towards an integrated view of economic development, planning and governance.
- Reaping the benefits rivers can provide is contingent upon how they are governed: the provision of and access to different benefits is influenced by institutions and infrastructure, which are in turn shaped by power and politics.
- Taking a basin-scale approach to river management, including cross-sectoral integration, equitable water allocation and a focus on a wide range of uses, is central to maximising the benefits rivers can provide to society. Transdisciplinary research helps inform river basin management; in a time- and resource-constrained environment, it can also allow programmes to focus in on the most critical parts of a river basin.

ADVOCACY AND POLICY INFLUENCING

WWF used policy influencing – whether through partnerships with or direct influencing of decision-making bodies, or indirectly by leveraging the power of others – to promote improved water resources management as part of the HSBC Water Programme.

CREATING TRANSFORMATIONAL PARTNERSHIPS

Worldwide, WWF often enters into partnerships with other actors with the expectation that they will lead to large-scale transformation, beyond the scope of short-term projects the partnerships might also deliver. WWF has been working in partnership with the General Institute of Water Resources and Hydropower Planning and Design (GIWP)^{vi} in China for several years, supported by HSBC funding.

As part of this partnership, WWF and GIWP undertook a series of reviews of global practice on strategic water management, covering drought and flood risk management, river basin planning, water allocation and river restoration. The guidelines that have emerged from these reviews have been used by GIWP to inform the development of different policy and planning instruments including basin plans and new national technical codes. The potential transformational impact of this ongoing partnership on future water management and governance is significant. WWF is also using the outputs from this project to guide its work in other countries including India, Malaysia, Kenya and Tanzania.

ADVOCATING FOR POLICY CHANGE

WWF used research, evidence from pilot projects and public support as a means of influencing decision-making bodies to adopt, enforce and strengthen laws and policies that promote improved water resource management, often via the multi-stakeholder partnerships detailed on pages 46-50. Advocacy was at the very core of the Pantanal Pact: the 25 target municipalities signed the Pact following a process of raising awareness, demonstrating benefits, mobilising support and – most importantly – creating local ownership. WWF’s securing of state government support for the Pact also contributed to its momentum.

WWF WORKED IN PARTNERSHIP WITH GIWP, AN AGENCY WITHIN THE CHINESE MINISTRY OF WATER RESOURCES, HELPING TO SUPPORT THE AGENCY IN ITS WATER PLANNING ROLE.

REPORTS

^{vi} GIWP is the main technical planning agency within the Ministry of Water Resources and, as such, it draws up the technical codes that guide water planning and management efforts at multiple scales across the country.

In India, we worked with a district administration to incorporate climate change adaptation within its plan. In China, we lobbied the Ministry of Agriculture to get the Yangtze finless porpoise upgraded to its strictest wildlife classification category.

Our policy advocacy doesn’t always achieve its aims, particularly in countries where is little tradition of (or legal structures for) integrating the views of civil society into decision-making. For example, the Mekong River Commission – an intergovernmental body tasked with solving river disputes – failed to integrate the views of civil society organisations into decisions around two main stem dams in Laos, and WWF campaigns were unable to influence the Laos government.

USING THE POWER OF OTHERS

WWF also often uses the power that other actors have to influence decision-making, either in parallel to our own direct policy advocacy efforts or instead of them, if these are not delivering their planned aims. Some examples of this are provided in the report. We plan to use our ‘Mekong River in the Economy’ study (see page 60) not only to continue influencing the region’s national governments but also to help leverage the power of national, regional and international private sector interests to influence policies. In India, the leather buyers’ platform that we initiated (see page 55) aims to provide a mechanism for international companies sourcing from India to collectively lobby authorities and advocate for better governance of water in order to reduce their risk.

In China, we harnessed the strong connection between academia and the government not only as a way of getting access to data but also in order to influence government policies via academic partners, for example through their participation in government fora that WWF doesn’t have access to. This approach was particularly effective in halting work on the proposed Poyang lake dam in 2012-13. In some settings, such as the Pantanal, the general public also has the power to influence decision-making; public communications campaigns help to harness this.

HAVING IMPLEMENTED CLIMATE-SMART AGRICULTURE AND WATER CONSERVATION MEASURES IN 39 VILLAGES IN INDIA, WWF USED THESE EXPERIENCES TO CREATE A SET OF RECOMMENDATIONS ABOUT CLIMATE CHANGE ADAPTATION THAT ONE UTTAR PRADESH DISTRICT ADMINISTRATION SUBSEQUENTLY ADOPTED.

CASE STUDY

A COMMUNICATIONS CAMPAIGN RAISED AWARENESS AMONG MORE THAN EIGHT MILLION PEOPLE ABOUT THE PANTANAL. THE CAMPAIGN WAS OPPORTUNISTIC AND INNOVATIVE, USING A FAMOUS CARTOON CHARACTER AND LOCAL CELEBRITIES TO INCREASE PUBLIC OUTREACH. THE INTEREST IT GENERATED HELPED CONVINCE ORGANISATIONS TO JOIN THE PACT.

CASE STUDY



Dr Seema Mahendra and her son testing water quality as part of a River Health Assessment of the Ramganga river in Moradabad, Uttar Pradesh, India. Such assessments are done three times a year, in several locations around the river basin, by Ramganga Mitras – friends of the river. Mitras are a multi-stakeholder initiative set up by WWF: the groups are composed of people from all walks of life who volunteer their time to contribute to freshwater conservation.

IMAGE: © SIMON DE TREY WHITE / WWF-UK

KEY INSIGHTS

- Partnerships with decision-making bodies have the potential to be transformational and to lead to long-term and large-scale improvements in water governance. Such partnerships often start with agreements to work jointly on smaller or short-term projects, which help build relationships and trust.
- WWF's reputation is such that in many countries it is in a privileged position to be able to enter into such partnerships. It also means that we are often able to advocate successfully for policy change directly with decision-making bodies. However, this is not the case in all countries or for all water-related issues.
- Other actors have the power to influence decision-making. These include the general public, academics and research institutions, the private sector within a particular country or region, or even international companies that can exert an influence on a particular river basin. Where possible, this power should be leveraged; multi-stakeholder partnerships offer an ideal avenue for this to happen.

IN SUMMARY: WATER GOVERNANCE APPROACHES

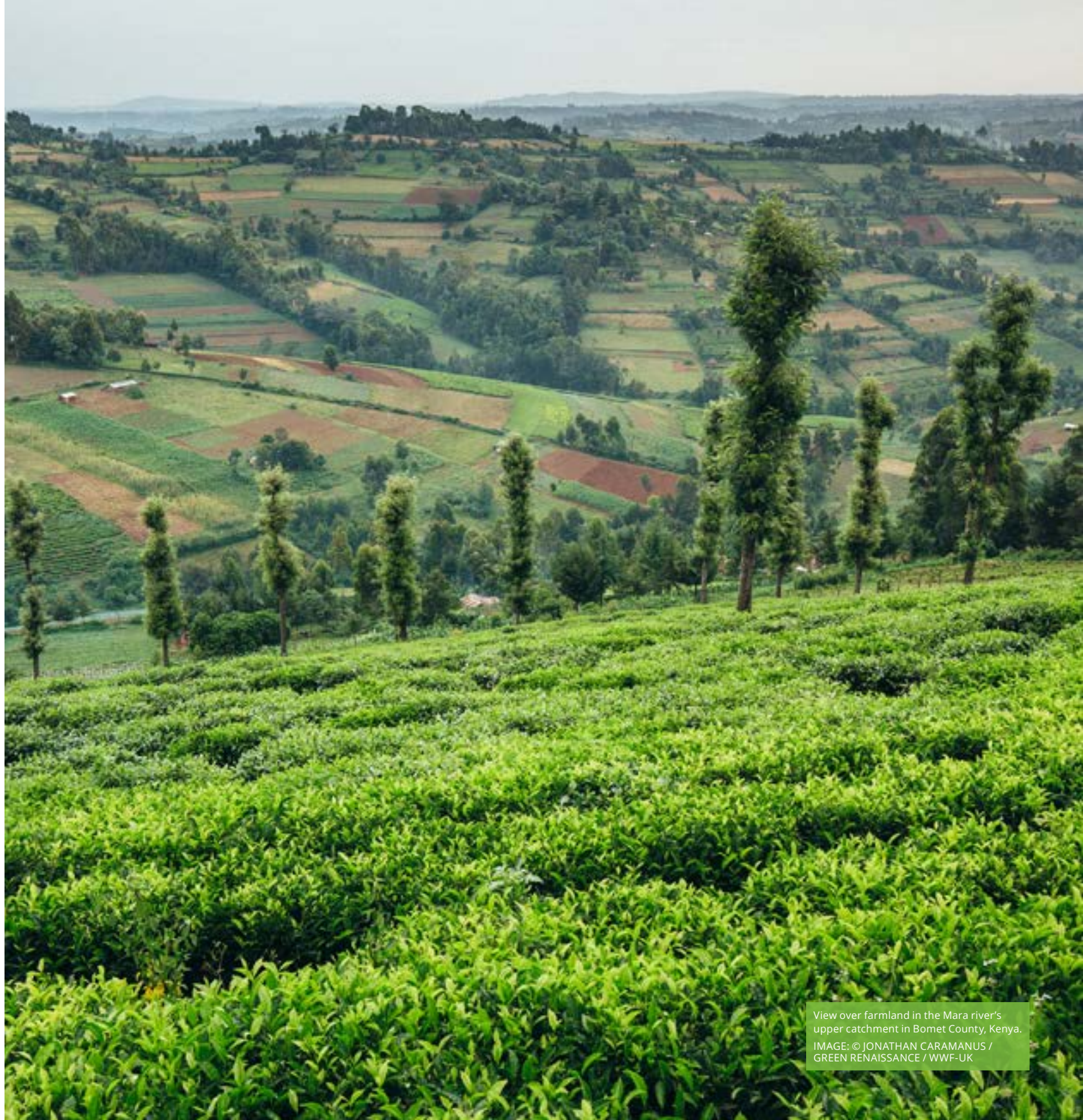
One of the main areas of focus for WWF's work relating to water governance as part of the HSBC Water Programme was on bringing multiple stakeholders together to achieve improved river basin management, at transboundary, national, basin or local scales. In many cases, our reputation meant we were able to play a convening role.

Central to most of our multi-stakeholder initiatives was the involvement of local communities, in recognition of their direct dependence on the health of rivers but also of the important power they have to collectively influence decision-making. We acknowledged the frequent power differential between communities and other stakeholders, and focused heavily on structuring multi-stakeholder groups appropriately as well as on empowering and building technical, organisational and advocacy capacity.

Two of the most important groups for us to engage with – for instance in terms of achieving impacts at scale and addressing some of the major threats to rivers – are the public and private sectors. Although engagement with both was not without its challenges, HSBC Water Programme basin teams were able to foster much positive action on the part of these two groups of actors.

Our approach to influencing the public and private sector crystallises in many cases around the idea of benefits. For companies, building a strong business case for sustainability-related investments proved vital. Similarly, developing an evidence base relating to the wide range of social, economic and strategic benefits rivers can provide society is key for guiding government decision makers to manage rivers with these benefits and interconnections in mind.

Multi-stakeholder initiatives are central to WWF's goal of exploring the shared nature of water risks and of strengthening governance on a river basin scale. Through this multi-stakeholder work, and through river basin management planning as well as studies of basin hydrology and of the role of rivers in the economy, the programmes took a basin-scale approach to water governance that was holistic, integrated, based on evidence, and benefits-led. This work is thereby a practical demonstration of WWF's commitment to apply the OECD water governance principles³⁰ in order to strengthen effectiveness, efficiency, trust and engagement in water governance.



View over farmland in the Mara river's upper catchment in Bomet County, Kenya.
IMAGE: © JONATHAN CARAMANUS / GREEN RENAISSANCE / WWF-UK

CONCLUSION

The WWF teams in the Ganga, Mara, Mekong, Pantanal and Yangtze basins achieved many things^{vi} and learned many lessons during the five years of the HSBC Water Programme. This report’s conclusion sets out some of the factors that enabled these successes to happen, as well as some of the challenges the teams faced.^{vii}

SUCCESS FACTORS...

BUILDING EFFECTIVE PARTNERSHIPS

Basin programmes were enriched by WWF’s partnership work with many different stakeholders, including local communities, the public and private sectors, civil society and academia. These partners added value by for example providing access to data, contributing time or complementary technical expertise, bringing new perspectives (such as local knowledge, which can increase our contextual understanding) and creating a multiplier effect via their own networks. Particular individuals and groups championed conservation activities in all basins, including committed public servants who strongly supported programmes as well as local people who were instrumental in stimulating change within their communities.

OBTAINING GOVERNMENT SUPPORT

Public sector engagement was a cornerstone of all of the basin programmes. In some cases, WWF supported and helped strengthen structures existing within legal frameworks, as with water user groups in the Mara. We targeted appropriate levels of government for the uptake of particular recommendations or commitments. In many cases, particular interventions would not have happened without government permission, support or instigation, including Yangtze finless porpoise translocations and Ganges river dolphin surveys. Furthermore, government support was in many cases the single most important factor for ensuring particular activities reached a meaningful scale and had a lasting impact.

CONSIDERING PEOPLE AND THE ENVIRONMENT

Livelihoods and food security were central considerations within basin teams’ work with farmers and fishers, particularly small-scale producers, to ensure uptake and long-term behaviour change. Where existing practices or their locations were negatively affecting freshwater habitats and species, our teams worked to raise awareness, change practices or support alternative livelihoods. We also involved local people and other stakeholders in things like environmental flow assessments and freshwater protected area management, in recognition of the imperative for their understanding, acceptance and support for implementation.

^{vi} Although many other successes and challenges were unique to each country’s socio-economic and political setting, here we set out those that were common across all the basin programmes.

BASING CONSERVATION PROGRAMMES ON EVIDENCE

Research allowed the basin programmes to target activities in appropriate areas, such as headwater sub-basins that contribute the most run-off (in the Pantanal) or soil erosion hotspots (in the Mara). Techniques such as population surveys, necropsies, radio telemetry and environmental DNA helped basin programmes better understand and hence protect particular freshwater species. Socio-economic studies in the Yangtze helped us plan alternative livelihoods for fishers and farmers operating within and around the finless porpoise nature reserves. Other studies supported the teams’ policy advocacy, for example by providing decision makers with information about the impact of dams on sediment flows, migratory fish and entire economies. Data obtained also allowed teams to create baselines from which to measure change and evaluate the contribution of conservation activities.

FOCUSING ON INCENTIVES AND BENEFITS

WWF teams highlighted the benefits of engagement in conservation for a range of different stakeholders. Most obviously, this involved developing a strong business case, including payback periods, for engaging private sector actors. Incentives for buyers further up the supply chain included physical, regulatory and reputational risk considerations as well as issues like food quality. For small-scale farmers, the focus was on showcasing profit increases or even food security improvements. Basin teams also provided information and evidence to governments to help them understand the benefits of sustainable river management. This benefits-led approach often involved thinking beyond the realm of freshwater ecosystems. For example, in the Pantanal, activities emphasised job creation and reduced incidence of diseases. In China, aquaculture work considered aquaculture from the perspectives of water quality, livelihoods, consumer safety and market demand. In India, many Mitras became involved based on their concerns around drinking water quality or the spiritual value of the river.

TAKING AN APPROACH LED BY SOLUTIONS AND BUILDING CONSENSUS

This approach, as well as WWF’s long history, credibility and renown, enabled us to play a facilitating and convening role in all the basins, not least as part of multi-stakeholder partnership work. Our basin teams built the capacity of other actors to take conservation action, for example within community-managed fisheries in the Mekong. Capacity building also enabled enhanced participation and representation of local level stakeholders – for example the Mara’s water user groups – in water resources management structures. Our approach to economic development is pragmatic and proactive: for instance, in the Mekong we promoted the strategic planning of dams within river basins as well as alternative sources of renewable energy as approaches for balancing economic development and the environment.

DEMONSTRATING SUCCESSES AND TANGIBLE ACTION ON THE GROUND

This helped increase uptake and engagement and also sowed the seeds for further action. Concrete projects like wetland surveys and clean-up drives allowed Ramganga Mitras to contribute to the programme and become more connected to the ecosystems on which they depend. Quick wins in terms of crop yields were essential in generating enthusiasm among farmers in the Mara and Ganga basins. Local demonstrations were also an avenue for wider-scale action: community-based interventions with water user groups in the Mara helped persuade the public and private sector of the importance of water resources conservation. Similarly, the positive example of the Yangtze Basin Protected Area Network convinced the government to replicate it in other parts of China, while a springs restoration pilot was the origin of the Pantanal Pact concept.

KEEPING IT SIMPLE

Programme activities that focused on changing practices among small-scale farmers and aquaculturists typically promoted locally-appropriate, proven, cost-effective and simple measures that used local knowledge, ingredients and materials. These included fencing off springs in the Pantanal, planting napier grass buffer strips in the Mara, using buffalo manure and urine as a fertiliser in the Ganga, and improving a traditional grass carp feeding method in the Yangtze.

ADAPTING PROGRAMMES

Teams changed focus based on new information, changing contexts and lessons learned. Sanitation was added to the Pantanal programme's scope when a regional study revealed it was a critical problem, while data made the Yangtze team realise diffuse pollution (and not only fishing) was a major problem for the finless porpoise. Basin programmes also changed tactics when initial plans failed: Mekong dam advocacy was first science-based but then progressed to campaigning and finally to an approach based on collective action. WWF teams were also able to take advantage of opportunities when they arose, to create communications moments but also new programme activities: for example, both the Ramganga Mitras initiative and river basin management plan were not planned at the start of the programme but were developed in response to a receptive external environment.



Port construction equipment, sand dredgers, fishing boats and other ships vie for space on Dongting lake, Hunan province, China. These activities have an important impact on ecosystems: for example, Yangtze finless porpoises are affected by the noise and the reduction in their prey base and are also regularly killed by ship strikes and entanglement in fishing gear. Urbanisation, economic development, population growth and climate change are growing challenges for river basins worldwide.

IMAGE: © WWF-UK

... AND COMMON CHALLENGES

MOVING BEYOND PILOTS

Many HSBC Water Programme activities started with pilots to test effectiveness and were then scaled up to wider areas. In some cases, as in the Pantanal, the scaling up shifted, jumping from conservation actions on the ground straight to the policy level. In others, scaling up instead involved multiplying the number of people involved. However, the extent to which even large numbers represent effective up-scaling is uncertain, particularly in extensive river basins. More than 500 farming families implemented better land management practices in the Mara, but it has always been clear to the WWF team that measurable and sustained impact on river health will require a vast number of participants, and that rainfall run-off analysis and erosion modelling is needed to understand what area of farmland is required to create a discernible turbidity change. In the Yangtze, the impressive 73,000 aquaculturists that were trained still only represent around 6% of Hubei province's fish farmers.

IMPACTS AT SCALE

In a related point, progress was made in terms of mainstreaming conservation practice into policy – including the Pantanal Pact and the adoption of WWF climate-smart agriculture recommendations into one district's plans in India. However, some uncertainty remains on how to replicate these successes, and in some cases actual implementation beyond policy commitments remains a challenge – for example with implementation of Pantanal Pact commitments or full devolution of responsibilities and resources to water user groups in the Mara. Ultimately, many of the most effective conservation practices need government adoption and roll-out to achieve impacts at scale, requiring strong and sustained policy advocacy and a recognition of the political ramifications of things such as decisions around water allocation.

LONG-TERM SUSTAINABILITY

For some interventions, sustaining long-term behaviour change and lasting engagement will be a challenge. This is particularly the case where significant time and financial resources have been (and will continue to be) required from WWF. Examples include community-based fish conservation in the Mekong, multi-stakeholder initiatives such as the Mitras in India and water user groups in the Mara. Political representation changes that follow elections also proved difficult for most of the basin programmes, and required us to rebuild relationships with newly-elected representatives and their staff to gain their support for particular interventions. Such influencing needs will become more difficult to meet on a long-term basis.

PRIVATE SECTOR ENGAGEMENT

All five HSBC Water Programme basin programmes engaged with the private sector, albeit with a variety of private sector actors and in different ways, but this proved challenging. The reasons for this varied widely according to location and economic sector. They included having insufficient information about certain businesses; a lack of interest in conservation issues; the presence of unregistered or informal local industries; and a lack of adequate legislation or enforcement thereof by authorities, creating complacency. Overall, despite some encouraging progress, WWF teams sometimes struggled to move beyond one-way transmission of information to a more dialogue-based collaboration with the private sector. Learning how to incentivise, work and build effective dialogue-based partnerships with the private sector proved challenging for the teams. In many countries, the concept of collective action is still an emerging one.³⁷

COMMUNITY ENGAGEMENT

Similarly, community engagement formed part of all basin programmes and posed its own set of challenges. In several countries, WWF had to overcome lack of civil society participation in decision-making. Furthermore, our capacity building support for communities to engage effectively in multi-stakeholder partnerships was very time-intensive.

MONITORING AND EVALUATION

Evaluating the success of programmes, and attributing improvements in the status of water bodies or freshwater species to particular activities, is challenging – not least when it comes to measuring the impact of policy advocacy. In several cases, programmatic theories of change rested on assumptions that are difficult to verify and require further investigating – for example that effective management of freshwater protected areas leads to positive conservation impacts, or that fishers and farmers who have received training will actually implement improved practices in the long term. Monitoring and evaluation can be time-consuming and expensive: a good example is fish catch monitoring, required to assess the biodiversity benefits of community-based fish conservation. In some instances, WWF may not have access to monitoring data collected by governments. In several cases, it is still too early to quantify benefits: for example, the implementation of commitments made under the Pantanal Pact is only just starting. Appropriate resource allocation for obtaining baseline data – and following up on it – is critical for effective programme design.

The floating boundary fence to the Yangtze finless porpoise reserve at the transboundary He-wang-miao/ Ji-cheng-yuan oxbow, Hubei and Hunan provinces, China. Eight finless porpoises were translocated to the oxbow during the HSBC Water Programme. This and other protected oxbow lake reserves have been set up in order to establish breeding finless porpoise populations safe from the threats they face in their current core habitats. Translocations to He-wang-miao/Jicheng-yuan are planned to continue until the oxbow has reached its carrying capacity.

IMAGE: © XIAODONG SUN / WWF-UK

KNOWLEDGE AND DATA GAPS

As detailed in the report, WWF carried out numerous studies aimed at starting to fill information gaps – for example, gaps in socio-economic, hydrological or species-related data, and information gaps relating to the impact of human activities (such as dam building) on freshwater ecosystems. We also carried out a number of studies to better understand cultural, political and economic contexts; the ‘Mekong River in the Economy’ report is a good example. However, there still remain basin- and site-specific knowledge and data gaps in all these areas of work.

EXTERNAL FACTORS

Legal and regulatory challenges outside WWF’s control had impacts on programme activities – for instance on work with leather and textile dyeing SMEs in India and China respectively. Furthermore, pressing threats to freshwater habitats and species required programmes to implement some short-term conservation strategies that might otherwise not be preferable, whether because of cost, potential risk or simply because they divert resources away from more strategic basin-scale threat mitigation. This includes translocations and reintroductions. The challenges linked to changes in political representation at different scales have been mentioned previously. Finally, systemic trends at regional and global scales are creating ongoing challenges for the five HSBC Water Programme basins. Among many others, these include: urbanisation and associated demand for sand for construction; economic development with linked demand for energy; trade growth for which rivers are a means of conveyance; population growth and the emergence of new middle classes with consequences for agricultural production; and the likely impacts of climate change.

WHERE WILL WE GO FROM HERE?

The HSBC Water Programme is being extended as part of a three-year second phase (2017-2020), during which WWF will continue to fund work in the Ganga, Mara, Mekong, Pantanal and Yangtze river basins, but with a particular focus on freshwater conservation in China, India and Brazil. The lessons learned as part of the first phase of the HSBC Water Programme – both in terms of success factors and challenges – will feed into basin programme planning activities for the second phase of the programme.

REFERENCES

- WWF. 2017 (Forthcoming). Primer on sustainable water infrastructure.
- Olson, D and Dinerstein, E. 2002. The Global 200: Priority Ecoregions for Conservation. *Annals of the Missouri Botanical Garden* 89: 199-224.
- IUCN. 2016. The IUCN Red List of Threatened Species. Version 2016-2. Retrieved from: www.iucnredlist.org. Downloaded on 26 October 2016.
- Stolton, S, Dudley, N, Avcioglu Çokçalışkan, B, Hunter, D, Ivanić, K-Z, Kanga, E, Kettunen, M, Kumagai, Y, Maxted, N, Senior, J, Wong, M, Keenleyside, K, Mulrooney, D and J Waithaka. 2015. Values and benefits of protected areas, in: Worboys, G, Lockwood, M, Kothari, A, Feary, S and I Pulsford (eds) *Protected Area Governance and Management*. ANU Press, Canberra, Australia.
- The Nature Conservancy and WWF-Brazil. 2011. Ecological Risk Assessment for the Paraguay River Basin: Argentina, Bolivia, Brazil, and Paraguay. *The Nature Conservancy, Brasilia, Brazil*.
- Ramsar Sites Information Service. N.d. Retrieved from: [rsis.ramsar.org/ris-search/?f\[0\]=regionCountry_en_ss%3AViet+Nam&pagetab=1](http://rsis.ramsar.org/ris-search/?f[0]=regionCountry_en_ss%3AViet+Nam&pagetab=1)
- McDonald, R, Forman, R, Kareiva, P, Neugarten, R, Salzer, D and J Fisher. 2009. Urban effects, distance, and protected areas in an urbanizing world. *Landscape and Urban Planning* 93 (1): 63-75.
- Thieme, M, Rudolph, J, Higgins, J and J Takats. 2012. Protected areas and freshwater conservation: A survey of protected area managers in the Tennessee and Cumberland River Basins, USA. *Journal of Environmental Management* 109: 189-199.
- Herbert, M, McIntyre, P, Doran, P, Allan, J and R Abell. 2010. Terrestrial reserve networks do not adequately represent aquatic ecosystems. *Conservation Biology* 24: 1002-1011.
- Nel, J, Reyers, B, Roux, D, Impson, N and R Cowling. 2011. Designing a conservation area network that supports the representation and persistence of freshwater biodiversity. *Freshwater Biology* 56: 106-124.
- Saunders, D, Meeuwig, J and A Vincent. 2002. Freshwater protected areas: strategies for conservation. *Conservation Biology* 16: 30-41.
- WWF-UK. 2015. *A review of monitoring PA effectiveness in the context of protecting freshwater habitats*. Unpublished report.
- Reeves, R, Brownell, R, Gulland, F, Smith, B, Turvey, S and W Ding. 2009. *Assessment of mortality of Irrawaddy dolphins in the Mekong River and recommendations for a population recovery plan*. IUCN Species Survival Commission's Cetacean Specialist Group and Veterinary Specialist Group. Retrieved from: www.iucn-csg.org/wp-content/uploads/2010/03/Mekong_Dolphin_Mortality_report_from_international_experts.pdf
- Mei, Z, Zhang, X, Huang, S-L, Zhao, X, Hao, Y, Zhang, L, Qian, Z, Zheng, J, Wang, K and D Wang. 2014. The Yangtze finless porpoise: On an accelerating path to extinction? *Biological Conservation* 172: 117-123.
- Wang, D. 2015. Progress achieved on natural ex situ conservation of the Yangtze finless porpoise. IUCN Cetacean Specialist Group. Retrieved from: www.iucn-csg.org/index.php/2015/12/10/progress-achieved-on-natural-ex-situ-conservation-of-the-yangtze-finless-porpoise
- WWF. 2016. Living Planet Report 2016. *Risk and resilience in a new era*. WWF International, Gland, Switzerland.
- Bunn, S and Arthington, A. 2002. Basin principles and ecological consequences of altered flow regimes for aquatic biodiversity. *Environmental Management* 30: 492-507.
- International Water Centre. N.d. The Brisbane Declaration. Retrieved from: www.watercentre.org/news/declaration
- O'Keeffe, J and Le Quesne, T. 2009. *Keeping Rivers Alive – A primer on environmental flows and their assessment*. WWF-UK, Godalming, United Kingdom.
- Tharme, R and King, J. 1998. *Development of the Building Block Methodology for Instream Flow Assessments and Supporting Research on the Effects of Different Magnitude Flows on Riverine Ecosystems*. Report to Water Research Commission, Cape Town, South Africa.
- Le Quesne, T, Kendy, E and D Weston. 2010. *The Implementation Challenge – Taking stock of government policies to protect and restore environmental flows*. The Nature Conservancy, Arlington, United States and WWF-UK, Godalming, United Kingdom.
- Winemiller, K, McIntyre, P, Castello, L, Fluet-Chouinard, E, Giarrizzo, T, Nam, S, ... and L Sáenz. 2016. Balancing hydropower and biodiversity in the Amazon, Congo, and Mekong. *Science* 351 (6269): 128-129.
- Batchelor, C, Reddy, V, Linstead, C, Dhar, M, Roy, S and R May. 2014. Do water-saving technologies improve environmental flows? *Journal of Hydrology* 518: 140-149.
- Owens, P, Batalla, R, Collins, A, Gomez, B, Hicks, D, Horowitz, A, Kondolf, G, Marden, M, Page, M, Peacock, D, Petticrew, E, Salomons, W and N Trustrum. 2005. Fine-grained sediment in river systems: environmental significance and management issues. *River Research and Applications* 21: 693-717.
- Millennium Ecosystem Assessment. 2005. *Ecosystems and Human Well-being: Synthesis*. Millennium Ecosystem Assessment, Washington, DC, United States.
- Porras, I, Alyward, B and J Dengel. 2013. *Monitoring payments for watershed services schemes in developing countries*. IIED, London, United Kingdom.
- Subalusky, A, Dutton, C, Hill, T, Aleman, J, Staver, C and D Post. 2017 (Forthcoming). *Reading the Historical Record of the Mara Using Sediment Cores from the Mara Wetland*. Unpublished report to WWF-Kenya, Nairobi, Kenya.
- Brouwer, H and Koopmanschap, E. 2016. *Discussion paper to guide future WWF work on freshwater governance*. Centre for Development Innovation, Wageningen, the Netherlands. Unpublished report to WWF International, Gland, Switzerland.
- Ribeiro, N. 2016. *Governança sistêmica das águas: proposição de um modelo analítico e sua aplicação na Bacia Lagos São João, RJ* (Doctoral dissertation). Rio de Janeiro State University, Rio de Janeiro, Brazil.
- Organisation for Economic Co-operation and Development (OECD). 2015. *OECD Principles on Water Governance*. OECD, Directorate for Public Governance and Territorial Development, Paris, France.
- Brouwer, H, Woodhill, A, Hemmati, M, Verhoosel, K and S van Vugt. 2015. *The MSP guide: how to design and facilitate multi-stakeholder partnerships*. Centre for Development Innovation, Wageningen, the Netherlands.
- WWF-UK. 2015. *From Risk to Resilience: Does your business know its water risk?* WWF-UK, Woking, United Kingdom.
- Parker, H and Oates, N. 2016. How do healthy rivers benefit society? *A review of the evidence*. Overseas Development Institute (ODI), London, United Kingdom. Report to WWF-UK, Woking, United Kingdom.
- Overseas Development Institute (ODI). 2016. *River-Society Relationships: How the Rāmgangā Provides Benefits to Society*. ODI, London, United Kingdom. Unpublished report to WWF-UK, Woking, United Kingdom.
- Pegasys Consulting. 2016. *Mekong River in the Economy*. WWF-Greater Mekong.
- Earthwatch, WaterAid and WWF. 2016. *HSBC Water Programme impact report 2016*. Retrieved from: impactreport.thewaterhub.org/impact-report
- Newborne, P and Dalton, J. 2016. *Water Management and Stewardship: Taking stock of corporate water behaviour*. IUCN, Gland, Switzerland and ODI, London, United Kingdom.

FOR MORE INFORMATION

We've produced a number of case studies and other documents exploring the topics detailed in this report in more depth.

GANGA

- Keeping the Ganga flowing: How an environmental flows assessment in the Upper Ganga Basin can be a stepping stone for basin wide results
- India's Mitras: Friends of the river - How thousands of volunteers from all walks of life are working together to help protect the Ganga River and its tributaries
- Planning at the river basin scale: How WWF-India worked with stakeholders to create a river basin management plan for the Ramganga
- Climate-smart agriculture: Encouraging the adoption of sustainable agricultural practices, recharging aquifers, restoring wetlands and advocating for climate-resilient policies in the Ganga river basin
- Gharials on the Ganga: How WWF-India is working with partners to reintroduce gharials within the Hastinapur Wildlife Sanctuary.
- A tiger among fish: Learning more about the Ganga river basin's golden mahseer fish to better protect it
- Otters under pressure: How WWF-India is working to improve knowledge and protection of otter populations in the Ganga river basin

MARA

- Kenya's water resource user associations: Devolving responsibility for water management in the Mara river basin
- Better land management in the Mara: How hundreds of farmers reduced soil erosion
- Water flows from Kenya to Tanzania: Doing the groundwork for a transboundary flow agreement between the two countries

MEKONG

- Community-based fish conservation: Working with communities in Laos, Cambodia and Thailand to preserve the Mekong river basin's endemic species and livelihoods
- 'Mekong River in the Economy' report
- Searching for the Mekong giant catfish: eDNA reveals fish biodiversity in the Mekong River
- The sands are running out: How WWF sought to better understand the impact of dam construction and sand mining on sediment flows in the Mekong river basin

PANTANAL

- Brazil Pantanal: From pilot to Pact - How we scaled-up a pilot to bring about improved watershed management across the headwaters of the Pantanal wetlands
- The Water Producers Programme: Incentives for spring restoration in the Pantanal's headwaters
- A 'Water Observatory' for Brazil: Assessing the effectiveness of water policy and governance
- Communicating the Pantanal: An innovative and opportunistic communication strategy raises awareness about Brazil's biggest wetland

YANGTZE

- Participatory wetland conservation: Tools for wetland conservation in the Yangtze river basin: the Protected Area Network and 'Nature School' platform
- Yangtze freshwater aquaculture: Using multiple tactics to change aquaculture practices to improve water quality in the Yangtze River
- Finless porpoises on the brink: How WWF is working with partners to prevent the extinction of the Yangtze River's last remaining cetacean species

OTHER

- Collective action for better governance: Implementing water stewardship with micro, small and medium enterprises in China, India & Pakistan
- Reviews of global practice on strategic water management: WWF and GIWP collaboration
- 'How do healthy rivers benefit society? A review of the evidence' report

Download the case studies:
www.wwf.org.uk/fiveyearsfiveivers





For a future where people and nature thrive | [wwf.org.uk](https://www.wwf.org.uk)

© 1986 panda symbol and ® "WWF" Registered Trademark of WWF. WWF-UK registered charity (1081247) and in Scotland (SC039593). A company limited by guarantee (4016725)