Chapter 23
NGOs in Freshwater Resource Management

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23.1 Why Do NGOs Work in Freshwater Conservation?

Freshwater ecosystems, such as rivers, lakes, active floodplains, and marshes, are crucial to our existence. They provide the water needed to support human lives and livelihoods and are vital to key economic sectors such as agriculture, fisheries, and tourism. Freshwater ecosystems are also home to an astonishing diversity of plants and animals. Indeed, many of the socioeconomic functions of freshwater ecosystems—food production and water purification, for instance—are dependent on this biodiversity.

Despite these enormous values, freshwater ecosystems are under threat throughout the world. Outright destruction and more insidious degradation mean that fewer and fewer areas are able to function naturally and provide the goods and services upon which so many people depend, particularly the rural poor.

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This becomes even more alarming when it is realized just how scarce freshwater ecosystems are in the first place, covering for less than 1% of the Earth's surface.

Freshwater conservation has therefore been a priority among environmental NGOs for decades. In fact, many local or national NGOs and initiatives were formed as a direct consequence of too little to no governmental action toward sustainable management of freshwater resources. Many international NGOs, such as WWF, also started to act because of the crucial role water resources play in the context of human development globally. They function as advocates for integration of local, regional, and international water policies, for a proper science–policy interface, and for adequate stakeholder involvement in decision-making in order to ensure that the needs of both nature and local communities are being met.

In the following text, we will present three case studies that illustrate how environmental NGOs can make a difference and what challenges they face.

23.2 Showcase India

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India's rivers, wetlands, and lakes account for only 4% of the world's freshwater resources but sustain more than 16% of the world's human population. WWF-India works in the Ganga and Brahmaputra basins (Behera et al. 2011), where 50% of the country's population depend on for water, food, and livelihood security. Community-led conservation of urban, peri-urban, and high conservation wetlands in Rajasthan, Punjab, and Karnataka is another area of focus to fulfill the goal of protecting, managing, and restoring rivers and wetlands to retain biodiversity values, sustain ecosystem services, and provide long-term water security for people and nature.

23.2.1 Rivers for Life, Life for Rivers Initiative

Covering roughly 30% of India's land area, the basin of the Ganges river is home to 500 million people and thousands of aquatic species (Behera et al. 2011). However, the river is also highly polluted and overexploited. Huge volumes of water are used for irrigation, and untreated sewage and toxic effluents are dumped into it daily. At the same time, issues of unsustainable hydropower continue to be a major threat, affecting the flows, the connectivity, and the health of the river. The 600-km-long Ramganga River is one of the most polluted tributaries of the Ganga, flowing through Moradabad (the *Pital Nagri).* The issues of the Ramganga are characteristic of the whole basin: over abstraction; a growing footprint of industries, cities, and agriculture; degradation of habitats; and decline of key aquatic species (Fig. 23.1).

River conservation is complex and requires a multidisciplinary, multi-stakeholder approach. Hence, WWF-India's Rivers for Life, Life for Rivers initiative (RfLLfR, 2012–2017), supported by the HSBC Water Program, is structured around four

Fig. 23.1 Location of the Ganga River (Ganges)

pillars: sustainable water management, urban and industrial water stewardship, climate change adaptation, and habitat and biodiversity conservation. Implemented across seven districts of Uttar Pradesh with a geographical focus on the 300 km stretch of the Ramganga (Kalagarh to Hardoi) and the 900 km stretch of the Ganga (Bijnor to Varanasi), this program envisions Ganga and Ramganga as healthy river systems rich in biodiversity and aims to provide long-term water security to communities, businesses, and nature. This builds on WWF-India's work in the Ganga basin since 1997 with conservation of aquatic biodiversity and the Living Ganga Program (2007–2012), which developed strategies for sustainable energy and water resource management in a critical stretch of 800 km from Gangotri to Kanpur.

To restore the ecological health of the rivers, the program works with a diverse range of stakeholders across academia, government institutions, policy makers, civil society members, local communities, and businesses to implement its multidisciplinary conservation strategy.

The involvement of various partners, including religious leaders, government departments, and NGOs, in the project, the improvement in the livelihood of the local people, and the riverine habitat have provided additional acceptability for WWF-India's work. Awareness of the local community toward the environment has helped greatly in motivating the community to work for conservation and climate change adaptation. Studies on water availability and water quality in the Ganga and Ramganga Rivers are being carried out in order to understand the factors determining the flexibility and resilience of ecosystems, including the habitat preference of species, river connectivity and quality, flow regimes, disturbances, and mortality of the aquatic biodiversity, especially of Ganges river dolphins, gharials, and freshwater turtles.

Under the RfLLfR program, the development of a data base and research through GIS and remote sensing is an extremely valuable asset that will support further research and will help to formulate adaptation strategies where required, with the long-term goal to save the ecosystem.

The lessons learned from WWF-India's intervention, particularly its strategy with regard to garnering support from the local communities, has been widely disseminated and accepted by the government and local people as a replicable model.

23.2.2 *Friends of the River Multi-stakeholder Groups*

Degradation of water quality has manifested as a shared risk to people (polluted, unreliable water, huge health costs), businesses (cost of clean water and increased regulatory pressure), and nature (declining populations and distribution of species and overall health). As a shared resource and a shared risk, water demands collaborative action to address some of the basin-level issues. It is this philosophy that drove the formation of multi-stakeholder groups—Ganga/Ramganga Mitras. Today there are over 6000 Ganga/Ramganga Mitras (Friends of the River)—a multi-stakeholder consortium which has been trained on various aspects of river conservation including river health assessments, turtle conservation, better practices in agriculture, and water management. WWF-India and WWF UK jointly conducted a mapping of buyers from leather cluster of Kanpur and created a UK Leather Buyers platform to work with tanneries in promotion of water stewardship.

Advocacy work to encourage scale-up and buy-in by the government has been an important component of the project. WWF-India is now in the process of advocating and scaling up its work to the national level with the active involvement of the government and the concerned local authorities—a recent example being the mainstreaming of environmental flows in the Ganga River Basin Environment Management Plan (GRBEMP) submitted by the consortia of seven Indian Institute of Technologies to the Ministry of Water Resources, River Development and Ganga Rejuvenation in 2015. In 2014, jointly with the National Mission for Clean Ganga, WWF-India prepared an operational strategy for the implementation of Dolphin Action Plan 2010–2020. The My Ganga, My Dolphin campaign (October 5–7, 2012), in partnership with the Uttar Pradesh Government, 18 NGOs, and HSBC, aimed at the assessment of distribution and population status of the Ganges river dolphin (India's National Aquatic Animal) using a unified methodology—for the first time in India. This will now be scaled up to the national level by the Government. WWF-India is engaging with the UP Government to develop an aquatic biodiversity management plan for 200 km stretch of the Ganga. Similarly, at the district level, jointly with the local administration, WWF is working with six districts to demonstrate alternative water and agriculture management to enhance adaptive capacities of people and reduce threats to the river.

23.3 Showcase Austria

Eco Masterplan III—Strategic considerations for sufficient water protection and ecologically sustainable expansion of hydropower in Austria (WWF Austria 2014; Seliger et al. 2016; Scheikl et al. 2016)

The three WWF Austria Eco Masterplans are prime examples of successful synergies between science and NGOs, since each of them is based on scientific studies carried out by the Institute of Hydrobiology and Aquatic Ecosystem Management (IHG) at the University of Natural Resources and Life Sciences (BOKU) in Vienna.

Both Eco Masterplans I and II were designed to designate the ecological sensitivity of Austrian rivers and subsequently identify protection priorities with respect to the future use of water resources. The four underlying criteria were the ecological status, the situation in a protected area, the hydromorphological status, and the length of the free-flowing section (WWF Austria 2009, 2010). Springing from these initiatives, the Eco Masterplan III (WWF Austria 2014) provides the fundamentals for an effective "Hydropower Masterplan," in which the options and limitations for the expansion of hydropower in Austria are investigated from an ecological and energy-economic perspective. Due to subsequent scenario development, different degrees of expansion with the corresponding ecological consequences and energy-economic implications can be illustrated and discussed on a national scale for the first time.

One key element of the Eco Masterplan III is the decision support tool "HY:CON" (HYdropower and CONservation) developed by the IHG (Seliger et al. 2016; Scheikl et al. 2016): HY:CON represents a strategic and transparent methodological approach to balance the energy-economic attractiveness of planned hydropower projects and the conservation needs of the river stretches that are affected by these projects.

In total, 39 ecological criteria were used to assess the ecological sensitivity of sites earmarked for power plant construction. Due to the high number of single criteria, almost all of the 102 investigated hydropower projects overlapped with at least one criterion. In order to avoid an overestimation of the ecological sensitivity, related criteria was assigned to one out of eight thematic groups: (1) ecological status; (2) hydromorphological condition; (3) river continuity; (4) floodplains; (5) situation in a legally binding protection area, where new hydropower projects are prohibited by law; (6) situation in another designated protected area; (7) actual habitats of key species (endangered and/or indicator species); and (8) key habitats (see Table 23.1).

In order to cover possible future trends regarding the prioritization of conservation and river ecological aspects, different scenarios were developed. To evaluate the conflict potential of hydropower projects with regard to the conservation need of a river stretch, each criterion was classified according to its protection priority. These scorings were a function of the priority given to conservation objectives in the scenarios (minimal conservation up to high conservation). Depending on the scenario, the scoring ranged from "low conservation value" to "exclusion of further hydropower development." If no "exclusion" criterion was affected, the final evaluation was conducted by calculating the mean of the highest-rated criteria per thematic group.

The energy-economic assessment of recorded hydropower project is geared to the "classic" energy-economic, optimization principles of economic, safe, and environmentally friendly electricity supply and is based on the criteria for assessing hydropower projects in energy-economic terms.

Finally, the results of the energy-economic assessment were interrelated with the results of each conservation scenario (Fig. 23.2). The results show that, not only in the "high conservation" scenario but even in the "moderate conservation" scenario, a large share of planned hydropower projects was in conflict with exclusion criteria

Table 23.1 Thematic groups (bold) and related ecological criteria used for the identification and evaluation of possible conservation conflicts of planned hydropower projects

1. Ecological status	**7. Actual habitat of key species**
Ecological status	*Austropotamobius pallipes*
2. Hydromorphological (hy-mo) condition	*Margaritifera margaritifera*
Hy-mo status	*Myricaria germanica*
3. River continuity	*Hucho hucho*
Connected habitat	*Carassius carassius*
Free-flowing section (small river)	*Leucaspius delineatus*
Free-flowing section (medium and large rivers)	*Leuciscus idus*
Migration corridor of medium-distance migrating fish species	*Coregonus* sp.
4. Floodplains	*Sander volgensis*
Conservation value of remaining connected floodplains	*Thymallus thymallus*
5. Legally binding protection sites	*Chondrostoma nasus*
National park	**8. Key habitats**
Special protection area	Glacial river
Wilderness area	Large river
6. Other protection sites	Lake outflow
Protected landscape	Rare river types
Natural monument	Type-specific river sections
Nature reserve	First km (Epirhithral) as far as passable from river mouth
Resting area	First 5 km (metarhithral, hyporhithral small, and epipotamal small) as far as passable from river mouth
Ramsar area	Tributary to rivers >500 km^2 catchment size until first impassable barrier
River sanctuary	Potential reproduction area of *Salmo trutta lacustris*
WFD-relevant Natura 2000 area	
Other Natura 2000 area	
Other protection areas	

and therefore was highly in conflict with conservation needs. Even in the "minimal conservation" scenario, several projects conflict with "high" conservation needs. Additionally, from the energy-economic point of view, the attractiveness of small hydropower projects (<10 MW) were rated as "low" or "moderate," yet at the same time, they affect sensitive river stretches despite their small size.

The HY:CON study formed the scientific basis for the WWF Eco Masterplan III where the main outcomes were finally summarized as follows:

1. The expansion of hydropower in Austria happens uncoordinated. Projects do not originate from an elaborate national plan—in fact, most of the projects derive

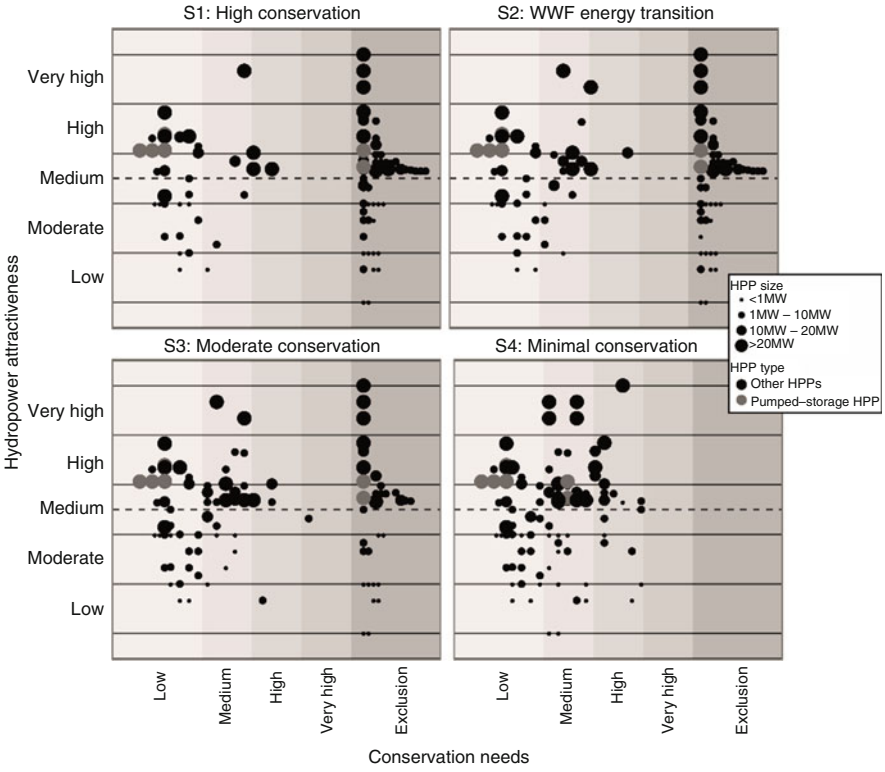

Fig. 23.2 Results of the four conservation scenarios. The size of the dots indicates the size of the assessed hydropower project (depending on the installed capacity in megawatts). The further right a dot is placed, the higher the conservation conflict. Projects above the dashed line were considered as attractive, whereas projects below the line were evaluated as less attractive from the energy-economic point of view (Modified from Seliger et al. 2016)

from private interests of (private) investors or entrepreneurial targets of single energy suppliers and other companies.

2. Expansion targets for hydropower in Austria are far too ambitious (7 TWh/a till 2020). Moreover, many of the projects identified within this study show massive conflicts of objectives with other European and national targets and/or legal regulations. A high share of the investigated projects is in conflict with conservation needs in almost all scenarios—even in the "minimal conservation scenario," numerous projects are in "high" conflict with conservation needs. Therefore, an implementation of the present projects appears to be questionable even from a legal perspective.

In the course of data collection, major data gaps became evident. There is no comprehensive, publicly accessible database regarding power plant projects in Austria that includes, in particular, energy-economic figures that follow a consistent system. Furthermore, a significant lack of ecological data exists; specific information

on relevant water-related objects of protection (species and habitats) does not exist or is not publicly accessible. However, the study shows that it is indeed possible to create, in a timely manner and with reasonable efforts, an information basis that contributes to the development of an expansion strategy and to secure the most important ecological values. Strategic planning, also in the frame of IRBM, is feasible.

It is equally obvious that the limit of an expansion potential that is acceptable from an ecological perspective has already been reached. This is especially evident in the intensity of hydropower expansion along Austrian waterbodies (70% of the Austrian river network already affected by hydropower), on the one hand, and, on the other hand, when considering realistic expansion scenarios, half of all projects are in conflict with applicable European and national laws. Thus, they can only be approved by exemption. Therefore, this data confirms for WWF that the peak of hydropower expansion has been reached in Austria.

The results regarding small hydropower plants are sobering. Although this industry enjoys a public reputation of being a seemingly clean, acceptable form of energy (often touted as an alternative to large projects), this view needs to be put into perspective after thorough analysis. The number of micro and small projects in Austria must be examined critically from both an energy-economic perspective and in terms of nature and water protection. Half of the projects analyzed were evaluated as not attractive from the energy-economic point of view. The contribution of these projects to the overall energy production is negligible. It can be argued that small hydropower plants do not support climate protection as these only make an insignificant energy contribution and do little, from a national strategic perspective, to decarbonize the Austrian economy. Yet it is expected that the vast number of projects has a massive impact on nature, since so many small hydropower plants are located in ecologically sensitive areas.

From these outcomes, WWF Austria formulated three conclusions on where the national policy has to change:

Redefinition of Strategic Expansion Targets of Hydropower

When applying realistic expansion scenarios, the expansion potential aimed at 7 TWh/a by 2020 cannot be accomplished. Such a large expansion potential remains largely theoretical and cannot be implemented under the current framework conditions (duration of planning and approval procedures, electricity prices, etc.). Hence, WWF recommends to decrease the pressure on national energy suppliers, policy, and economics as soon as possible and to initiate an open, transparent discussion, also involving the public with regard to future options of expansion. Thereby, realistic targets and reasonable implementation strategies can be developed which could lead, with reasonable involvement of the public, to viable results.

Determining Exclusion Zones

Many years of experience in the discussion around the expansion of hydropower in Austria, also on international level, have shown that a clear and comprehensible designation of exclusion zones has been a smart and effective political initiative. It

supports the conservation and protection of ecologically valuable waterbodies, while at the same time creating legal and planning security for e-economics.

Interlinking Subsidies with a Strategic Management Plan
In particular, small and micro hydropower plants are to be rejected, not only from an ecological perspective, but because these are also significantly less attractive in comparison with medium and large hydropower facilities from an energy-economic view. The support of hydropower plants should be bound to ecological standards. Hence, facilities located at ecologically sensitive waterbodies and which do not represent energy-economically attractive sites must not be subsidized.

This case study shows that an NGO can act as an effective intermediate between science and policy. Based on scientific studies, conclusions were drawn and then translated into policy action plans.

23.4 Showcase Danube–Carpathian Region

Partnership For a Living Danube (WWF DCP)

Floodplains of the Danube, the EU's longest river, and its tributaries have long been hotspots of biodiversity, providing a myriad of ecosystem services, including flood protection, drinking water provision, nutrient removal, biomass and food production, and landscapes for tourism and recreation. Despite this, the Danube alone has seen 80% of its floodplains and wetlands disappear over the past 150 years. It has been diked, dredged, and dammed for hydroelectric power production, shipping, and flood mitigation (see Chap. 24).

The effects of such industrial development of riverine landscapes have been wide-ranging and include plummeting fish and wildlife populations and decreases in water quality. Floodplains cut off hydrologically from the river channel can no longer act as natural water retention areas with consequences for flood risk.

This is why WWF promoted the Lower Danube Green Corridor Initiative, a framework for cooperation and coordination between the countries of the Lower Danube, Bulgaria, Romania, Moldova, and Ukraine, aiming to protect and restore floodplain ecosystems. As an NGO with observer status, WWF also managed to keep floodplain restoration high up on the agenda of the International Commission for the Protection of the Danube River (ICPDR) and its Basin Management Plans of 2009 and 2015.

Furthermore, WWF and the Coca-Cola Company (TCCC) entered a project partnership to restore vital wetlands and floodplains along the Danube River and its tributaries. The ambitious project aims to increase the river's flood water storage capacity by 12 million m^3 and to restore over 5300 ha of wetland habitat, which is a

substantial contribution to what governments of the Danube River basin pledged to restore by 2021.

This example shows that NGOs can be influential cooperation partners of governments and businesses, able to initiate and pilot action toward ecosystem restoration and good water management.

23.5 The Role of NGOs in Freshwater Conservation

The three case studies above are typical for thousands of places where NGOs work with scientists, governments, companies, and the local communities to improve freshwater conservation and, as a last consequence, protection of biodiversity. How NGOs can make a difference and overcome the challenges they face in their freshwater conservation work can be summarized by six principles:

1. Vision
Management of river basins should be governed by a long-term vision that is agreed to by consensus between all major stakeholders. The vision must give equal weight to the three pillars of sustainable development—economic, social, and environmental concerns. NGOs stress the need to maintain and restore ecosystem services and biodiversity in order to enhance local livelihoods.

2. Integration
Global policies and decisions must be integrated into national and regional decision-making processes. In many cases, this integration will be required across administrative boundaries. To achieve effective integration at the scale of a whole river basin, NGOs are a valuable partner, as they can provide a direct link between the public and the authorities. NGOs can also support applied science by linking researchers with local practitioners, and this helps integrate science and policy.

3. Scale
The primary scale for strategic decision-making must be the whole river basin. Operational decisions must then be taken in accordance with the basin-wide strategy but can be made at subbasin or local levels. This principle applies in all cases, including transboundary river basins.

The enormous diversity in the size and characteristics of river basins means that approaches suited to one location are not automatically transferable to another. NGOs can help to guarantee as much coherence as possible between "top-down" and "bottom-up" approaches in the pursuit of common environmental and socioeconomic objectives.

4. Timing
Coordination is critical for ensuring that the different elements of Integrated River Basin Management (IRBM) (see Chaps. 15 and 16) are implemented in the right sequence. On the one hand, it is important to base management decisions on sound information, strong institutional mechanisms, and broad stakeholder participation. On the other hand, urgent action should not be postponed while tools, data, and processes are perfected. It may be better to begin implementing river basin management sooner rather than later with emphasis on low/no regret measures, using existing information and experience and applying the lessons learned to achieve continuous improvement. NGOs can provide knowledge as well as experience and help define the urgency of implementing first steps in IRBM (WWF International 2002).

5. Participation
High priority must be given to establishing effective mechanisms for active public participation in planning and decision-making, right from the start of the process. NGOs play a crucial role as observer in such processes, ensuring transparency, and stakeholder involvement with broad access to information.

6. Capacity and Knowledge
Investment of adequate financial and human resources into capacity building and participation processes is one of the keys to successful river basin management, especially in those parts of the world where existing capacity is likely to be most limited. IRBM must be based on sound scientific data and an understanding of freshwater ecosystems and their component key hydrological and ecological processes. Similarly, socioeconomic analyses are key to understanding the drivers behind water use and abuse. NGOs can provide capacity of knowledge by facilitating the transfer of scientific data analysis to the broader public in order to inform and raise awareness on critical issues. At the same time, the illustrations are used to improve and advance policy processes on national, regional, and global levels.

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