



Our Wetland Restoration Track Record 2000-2022

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Foreword

Restoring degraded wetlands has never been more urgent. Wetlands are key for biodiversity and maintaining the hydrological cycle and constitute a large reservoir of carbon, and yet, 90% of these ecosystems have been drained and degraded for other land uses. The benefits of restoring wetlands are many, from improving biodiversity to protecting water, providing people with new sources of income, and storing carbon, thereby slowing future heating but their restoration remains as a challenge. Under the United Nations Decade on Ecosystem Restoration, and regional initiatives, such as Initiative 20x20 in Latin America and AFR100 in Africa, wetland restoration has been prioritized as a key action to achieve global restoration pledges, Kunming-Montreal targets as well as countries' commitments under the Paris Accord.

This report presents the state of the art of wetland restoration by showcasing 30 projects in 17 countries around the world, highlighting the challenges and opportunities and, most importantly, key lessons learned to improve effectiveness of restoration for people and nature. I share the authors' hope that severely degraded wetlands can be restored when people, organizations and governments work together to achieve their outcomes, respecting different perspectives but enabling local leadership to co-create restoration strategies and implement effective solutions.

We also hope this report will inspire different stakeholders to take action on restoring degraded wetlands. In Initiative 20x20, we are immensely grateful for this work as Wetlands International has supported our Task Force on Wetland Restoration, convening different stakeholders to present evidence that positive change is possible.

This publication allows us to change the future by learning the lessons of the past to ensure better livelihoods for our people and planet. Wetland restoration at scale is the narrow bridge across which we must walk if we are to realize our restoration ambitions of going beyond increasing forest cover and towards functional landscapes.

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Executive Summary

This publication presents Wetlands International's (WI) track-record on wetlands restoration for the last two decades, as an internal learning process, but also as a contribution to key regional and international initiatives like the UN Decade on Ecosystem Restoration, the Freshwater Challenge and the 20x20 for Ecosystem Restoration in Latin America and the Caribbean (in which WI is leading the "Wetland Restoration Task Force").

As a global wetland-specific organization, we have acquired a lot of experience in wetland restoration from projects implemented by our network of offices all around the globe. However, these projects had not yet been systematically documented and the important knowledge and experiences gained from their implementation was not compiled and synthesised before this initiative. The results obtained and presented here are serving to better understand the approaches and methodologies used, share knowledge and learning between our network of offices, reflect and communicate our capacities to the external world, build new networks and partnerships, improve praxis, and raise resources to advance wetlands restoration at global level.

This initiative mapped 30 wetland restoration projects implemented since 2000 in 66 sites located in 17 countries across four continents. During the last 22 years over 200,000 ha of wetlands have been restored or are under restoration thanks to these projects. According to the Ramsar Convention classification system, the projects focused on 14 different wetland types. Of these, mangroves; rivers, streams and creeks; freshwater lakes & floodplain lakes; seasonal/intermittent freshwater marshes and flooded meadows; non-forested peatlands; permanent freshwater lakes; forested peatlands and peat swamp forests were the ones most frequently involved in the restoration actions.

We found that 21 projects were implemented at local scale, while 16 of them are part of a wider landscape approach involving our collaboration with partners. Nine projects were implemented at a landscape scale of more than 100,000 ha, of which four were transboundary, in clear alignment with the "4 Returns" approach that Wetlands International is adopting to achieve true resilience.

"Ecological restoration" was the approach adopted by ten projects while "ecosystem rehabilitation" was used in nine projects; a combination of both approaches was implemented in the remaining projects. Sediment balance and hydrological functions were targeted in 20 projects, revegetation or extensive tree planting was widely used to restore and rehabilitate wetlands. Many projects established seedling nurseries and encouraged the planting of native tree species by the local communities.

Almost all projects started with a stakeholder consultation and aimed to improve the livelihoods of local communities. They also encouraged stakeholders to work together towards common outcomes. Community trainings and capacity building of local institutions were important elements as well.

The development of local regulations or legal restrictions with local communities was often an integral part of projects. Work often involved the elaboration of governmental management plans and restoration strategies and, at times, national and international-level policy involvement.

Local communities were among the main beneficiaries, reported for 28 of the 30 projects. Others beneficiaries included governments (23 projects), the private sector (eight projects) and students (five projects). Our long history of alliance and partnership building produced its fruits across the 30 projects. Together, they involved over 80 partners. These ranged from local communities, to civil society organisations, local governments, universities, national governments, foundations, national and international NGOs and companies. Private foundations, governments and companies have supported our work to the tune of 126 million Euros since 2000; however it was not possible to carry out any meaningful analysis of the costs of restoration actions. Further research would be needed for that.

We compiled ecological, socio-cultural, socio-economic and policy outcomes from the 30 projects. Many of them recorded ecological outcomes such as ecosystem and biodiversity recoveries of reptiles, birds, etc. It was nevertheless surprising how little quantitative ecological data was available. More attention to this would benefit the future understanding of project impacts. Similarly for socio-cultural outcomes – these were often anecdotal, including enhanced appreciation of mangroves by communities, increased tourism, better living standards, etc. From the data collected, it is clear that all wetland restoration projects aimed to benefit local economies, but socio-economic achievements were not always measured because they require complex monitoring and evaluation strategies. Twenty of the 30 projects had Monitoring & Evaluation (M&E) programmes in place, but there was not enough information about the M&E strategies or methodologies in-depth analysis for for any of them.

A significant outcome of this initiative is that many of the valuable lessons learned within our organisation over the years have now been brought together in one place. A key lesson from two decades of restoration work is that even severely degraded ecosystems, in gold panning sites or totally transformed military bases, for example, can be at least partially restored in the medium-term. We now have an opportunity to take forward the lessons learned, to upscale our work and restore wetlands across the globe.

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1 Introduction

This initiative was developed by Wetlands International Argentina within the context of the proposed UN Decade on Ecosystem Restoration, our role in leading the “Wetland Restoration Task Force”¹ in Latin America, and the intensification of our restoration work in the Corredor Azul Programme.

Wetlands International has a lot of experience in wetland restoration from projects implemented by our global network of offices. However, these projects have not been systematically documented and the important knowledge and experiences gained from their implementation has not been synthesised. This initiative was developed to demonstrate our vast track record, better understand the approaches and methodologies used, extract key lessons learned for future projects.

The objective of this initiative is to map our organization’s track-record on wetland restoration - whether in coastal or inland areas, including peatlands, mangrove swamps and wetlands in arid regions - documenting information on the different type of interventions, approaches and methodologies used in each case.

The results obtained and presented here will serve as a base to better reflect and communicate our capacities, build networks and partnerships, improve praxis, and raise resources to advance wetlands restoration in the LAC region and across the world.

This report

This report presents the main wetland restoration experiences and projects implemented by Wetlands International since 2000, totalling 30 projects across its network of offices². It also aims to preliminarily map restoration approaches used and define enabling environments conducive to successful wetlands restoration.

Over the next few months, it will also enable Wetlands International to:

- Develop an infographic track-record of our restoration work to communicate successes and to use with donors.
- Share knowledge between offices to strengthen and upscale wetlands restoration work within the Wetlands International network.

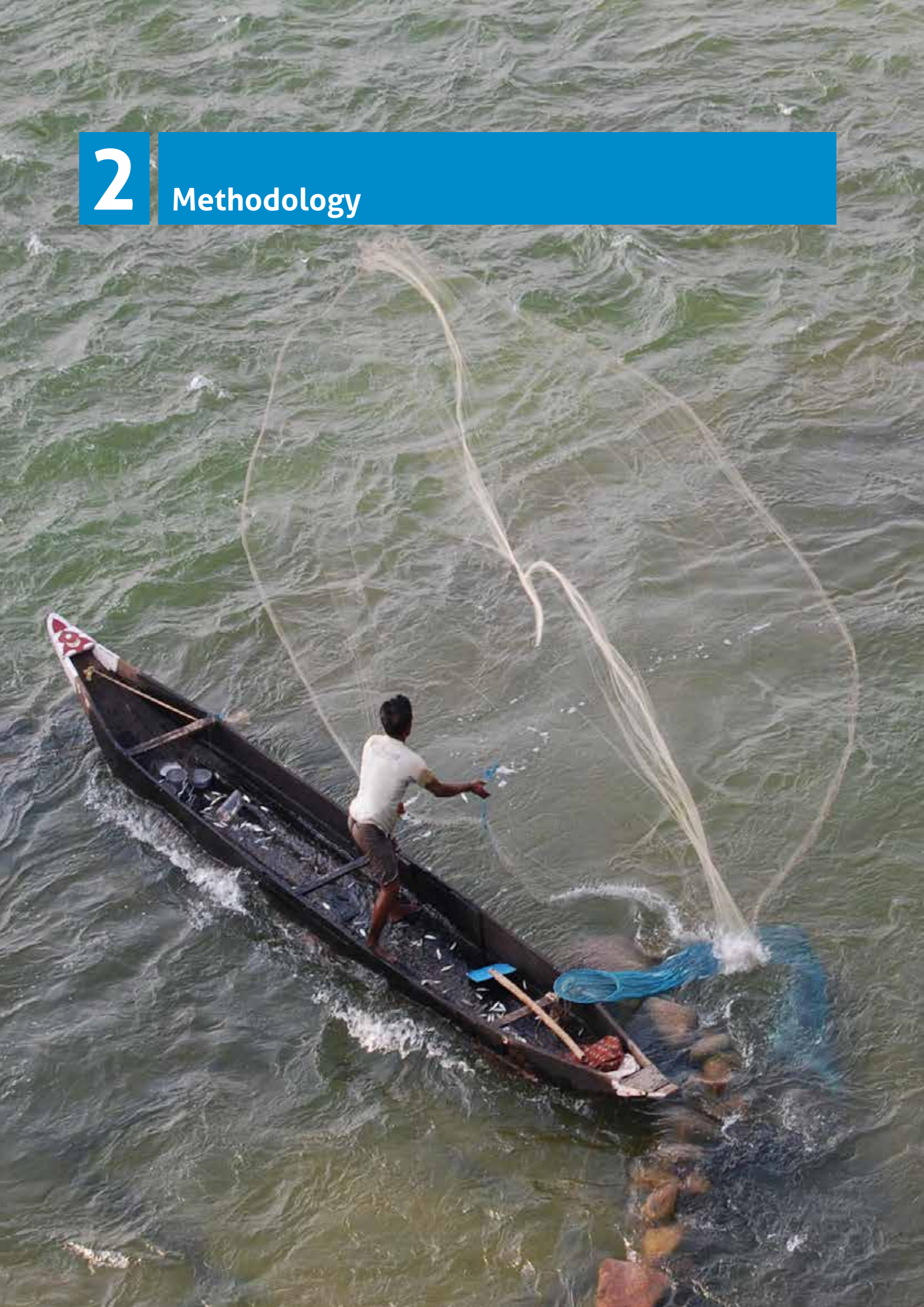
This report is an internal document that can be used in the future for external communication about our restoration work.

¹ **Initiative 20x20** is a country-led effort seeking to change the dynamics of land degradation in Latin America and the Caribbean by beginning to protect and restore 50 million hectares of forests, farms, pasture, and other landscapes by 2030. The initiative—launched formally at COP 20 in Lima in 2014—supports the [Bonn Challenge](#) and the New York Declaration on Forests, global commitments to bring 350 million hectares of the world’s deforested and degraded land into restoration by 2030. So far, 18 Latin American and Caribbean countries and three regional programs have committed to improve more than 52 million hectares of land (or about 124 million acres, an area roughly the size of Paraguay and Nicaragua combined) through Initiative 20x20 (<https://initiative20x20.org/>).

² Near to the closure of this report, we learnt about a 31st restoration project under implementation in the Central Rift Valley of Ethiopia by Wetlands International Ethiopia Office. While this project was not included in the analysis of this report, more details about it can be found in the Project Summary Sheet in **Annex 2**.

2

Methodology



This initiative was presented to the 2019 Wetlands International Annual Meeting and as a follow up, a core team was created to support its implementation. A proforma for the collection of information and data about restoration projects was developed with the core team and input from other Wetlands International staff. Based on the proforma a questionnaire on Survey Monkey was developed (see **Annex 1**).

Heads of Office (HoOs) were asked to contribute to the initiative and to submit information regarding restoration projects through filling the Survey Monkey questionnaire. Simultaneously, a search was conducted through scanning all Annual Reports since 2000, to identify relevant restoration work and triangulate it with what was submitted by HoOs in case any significant projects had been omitted.

Each HoO nominated one (or several) focal point staffs to fill in the Survey Monkey. Based on the input received from the network, summary sheets were developed for each project (see **Annex 2**). When necessary the focal point staffs were consulted to clarify any queries (i.e. budget issues or area restored, for example).

Focal points staffs were asked to provide detailed information concerning the restoration projects under implementation or implemented since 2000 by the WI offices, including:

- Project scale (whether a project was implemented at local scale or was part of a wider landscape approach).
- Project duration.
- Wetland type under restoration (using the Ramsar classification system of wetland types).
- Primary cause of wetland degradation from on a drop down menu consisting of 11 main causes.
- Ecosystem services recovered or improved, following the categories defined by the Millennium Ecosystem Assessment: (A) Provisioning, (B) Regulating, (C) Culture and (D) Supporting). Respondents were asked to indicate which ecosystem services sub-types were being recovered or improved by their projects. There was no limit to how many ecosystem services could be mentioned.

- Main restoration approaches used.
- Area restored.
- Main beneficiaries (drop down menu consisting of local communities, government, private sector, students and others).
- Main project donors and budget.
- Outcomes achieved, whether ecological, socio-economic or socio-cultural.
- Lessons learned.
- Whether a monitoring and evaluation programme is or was in place.

Restoration approaches

Focal point staffs were asked to classify the main restoration approach or approaches used in each project using the classification below, and to provide more detail about methodologies used.

- Ecological restoration:** The process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed. Restoration is used for the activity undertaken and recovery for the outcome sought or achieved. An **ecological restoration project** or program aspires to substantial recovery of the native biota and ecosystem functions (in contrast with rehabilitation below).
- Ecosystem Rehabilitation** which aspires to reinstate certain level of ecosystem functioning for renewed and ongoing provision of ecosystem services potentially derived from non-native ecosystems as well. Rehabilitation is one of many restorative activities aligned along a continuum that includes ecological restoration and its allied and complementary activities, all of which contribute to improving ecosystem integrity and social-ecological resilience.

This summary report was produced compiling and analysing the input received from the network of offices through the survey.

3

Wetland restoration within the Wetlands International strategy



Restoration has always been a corner stone of Wetland International's work. In some regions, demonstrating restoration on the ground has been a main focus, while in other regions greater effort has gone into influencing policies and communications. This initiative allows us to look back and see how our restoration work contributes to our 2020-2030 Strategic Intent.

Our intervention strategies

Our theory of change encapsulates three phases of work: to inspire, mobilise and upscale. These are the key ingredients of our organisational strategy for the period 2020-2030. They can be summarised as:

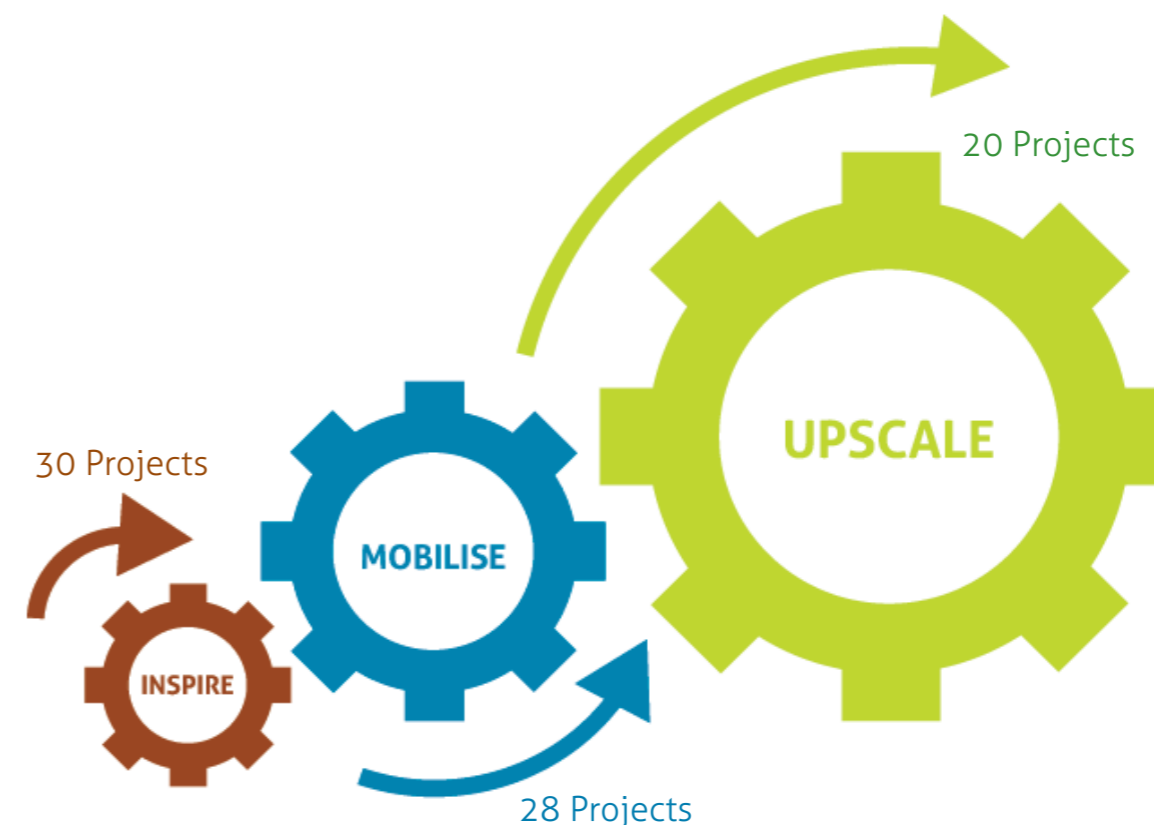
Inspire: To create societal demand for wetland action by a) sharing insights and knowledge; b) encouraging innovation and c) influencing agendas.

Mobilise: To enable action and create conditions for upscaling by a) enabling

dialogues; b) building coalitions around shared vision; c) identifying and piloting landscape solutions.

Upscale: To increase the scale of our impacts by enabling others to implement solutions by a) designing integrated landscape scale plans; b) transforming policies and attracting investment; c) improving standards and behaviours of companies.

All 30 restoration projects reviewed were seen as contributing to the "Inspire" phase of our intervention strategies, while 28 of the 30 projects (93%) contribute to the "Mobilize" phase and 67% (20 of the 30 projects) were reported as contributing to the "Upscale" phase. Clearly "Upscaling" is a strategy that has not been focused on as much as the others when it comes to restoration work. It is time to truly start upscaling our restoration work given our local successes to date and the urgency to take action.



Streams of work

Our vision, targets and strategic interventions are shaped according to landscapes. We focus on three broad categories of wetland landscapes: Deltas & Coasts, Rivers & Lakes, and Peatlands. "Streams" of work are defined according to the specific contexts of these wetland landscape types.

Projects were quite evenly distributed between the three organisational streams. Of the 30 projects surveyed, 10 were considered to be exclusively under the Deltas & Coasts Stream, 10 exclusively under Rivers & Lakes and four exclusively under the Peatlands stream; while six were reported as covering more than one stream (Table 1). In total, eight projects therefore focused on peatlands. Peatland restoration work has tended to consist of large programmes covering large wetland areas. A full list of projects and their respective streams can be found in **Annex 3**.

Table 1.- Number of projects per streams of work

Streams	Number of projects
Deltas & Coasts	10
Rivers & Lakes	10
Peatlands	4
Deltas & Coasts + Rivers & Lakes	2
Rivers & Lakes + Peatlands	4
Total	30

4 Wetlands restoration work since 2000 - Some key facts

A total of 30 restoration projects were submitted by the network of offices (see Table 2). It is important to note that some big programmes -such as Corredor Azul and Mangrove Capital Africa-, implement restoration actions that in this mapping were considered as "sub-projects", which are listed here as separate "projects" with a reference to the big programme under which they are implemented.

Table 2.- Restoration projects organized by WI office and indicating the timeframe

WI Office	No.	Project name	Timeframe
LAC - Argentina	1	Río Valdés Reserve Peatland Restoration	2016-2017
	2	Restoration of "Laguna Llanquanelo" Ramsar Site	2014-2021
	3	Saving High Andean Wetlands for People and Nature	2017-2024
	4	Corredor Azul: Cattle raising in Parana Delta	2017-2027
	5	Restoration of "Lagunas de Guanacache" Ramsar Site	2011-2020
LAC - Panama	6	Mangrove restoration on Isla Galeta	2018-2024
	7	Las Lajas lagoon	2017-2025
Brazil	8	CHOICE Pantanal	2022-2026
	9	Corredor Azul: Kadiwéu Indigenous Community	2020-2022
	10	Corredor Azul: Aquarela Pantanal	2020-ongoing
China	11	Peatlands restoration in the Ruoergai Plateau	2003-2006
East Africa	12	Nile Basin: Transboundary project	2019-2021
	13	Mangrove Capital Africa: Rufiji Delta	2017-ongoing
Indonesia	14	Partners for Resilience (PfR)	2011-2014
	15	Banten Bay Carbon Offset Project	2009-2023
	16	Peatlands North Sumatra (PME-IKI)	2019-2022
	17	Climate Change, Forest & Peatlands (CCFPI)	2001-2005
	18	Building with Nature	2015-2021
Japan	19	Yatsu-higata (tidal flats) Restoration	2010-2019
Philippines	20	Agusan River Basin	2016-2020
Russia	21	Restoring Peatlands in Russia – for fire prevention & climate change mitigation	2011-2023
Sahel (Mali)	22	Sand dune fixing in the Inner Niger Delta	2011-2015
	23	Ecosystem restoration in Sakarani Basin	2017-2021
	24	Flooded forest in Inner Niger Delta	2015-2021
	25	Noga Village Pond channels, Inner Niger Delta	2011-2015
	26	Bourgour restoration, Inner Niger Delta	2019-2021
South Asia	27	Restoration of Loktak, India	1996-ongoing
	28	Chilika Lake, India	1992 - ongoing
West Africa	29	Mangrove Capital Africa: Saloum delta, Casamance and Nioumi National Park	2017-ongoing
	30	Conservation of Mangroves in Senegal	2012-2016

4.1. Scale of projects

Twenty one of the 30 projects are implemented at a local scale; 16 of them as part of a **wider landscape approach** involving our collaboration with partners. Nine projects or programmes were implemented at a landscape scale of more than 100,000 ha, of which four were transboundary.³

The landscape approach

Wetlands International has recently adopted the **4 Returns Framework** for landscape restoration, which uses a full “landscape approach”⁴. This approach shows that wetland restoration in pilot sites is not enough to bring about true resilience to the system. A landscape or catchment level solutions is needed.

Our analysis shows that Wetlands International had already implicitly adopted parts of the “4 Return” approach in several of its restoration projects implemented or under implementation since 2000. Of the 30 restoration projects studied, 25 had already adopted a landscape scale approach or were part of a broader landscape scale initiatives.

Other elements of the **4 Returns Framework**, such as stakeholder consultation were also part of almost all projects, and local communities were actively involved. Local communities have benefited economically from most of the wetland restoration projects through improved sustainable livelihoods, and various anecdotal socio-cultural benefits were report.

However, it appears that ecological restoration was the primary focus of the projects, hence leading to natural returns. Social, financial and inspirational returns, that are important elements of the **4 Returns Framework**, were not specifically targeted as objectives for these projects, nor systematically measured. So it is difficult to describe the 4 Returns of these projects based on the information gathered about the projects.

4.2. Duration of projects

Some projects have been running for decades while others have only just begun (Table 3 and **Annex 4**). Chilika Lake and Lokta Lake in India are the longest running project for over 30 and 26 years respectively. The Banten Bay Carbon Offset project in Indonesia has been in place for 14 years, and in Russia, peatland restoration work started some 12 years ago. The Corredor Azul programme, in Latin America (which includes some restorations actions / sub-projects), started in 2017 and is planned to run for at least 10 years.

Fourteen of the 30 projects mapped are ongoing today. The average project duration has been six years. It seems, from the survey responses, that we aspire more and more to design and implement longer-term restoration projects and programmes. Offices stated that they intend to continue their involvement for 20 years or more in 21 of the projects submitted.

Table 3.- Duration of projects

Project duration	Number of projects
1 year	1
2 year	4
1.5 years	12
6-10 years	9
> 10 years	4
Total	30

4.3. Project locations

The 30 restoration projects mapped in this initiative were implemented in 66 different sites located in 17 countries⁵ across four continents (see Table 4, Figure 1), including eight projects in Africa, 11 in Asia, 10 in Latin America & Caribbean and one in Europe (Russia). Some projects or programmes such as the Peatlands programme in Russia involve restoration work across multiple sites (more than 20) while other projects, such as some projects in Mali or Brazil, implement restoration work on a specific site covering a small to medium area. Other projects, like Chilika and Lokta Lake in India, focus on what is referred to as one site in this report, but these “sites” cover an extensive area within one catchment system or complex. This variation in site size and grouping under programmes or projects means that we cannot really draw any major conclusions from this data, but it does show that some programmes like the Russia Peatlands programme and Mangrove Capital Africa are upscaling to other regions what may have begun as a site specific project.

Table 4.- Project sites / locations

No.	Site / Wetland ecosystem or landscape (locations)	Country	Region
1	Río Valdés Reserve, Tierra del Fuego Province	Argentina	LAC
2	Llancanelo Lagoon Ramsar Site, Mendoza Province	Argentina	LAC
3	Parana Delta landscape	Argentina	LAC
4	Guanacache Lagoons Ramsar Site, Mendoza Province	Argentina	LAC
5	Pozuelos Lagoon, Jujuy Province	Argentina	LAC
6	Salinas Grandes, Jujuy Province	Argentina	LAC
7	Junín Lake, Junín and Pasco Departments	Peru	LAC
8	Carampoma-Marcapomacocha, Huarochiri Province	Peru	LAC
9	Las Lajas Lagoon, San Felix	Panama	LAC
10	Galeta Island protected area, Colón	Panama	LAC
11	Kadiwéu Indigenous Territory, Pantanal	Brazil	LAC
12	Sesc Pantanal Private Reserve, Pantanal	Brazil	LAC
13	Demak District, Central Java	Indonesia	Asia
14	Jambi, S. Sumatra, Central Kalimantan	Indonesia	Asia
15	Berbak National Park, Jambi	Indonesia	Asia
16	Merang Kepahiyang Peat Forest, South Sumatra	Indonesia	Asia
17	Banten Bay, Sawah Luhur Village, Banten Province	Indonesia	Asia
18	Flores Maumere (Sikka) and Ende District	Indonesia	Asia
19	Ruoergai, Sichuan Province	China	Asia
20	Yatsu-higata tidal flats, Tokyo Bay	Japan	Asia
21	Loktak Lake, Manipur Valley	India	Asia
22	Chilika Lake, Mahanadi river delta	India	Asia
23	Agusan River Basin, Agusan del Sur	Philippines	Asia
24	Saloum Delta	Senegal	Africa
25	Casamance	Senegal	Africa
26	Ziguinchor	Senegal	Africa

³ Corredor Azul (#4) implemented by LAC Argentina / Nile Basin transboundary project (#12) implemented by WI East Africa in Sio-Siteko (Kenya and Uganda), Semliki (Uganda and Democratic Republic of Congo) and Sango Bay-Minziro (Uganda and Tanzania) / Mangrove Capital Africa (#13) implemented by WI East Africa / Mangrove Capital Africa (#29) implemented by WI West Africa.

⁴ Recently, Wetlands International, [Commonland](#) and [Landscape Finance Lab](#) have come together to address the barriers that prevent a systemic approach taking root, by working through the **4 Returns Framework** for landscape restoration, which is a practical tested system-change framework used by stakeholders to undertake a landscape approach. It seeks to balance competing stakeholder demands in a mosaic of different management approaches, to supply a full range of natural, social and economic returns. In our joint ‘Accelerating landscape regeneration at scale’ program we are currently further developing the methodology and creating a **4 Returns Finance** framework alongside.

No.	Site / Wetland ecosystem or landscape (locations)	Country	Region
27	Kolda	Senegal	Africa
28	Niumi National Park, Essau	Gambia	Africa
29	Noga, Dialloubé, Mopti region	Mali	Africa
30	Akka-Goun, Inner Niger Delta	Mali	Africa
31	Walado Debo, Deboye & Youwarou, Inner Niger Delta	Mali	Africa
32	Farabacoura, Sakarani Basin of the Upper Niger	Mali	Africa
33	Sobé village, Mopti region	Mali	Africa
34	Rufiji Delta, Rufija district	Tanzania	Africa
35	Sio-Siteko Transboundary wetland	Kenya & Uganda	Africa
36	Semliki transboundary river	Uganda & DR of Congo	Africa
37	Sango Bay-Minziro transboundary wetland system	Uganda & Tanzania	Africa
38	Berkazan-Kamysh, Bashkortostan region	Russia	Europe
39	Vishnyovoye, Kaliningrad region	Russia	Europe
40	Vittgirrenskoye, Kaliningrad region	Russia	Europe
41	Drakovskoye, Kaluga region	Russia	Europe
42	Obolon, Kaluga region	Russia	Europe
43	Severnoye, Moscow region	Russia	Europe
44	Elk Island, Moscow region	Russia	Europe
45	Kama-Bakaldino, Nizhny Novgorod	Russia	Europe
46	Bolshoye Orlovskoye, Nizhny Novgorod	Russia	Europe
47	Gorodnoye, Ryazan region	Russia	Europe
48	Kovezh, Ryazan region	Russia	Europe
49	Mokhovoye, Tver region	Russia	Europe
50	Lodkinsky, Tver region	Russia	Europe
51-56	Orsha, Tver region (6 sites)	Russia	Europe
57	Ozeretsko-Nepluevskoye, Tver region (Demonstration site)	Russia	Europe
58	Vasilievsky, Tver region	Russia	Europe
59	Orlovsko-Kurlovskoye, Vladimir region	Russia	Europe
60-62	Ostrovskoye park, Vladimir region (2 sites)	Russia	Europe
63	Bakshevo, Vladimir region	Russia	Europe
64	Bolshoye Ursovo, Vladimir region	Russia	Europe
65	Makarihinskoy, Vladimir region	Russia	Europe
66	Gorohovetsky, Vladimir region	Russia	Europe

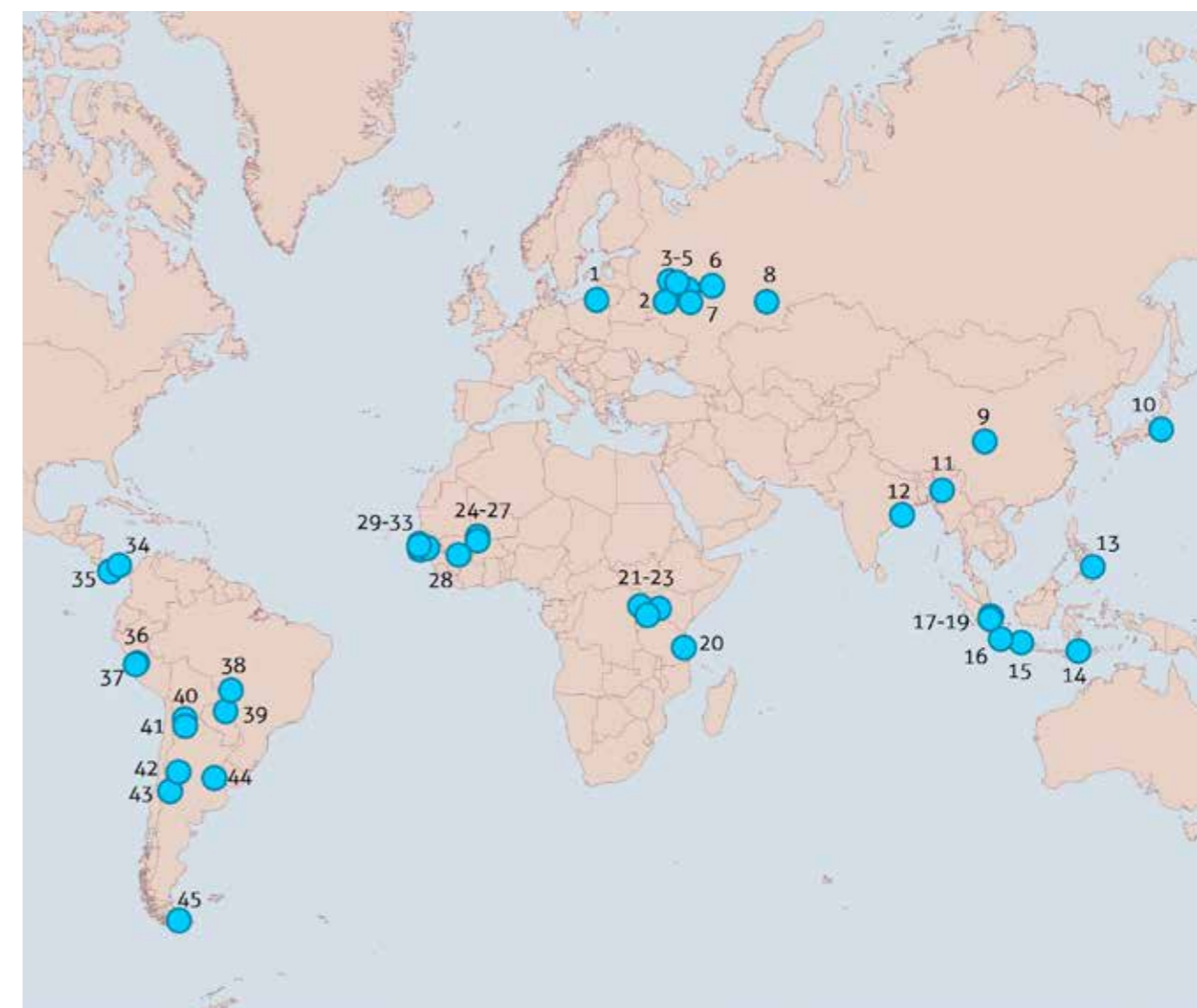
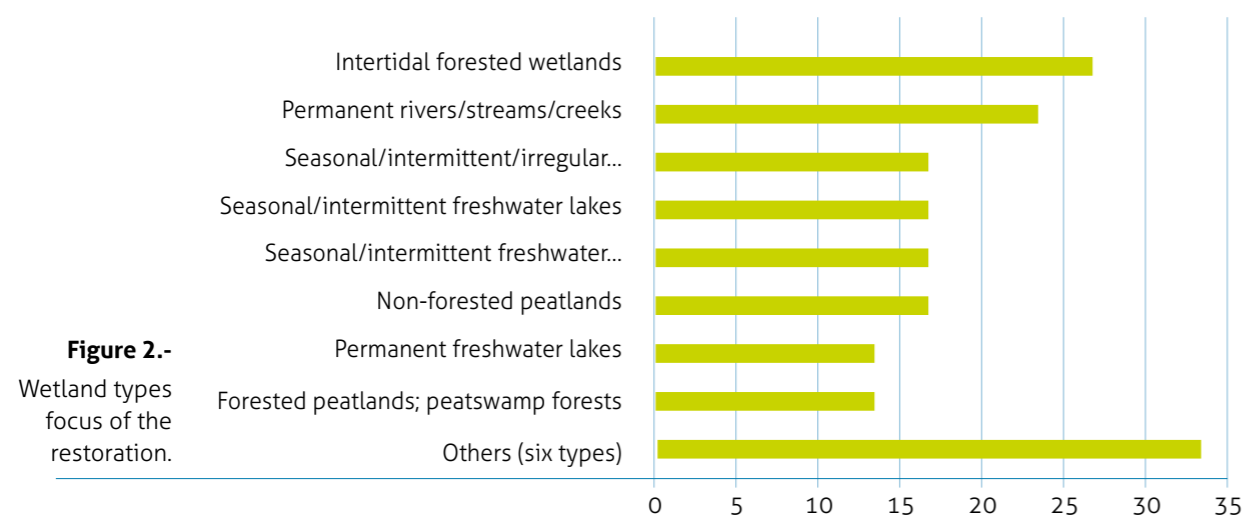


Figure 1.- Sites / locations with wetland restoration interventions: **1)** Kaliningrad region; **2)** Kaluga region (2 sites); **3)** Vladimir region (8 sites); **4)** Tiver region (10 sites); **5)** Moscow region (2 sites); **6)** Nizhny Novgorod region (2 sites); **7)** Ryazan region (2 sites); **8)** Bashkortostan Republic; **9)** Ruoergai (Sichuan Province), **10)** Yatsu-higata tidal flats (Tokyo Bay), **11)** Loktak Lake (Manipur Valley), **12)** Chilika Lake (Mahanadi river delta), **13)** Agusan River Basin, **14)** Flores Maumere (Sikka) and Ende District, **15)** Demak District (Central Java), **16)** Merang Kepahiyang Peat Forest (South Sumatra), **17)** Banten Bay, Sawah Luhur Village (Banten Province), **18)** Jambi (S. Sumatra, Central Kalimantan), **19)** Berbak National Park, Jambi, **20)** Rufiji Delta (Rufiji district), **21)** Sango Bay-Minziro transboundary wetland system, **22)** Sio-Siteko Transboundary wetland, **23)** Semliki transboundary river, **24)** Noga, Dialloubé (Mopti region), **25)** Akka-Goun (Inner Niger Delta), **26)** Walado Debo, Deboye & Youwarou (Inner Niger Delta), **27)** Sobé village (Mopti region), **28)** Farabacoura (Sakarani Basin of the Upper Niger), **29)** Saloum Delta, **30)** Casamance, **31)** Ziguinchor, **32)** Kolda, **33)** Niumi National Park, Essau, **34)** Galeta Island protected area (Colón), **35)** Las Lajas Lagoon, San Felix, **36)** Junín Lake (Junín and Pasco Departments), **37)** Carampoma-Marcapomacocha (Huarochiri Province), **38)** Sesc Pantanal Private Reserve (Pantanal), **39)** Kadiwéu Indigenous Territory (Pantanal), **40)** Pozuelos Lagoon (Jujuy Province), **41)** Salinas Grandes (Jujuy Province), **42)** Guanacache Lagoons Ramsar Site (Mendoza Province), **43)** Llacanelo Lagoon Ramsar Site (Mendoza Province), **44)** Parana Delta landscape, **45)** Río Valdés Reserve (Tierra del Fuego Province).

4.4. Wetland types

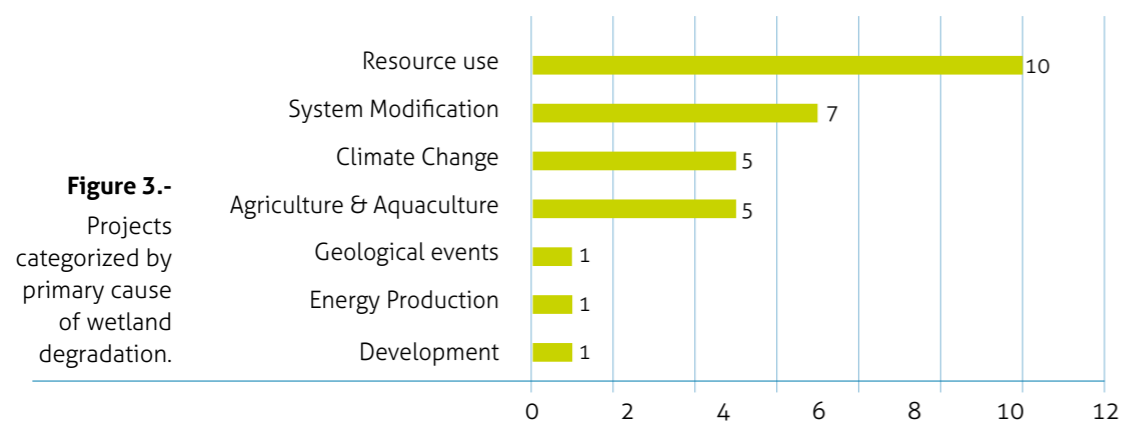
According to the Ramsar classification system of wetlands types, our 30 projects are restoring or have restored 14 different wetland types (see **Annex 5**). The most frequently restored wetland types are mangroves (intertidal forested wetlands); rivers, streams and creeks; freshwater lakes & floodplain lakes; seasonal/intermittent freshwater marshes and flooded meadows; non-forested peatlands; permanent freshwater lakes; forested peatlands and peat swamp forests (see figure 2).



4.5. Primary cause of wetland degradation

The primary cause of wetland degradation of mapped projects was defined based on a drop down menu consisting of main 11 causes (see Figure 3).

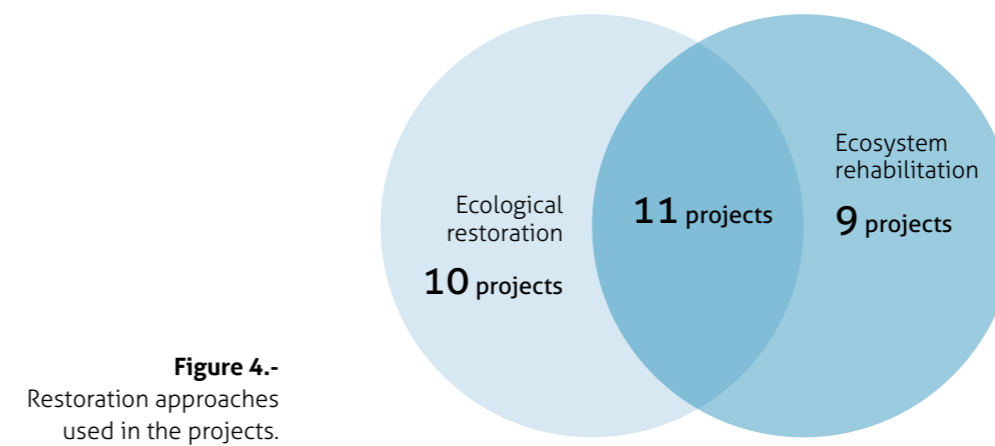
Resource use⁶ was reported as the main cause of wetland degradation in nine restoration projects; system modification in six projects (dams & water use and fires); agriculture in five projects and climate change in five projects. Less mentioned causes included development, energy production and geological events. Details for each project can be found in the respective Project Summary Sheets in **Annex 2**.



⁶ Such as logging and wood harvesting, fishing & harvesting aquatic resources, hunting & collecting terrestrial animals, gathering plants, peat extraction

4.6. Restoration approaches

Of the 30 projects analysed, ten reported the use of largely an “ecological restoration” approach, nine the use of “ecosystem rehabilitation” and 11 the use of a combination of both approaches (Figure 4; see more details about the different approaches in the Methodology section).



Almost all projects started with a stakeholder consultation process and aimed to fully involve local communities. Restoration or rehabilitation approaches were often supported by an innovative micro-credit mechanism called Bio-right⁷ that links improved livelihood production and habitat protection to sustainable environmental protection. If bio-rights per se were not used, other socio-economic measures to promote sustainable land-use were introduced such as sustainable aquaculture and livelihoods diversification.

At least 20 projects used specific technologies to restore sediment balance and hydrological functions such as clearing or constructing canals, blocking/removing drainage ditches or constructing embankments in gullies (often using local materials). River buffer zones were established and river banks stabilised using bamboo in many projects in Asia.

Revegetation (in at least 9 projects) and / or extensive tree planting (in at least 13 projects) were used to restore and rehabilitate wetlands. Many projects established seedling nurseries and encouraged the planting of native tree species by the local communities (mangrove species and

peat swamp species in particular). Re-seeding and replanting were also complemented by fencing off areas to encourage natural regeneration and farmer managed natural regeneration (FMNR). Removal of invasive species, such as the Tamarix specie in Laguna Llanquanelo (Mendoza province, Argentina), was part of at least two restoration projects. Community trainings and capacity building of local institutions were often an important element of the restoration strategy.

Community Based Ecological Mangrove Restoration (CBEMR)⁸ was often used focusing on better understanding of the ecology and hydrology of the site and correcting the problems that caused the mangrove loss in the first place which ensures successful restoration.

Passive restoration approaches were also used in a couple of projects. This starts with the assumption that when better management practices (focused on water resource, soil, vegetation and wildlife care) are implemented they will reduce the negative impacts leading to the recovery of ecological functions (hydrologic flux and storage, biological productivity, biogeochemical cycling and storage, decomposition, etc).

⁷ **Bio-rights** is an innovative financing mechanism for reconciling poverty alleviation and environmental conservation. By providing micro-credits for sustainable development, the approach enables local communities to refrain from unsustainable practices and be actively involved in environmental conservation and restoration. Micro-credits are converted into definitive payments upon successful delivery of conservation services at the end of a contracting period.

⁸ **CBEMR methodology** works to restore underlying hydrology and considers adjustments to a disturbed area’s topography, so that mangroves may regenerate naturally, resulting in true ecosystem restoration with a richer biodiversity. Importantly, local mangrove communities learn to perform this work, and in the process learn to restore, value, and responsibly steward their mangroves.

Many projects contributed to develop local regulations or legal restrictions with the local communities, to ensure the longer-term conservation of wetland sites. Wetlands International almost always worked to support the development of governmental management plans and restoration strategies. At times, far wider policy engagement at a national and international level was considered necessary.

Projects did not only aim to restore ecological function, they also aimed to improve the productivity of the wetlands and hence make more apparent the economic values of well managed wetlands. In the case of peatland restoration in Russia, peatbog management and restoration practices aimed to create an environment with high productivity and natural diversity improving the vegetation cover and optimizing rainwater harvesting and distribution. In this way sustainable peat extraction practices could be implemented reducing the negative impact of peat exploitation, leading to more resistant and resilient systems. In Llancañelo and Guanacache lagoon (Mendoza province, Argentina), wetland restoration also aimed to better support local communities and small scale livestock raising, improving the provision of key resources like natural pastures and water.

All restoration projects encouraged stakeholders to work together towards a common outcome. In Mali, for example, local water and forest authorities together with Wetlands International, supported rural communities in conservation techniques and monitoring of the sites. In India, Wetlands

International undertook bottom-up consultation with local communities and natural resource users thus being able to bring the concerns of these stakeholders into the development of a first management plan for the Chilika catchment in 2012.

What is clear is that our projects use an approach which recognises the interconnectedness of wetland biological diversity and ecosystem services with land and water management taking into account the external, natural and induced factors as well as the concerns and knowledge of local communities.

More details about the individual restoration approaches used in each project can be found in the project Summary Sheets in **Annex 2**.

4.7. Ecosystem services under recovery

The 30 projects contribute to the recovery of different ecosystem services. Twenty three projects focused on soil formation (sediment retention and accumulation of organic matter) and twenty two on food production. Twenty projects aimed to recover or improve water storage, erosion and climate regulation, while 19 projects were reported as targeting education, inspirational and spiritual values of wetlands (see Figure 5).

At least half of the projects also aimed to restore the natural hazard prevention, nutrient cycling, recreational and water purification functions of wetlands (more details about ecosystem services under recovery could be found in the project Summary Sheets in **Annex 2**).

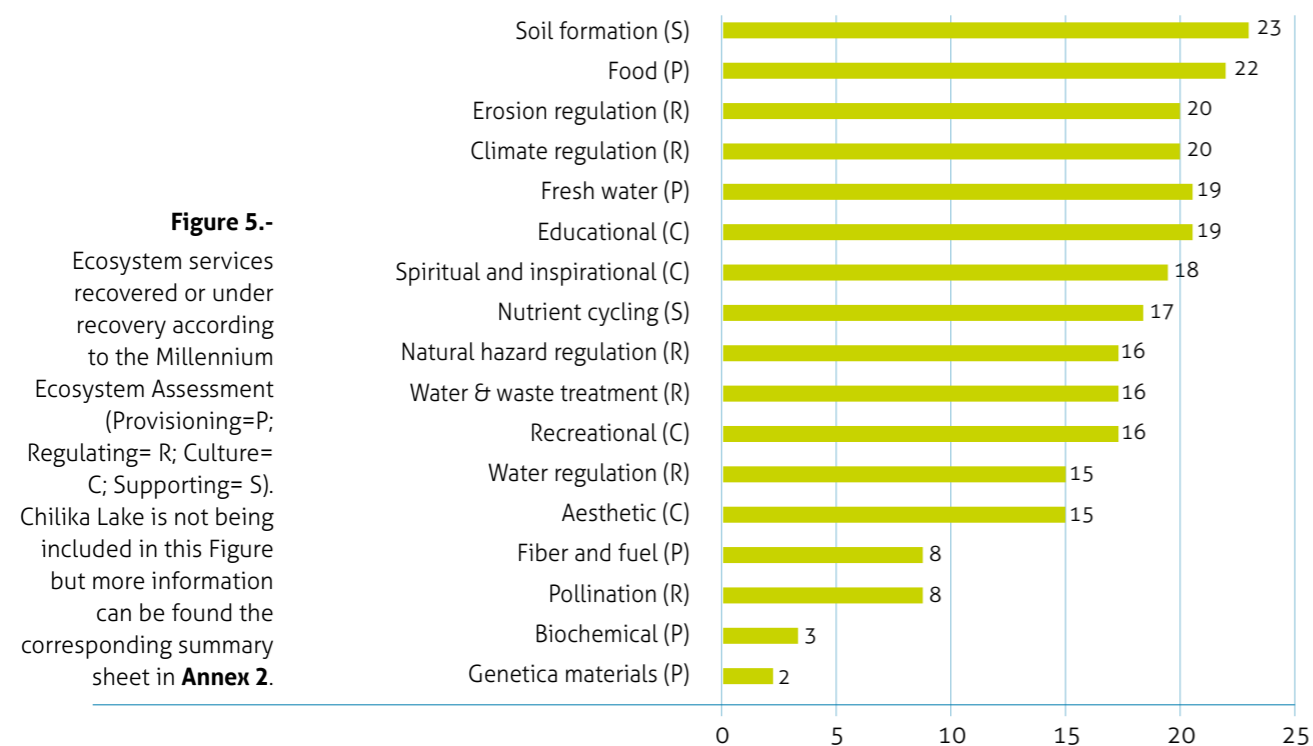


Figure 5.- Ecosystem services recovered or under recovery according to the Millennium Ecosystem Assessment (Provisioning=P; Regulating= R; Culture= C; Supporting= S). Chilika Lake is not being included in this Figure but more information can be found the corresponding summary sheet in **Annex 2**.

4.8. Area restored

From the 30 projects analyzed, over 200,000 ha of wetlands have been restored or are under restoration all around the world since 2000 (Table 5). The Chilika Lake programme (India) alone accounts for 116,500 ha, while Lokta Lake (also in India), restored 25,600 ha of permanent and seasonal lakes. 22,000 ha of peatlands were restored in Russia while 18,327 ha of wetlands are under restoration in the Parana Delta (Argentina), thanks to better livestock management practices. In Indonesia over 10,000 ha of peatlands have been restored in South Sumatra,

while in Mali 5,000 ha of flooded plains and lakes have been restored in the municipality of Dialloubé. Interestingly, a large project is in place on each of the four continents.

Some pilot projects aimed to restore only small well defined areas such as the Isla Galeta project in Panama that restored 6.2 ha. Others, like the peatland project in Russia, offered a spring board for upscaling restoration work to other sites across the country resulting in over 22,000 ha restored on more than 20 sites in 12 years. That said, lessons learned from pilot projects such as Isla Galeta can be very significant for upscaling our work across larger areas.

Table 5.- Estimated area restored or under restoration by project, in increasing order of size. N/A= data not available.	
Name of Restoration Project (project #)	Area restored or under restoration (ha)
Mangrove restoration on Isla Galeta, Panama (#6)	6.2
Ecosystem restoration in Sakarani Basin, Mali (#23)	10
Río Valdés Reserve Peatland Restoration (#1)	15
Agusan River Basin, Philippines (#20)	20
Banten Bay Carbon Offset Project, Indonesia (#15)	20
Partners for Resilience (PfR), Indonesia (#14)	30
Yatsu-higata (tidal flats) Restoration, Japan (#19)	40
Building with Nature, Indonesia (#18)	118.8
Las Lajas lagoon, Panama (#7)	150
Flooded forest in Inner Niger Delta, Mali (#24)	200
Peatlands restoration, Ruoergai Plateau, China (#11)	200
Saving High Andean Wetlands for People and Nature (#3)	238
Mangrove Capital Africa, West Africa (#29)	265
Restoration of "Laguna Llancañelo" Ramsar Site (#2)	282
Peatlands North Sumatra (PME-IKI) Sumut, Indonesia (#16)	285
Conservation of Mangroves in Senegal (#30)	350
Mangrove Capital Africa, East Africa Rufiji Delta (#13)	810 ⁹
Restoration of "Lagunas de Guanacache" Ramsar Site (#5)	1,000
Bourgour restoration, Inner Niger Delta, Mali (#26)	1,280
Sand dune fixing in the Inner Niger Delta, Mali (#22)	2,000
Noga Village Pond channels, Inner Niger Delta, Mali (#25)	5,000
Climate Change, Forest & Peatlands, Indonesia (#17)	>10,000
Corredor Azul: Cattle raising in Parana Delta (#4)	18,327
Restoring Peatlands in Russia	22,000
Restoration of Loktak Lake, India (#27)	25,600
Chilika lake, India (#28)	116,500
Nile Basin: Transboundary project (#12)	hundreds of km
Corredor Azul: Aquarela Pantanal (#10)	N/A
CHOICE Pantanal (#8)	N/A
Corredor Azul: Kadiwéu Indigenous Community (#9)	N/A

⁹ 810 ha restored and 86,500 ha conserved.

4.9. Main beneficiaries

Local communities were reported as the main project beneficiaries for almost all projects (28 of the 30 projects); governments were beneficiaries for 23 projects, the private sector for eight projects¹⁰ and “students” were identified as main beneficiaries in only five projects¹¹. Only the Mangrove Capital Africa programme in West Africa listed civil society organisations as additional beneficiaries alongside local communities, government, the private sector and students. In western Africa we have a history of empowering a wide range of civil society organisations that are seen as essential to project success due to their important roles in influencing local policies and supporting communities. Unfortunately, more detailed information regarding private sector’s beneficiaries was not collected, limiting our analysis.

4.10. Alliances and partnerships

We have a long history of building alliances and working in partnership, which are an integral part of almost all restoration projects reviewed. In wetland restoration we have worked with over 80 different partners since 2000, ranging from local communities, civil society organisations, local government, universities, national governments, foundations, national and international NGOs and companies (see **Annex 6**).

It is interesting to note that in some countries like Mali, the main partners are governmental agencies, while in Latin America many academic partnerships have been forged to implement projects on the ground. In Indonesia, partnerships with civil society organisations seem prevalent as well as governmental alliances. Donors, who in the past may not have been perceived as partners per se, seem to be working in a different way these days, DOB Ecology in particular is mentioned as an explicit project partner as well as a donor.

4.11. Main donors and budgets

Our projects and restoration work have been supported by private foundations, governments and companies (see **Annex 7** for more detail), however further research would be needed to clarify which type of donors contributed most to our restoration work.

Regarding the financing of our restoration work, it is important to note that for some projects it was only possible to get an overall budget (which includes the costs of different interventions, like restoration work, communications and advocacy, capacity building, etc), while for other projects it was possible to obtain the specific cost of the restoration interventions. Project budgets ranged from 90 million US\$ spent over 26 years to restore 25,000 ha in the case of Lokta Lake (which included all elements of the project necessary to secure its restoration) to 18,570 US\$ spent in one year to restore a 15 ha peatland in the Río Valdés Reserve, Tierra del Fuego, Argentina (see **Annex 8** for more detail).

It was not possible to carry out any meaningful analysis of average annual restoration budget or the budget spent per ha of wetland restored given the diversity of financial data received. Besides, it is clear that the cost of restoration work varies enormously between projects and countries. What might have some meaning is that between these 30 projects, over 126 million Euros were spent or committed to secure the restoration of just over 200,000 ha of wetlands.

4.12. Project outcomes

Information on the ecological, socio-cultural, socio-economic and policy outcomes achieved by the 30 projects were compiled (more detailed information in the Summary Sheets, **Annex 2**). While some ecological outcomes are well documented such as ecosystem and biodiversity recovery for reptiles, birds, etc, and some projects have monitored threatened species (manatee) and bio-indicator species (birds, fish), it was surprising how little quantitative ecological data was provided in the survey. It may be interesting to determine whether sufficient ecological data to demonstrate the effectiveness of restoration is being collected but was not submitted in the survey or whether projects need to put in place a more thorough methodology for ecological data collection. Many projects stated that it is too early to assess ecological outcomes.

Many anecdotal socio-cultural outcomes were listed such as enhanced appreciation of mangroves by communities living outside the project site, increased tourism, better living standards due to reduced odours of decaying seaweed, and the return of traditional rites to the site. In Tibet, a restoration project contributed to the increase in Black-necked Cranes a sign of good luck to Tibetan herders.

From an economic perspective it is clear that almost all wetland restoration projects have benefited the local communities. Sustainable livelihood activities are almost always associated with restoration work and listed as positive outcomes to most projects. These activities enable income diversification, the strengthening of local businesses and at times are seen as reducing dependence on ecologically damaging practices. However, socio-economic achievements were not always measured because it was argued that they require quite complex monitoring and evaluation strategies.

4.13. Monitoring and Evaluation

Monitoring & Evaluation (M&E) plans are in place for 20 of the 30 projects analyzed. Some projects without M&E plans in place tried to, for example, monitor the growth and survival of replanted trees, involving local communities but it did not work. Others are in the process of developing M&E protocols. Some projects failed to state whether they had M&E plans in place. The survey did not collect enough information about M&E programmes for any interesting analysis to be done or to come to any real conclusion other than M&E being recognised as an important part of project planning. Further research and reflection about how best to monitor and evaluate our restoration projects is clearly needed and should be part of the follow up work to this initiative.

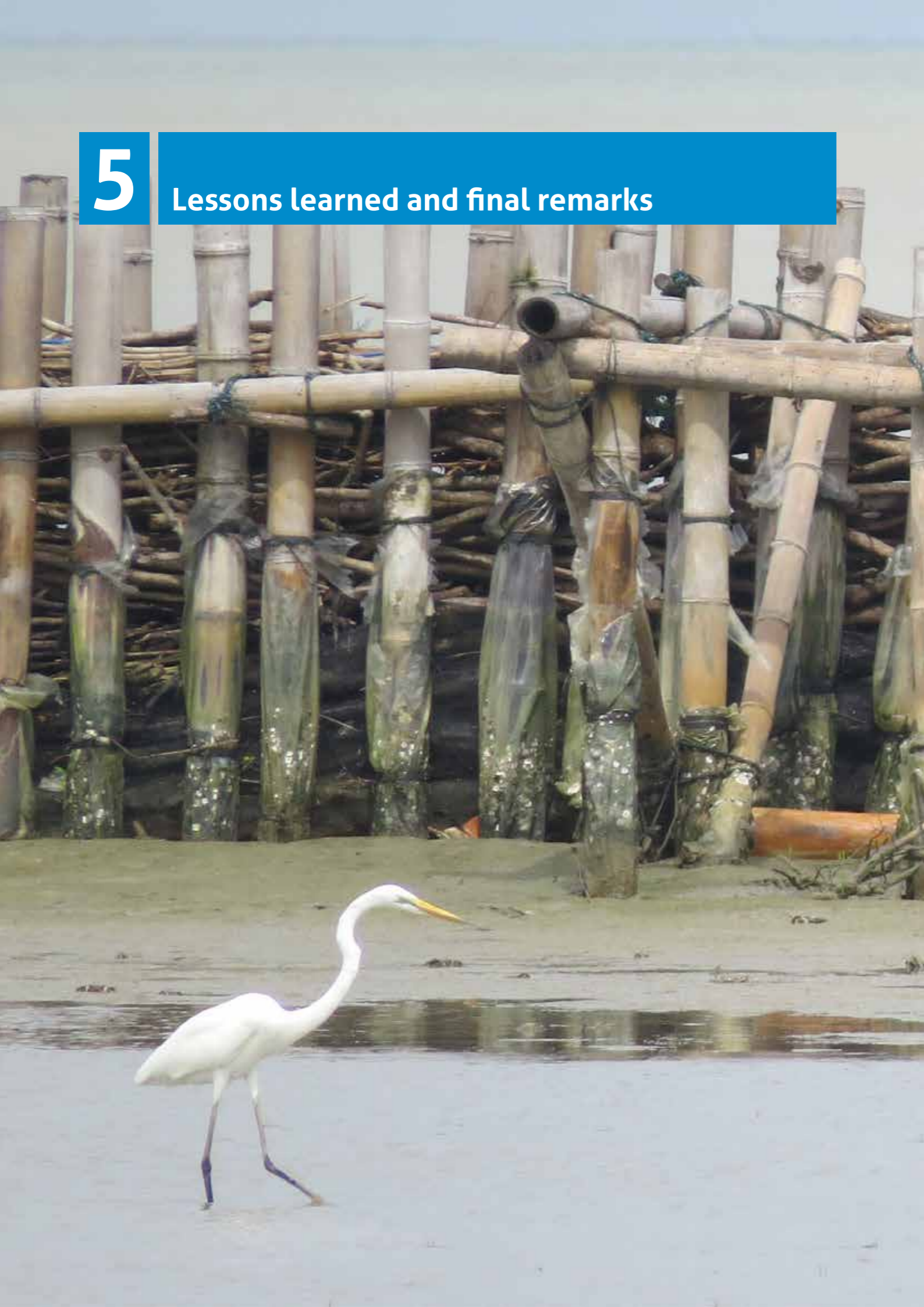


¹⁰ Corredor Azul: Aquarela Pantanal (#10); Flooded forest in Inner Niger Delta (#24); Climate Change, Forest & Peatlands (#17); CHOICE Pantanal (#8); Corredor Azul: Cattle raising in Parana Delta (#4); Conservation of Mangroves in Senegal (#30); Mangrove Capital Africa, West Africa (#29); Mangrove restoration Isla Galeta (#6).

¹¹ Mangrove Capital Africa (#13, #29); Partners for Resilience (#14); Laguna Llanquanelo Ramsar Site (#2); Lagunas de Guanacache Ramsar Site (#5).

5

Lessons learned and final remarks



5.1. Lessons learned

A key lesson from decades of restoration work is that even severely degraded ecosystems, in gold panning sites for example or sites totally transformed for military use, can be at least partially restored in the medium-term. Nature can bounce back given a facilitating environment. Below is a synthesis of the lessons learned from the 30 projects reviewed:

Proactive involvement and participatory approaches: working with local people and institutions is essential for effective project design and smooth implementation. More than working with, the active participation and involvement of local communities in restoration activities and projects is the only way to generate ownership and long-term commitment. From the beginning of a project, we work with the local communities to build mutual trust. Workshops and meetings are important for decision-making concerning every aspect of a restoration project should not be underestimated. Building trust between project implementers and local communities is not enough, we also need to build relationships and trust with local and national government. Developing management guidelines with or in close consultation with communities (such as cattle producers), who know their territory, is essential.

Conflict resolution At times, our restoration initiatives have done more than involve local communities, they have been a catalyst bringing communities together, helping to iron out disagreements and have helped build a stronger community resulting in other socio-cultural benefits.

Plan for long-term involvement: projects require a relatively long period of implementation to yield impact. This is not just for ecological outcomes to be realised but also for policies to change to support the project. Our involvement in the restoration work may diminish over time as the local communities take on ownership, but monitoring and evaluation of the outcomes should be in place for the long-term.

Monitoring and evaluation: Long-term monitoring should be put in place from the start to ensure efficiency and adequate data collection. The real impacts of a project take time to be recorded. There was the desire amongst many projects to involve local communities in the monitoring and evaluation of the restoration work. However, some respondents felt that they needed to also rely on more “qualified people” such as universities to carry out monitoring and evaluation. The PDCA (Plan-Do-Check-Act) cycle was seen as a very important approach for wetland restoration projects given the very sensitive nature of these ecosystems.

Wider landscape: It is important to consider the wider landscape when initiating restoration work. In the case of Lokta Lake, for example, while a significant improvement in the overall ecological health of the lake was achieved, the envisaged restoration (as set in the Management Plan) could not be achieved due to a very limited investment in the conservation of associated wetlands and inflowing streams or rivers which form an integral part of the wetland complex. A wider landscape approach using the 4 R approach may be best suited to wetland restoration.

Replication and up-scaling is essential: As stated above, the challenges facing biodiversity and people across most wetlands encompass whole sites or wider landscape issues. Our local scale interventions show how local challenges can be successfully addressed but changes that impact whole wetlands need measures that facilitate upscaling and replication. These require additional investments in community, government and civil society capacity building and improving governance from local-to-basin scale and at times transboundary scale. To up-scale the knowledge, experiences, approaches and tools we use for wetlands restoration demands a long-term regional programme. This requires a targeted up-scaling strategy.

Regulatory frameworks and legal issues: Regulatory frameworks are in many cases necessary to ensure the long-term success of projects. To be effectively applied they require effective institutional infrastructures. It is therefore important to keep this in mind when developing a project, in spite of the scale (local, regional, national or international). That said it is important to also recognise that regulatory frameworks do not, per se, create a positive incentive for community stewardship, which is vital for the sustainable management of the wetland system in the long-term. So, as stated above, it is also important to ensure that community awareness and involvement is ensured throughout the project.

Governance: We also need at times to improve governance at the local level. Once the ecological balance of a site has been improved there may be the need for strong measures to be put in place through for example a supervisory committee to prevent future damage. Such governance may require a very novel and collaborative approach in which we play a facilitating role. For example, this might be the case when needing to respect a new livestock carrying capacity which might require a different governance structure to ensure the re-entry and exit of animals from the site in question.

Awareness raising and capacity building: Many projects found that it is essential to run a strong and solid awareness raising and capacity building

programme in conjunction with field work. This type of sustained investment in human resources and awareness rising is necessary for the long-term success of a restoration project.

Communication around the project: Awareness rising amongst the local communities is not enough to secure the long-term restoration of a site. There is a need to share impact stories in an interesting way, contextualising the approaches so that donors and other stakeholders come to realise the value of this work and its complexity. For example, stressors to mangroves are different in East Africa from those in West Africa. It takes time to address them particularly if they are socio-economic in nature. This needs to be communicated to the donor clearly. In addition, frequent dissemination of information about the development of the restoration project to relevant stakeholders, including surrounding local community is very important and should be included in the project planning and budget.

Using restoration for environmental education: It might be interesting to be proactive in using restoration projects as material for environmental education. In Mendoza province (Argentina), wetland restoration projects involved student park ranger (in training), who participate in field work gaining experience and knowledge that they will use in their future works.

Climate change risks: All our restoration projects need to include a climate risks assessment that must be included and addressed in the management planning processes. Further climate risk research and assessments are required to build suitable adaptation measures into the management of these sites and landscapes.

Sustainable development is a key component: The challenges facing most wetlands we work in are driven by sectoral development pressures. This demands a more integrated and longer-term development vision built on principles of sustainability. Improving communities' socio-economic opportunities is important if local-scale interventions are to become sustainable in the long-term. We need to investigate alternative ways of, for example, adding value to local community products and increasing their economic prospects. This is one reason why developing alternative livelihoods is so important. Savings and credit groups, bio-rights and other financial mechanisms in addition to their economic contribution constitute an important means of social mobilisation.

Long-term financing: Government resourcing and project funding for NGOs or civil society to manage and restore wetland sites is unlikely to be enough to reach the scale needed to save wetlands. More

research is needed to see if "innovative financing" such as funds from carbon credits or payments for ecosystem services can help access new and significantly larger resources. These future financing options will need to be considered to determine whether they are appropriate tools to enable local authorities to capitalize on the benefits that these wetlands provide to society.

Collating and managing knowledge: Local scale work must be built on a sound knowledge base to support policy, planning and implementation. The importance of traditional knowledge, ancestral practices and local visions, in addition to science based information is clear. Developing and sharing a holistic knowledge base would greatly enable the organisation to capitalize on its work to date and in the future. There is also interest - among practitioners, academics, authorities, and others - to create regional or national networks and platforms to exchange knowledge and best practice. Wetlands International has the experience and skills to lead such initiatives around the globe.

5.2. Final Remarks

While wetlands conservation continues to be the main approach for vast areas around the World, restoration strategies are becoming more and more relevant due to the high rate of wetland loss and degradation. The management and restoration of wetland ecosystems are essential strategies to mitigate climate change, whilst also protecting the many other ecosystem services that they provide.¹²

The results of our study reflect this change, with at least 31 different restoration projects implemented or under implementation since 2000 by the Wetlands International's network of offices, covering more than 200,000 ha of wetlands in 17 countries across the globe. Mangrove and peatland restoration stand out as the main wetland types on which we have focused our work.

Our restoration work is very varied in terms of project size, duration and budget. However, given the way restoration work is carried out -usually as part of a wider programme or project, it was difficult to determine any detailed budgetary conclusions. We may wish to do further research into this.

Common threads include our approaches to work in broad alliances involving local communities and to facilitate better regulations and improvements in governance at local level. All restoration projects included in this study have been carried out in partnership with local communities as well as in collaboration with other partners, ranging from

governmental and research institutions, NGOs, companies and private foundations.

Institutional and governance arrangements play a critical role in directing wetlands restoration towards clearly defined goals. Catalysing, facilitating and enabling the inclusion of diverse stakeholder views and knowledge systems in the process is essential and is pro-actively pursued by all Wetlands International projects surveyed for this report. Persistent mismatches between governance arrangements and social ecological systems puts these ecosystems at risk and into what some call a 'social-ecological systems trap' where piecemeal and incremental changes fail to deliver the restoration outcomes desired or aligned with the overarching goal of maintenance of ecological character.

Our research showed that both ecological restoration and ecosystem rehabilitation approaches were equally used, and that wetland restoration is possible and effective even when dealing with highly degraded wetlands. The biggest challenge we face is upscaling restoration efforts to achieve higher impacts across a greater area.

While this initiative provides a first map of our organization's track-record on wetland restoration, documenting information on the different type of interventions, approaches and methodologies used in each project, a deeper assessment of the different technical restoration approaches used would be the next natural step.



¹² Convention on Wetlands. 2021. Global Wetland Outlook: Special Edition 2021. Gland, Switzerland: Secretariat of the Convention on Wetlands.



Annex 1.- Survey Monkey questionnaire sent to focal point staffs

Introduction to Project

This survey aims to collect key information about the 5 main restoration projects your organization has undertaken since 2000. Please fill in a separate survey for each project (unless several projects have contributed to the restoration of 1 wetland site, in which case include them under 1 survey).

You will receive a separate email with an individual web link for each of the projects you want to submit (this allows you to go back to each project proforma and edit it later if you wish).

A restoration project is any organized effort undertaken to achieve the recovery of a wetland ecosystem and/or its functioning for renewed and ongoing provision of ecosystem services. A project may require multiple agreements or funding cycles and may also be one of many projects in a long-term restoration program.

You were also sent a Proforma Guideline to help fill in this survey, please refer to this document if anything is unclear.

Thanks in advance for your help.

For accessing the whole questionnaire use the following link: <https://bit.ly/3rGf4Gc>

Annex 2.- 30 Project Summary Sheets

No.	Project name	WI Office
1	Río Valdés Reserve Peatland Restoration	LAC - Argentina
2	Restoration of "Laguna Llancanelo" Ramsar Site	
3	Saving High Andean Wetlands for People and Nature	
4	Corredor Azul: Cattle raising in Parana Delta	
5	Restoration of "Lagunas de Guanacache" Ramsar Site	
6	Mangrove restoration on Isla Galeta	LAC - Panama
7	Las Lajas lagoon	
8	CHOICE Pantanal	
9	Corredor Azul: Kadiwéu Indigenous Community	Brazil
10	Corredor Azul: Aquarela Pantanal	
11	Peatlands restoration in the Ruoergai Plateau	China
12	Nile Basin: Transboundary project	East Africa
13	Mangrove Capital Africa: Rufiji Delta	
14	Partners for Resilience (PfR)	
15	Banten Bay Carbon Offset Project	Indonesia
16	Peatlands North Sumatra (PME-IKI)	
17	Climate Change, Forest & Peatlands (CCFPI)	
18	Building with Nature	
19	Yatsu-higata (tidal flats) Restoration	Japan
20	Agusan River Basin	Philippines
21	Restoring Peatlands in Russia – for fire prevention and climate change mitigation.	Russia
22	Sand dune fixing in the Inner Niger Delta	Sahel (Mali)
23	Ecosystem restoration in Sakarani Basin	
24	Flooded forest in Inner Niger Delta	
25	Noga Village Pond channels, Inner Niger Delta	
26	Bourgour restoration, Inner Niger Delta	
27	Restoration of Loktak, India	South Asia
28	Chilika Lake, India	
29	Mangrove Capital Africa: Saloum delta, Casamance and Niomi National Park	West Africa
30	Conservation of Mangroves in Senegal	



1: Río Valdés Reserve Peatland Restoration

Type of wetland under restoration:

U -- Non-forested peatlands; includes shrub or open bogs, swamps, fens.

Abstract: This was the peatland restoration project to take place in Argentina. The project aimed to restore the hydrological conditions of a 15 ha drained, degraded and abandoned Sphagnum mire after the cessation of peat exploitation. The closure of the mire man-made drainage systems brought about a change in the hydrological conditions and led to the recovery of the ecosystem as a provider of hydrological services. This resulted in an increase in water storage capacity, estimated to exceed 20 million litres after the 2017 austral winter season. Beyond this concrete result, the project also contributed greatly to develop hydrological restoration methodologies and technologies, which could be used and replicated in other degraded mires under exploitation in the province of Tierra del Fuego. The project also helped raise awareness, in the Tolhuin community and amongst visitors of the Río Valdés Reserve, about the importance of peatlands and their contribution to watershed protection.

Key Facts

Region:	LAC
Country:	Argentina
Wetland Type:	Peatlands
Location:	Tierra del Fuego Island
Area restored:	15 ha
Time frame:	2016-2017
WI Lead Office:	LAC - Argentina

Primary cause of degradation: Peat exploitation for commercial uses. In Tierra del Fuego, it is a common practice to open drainage ditches for concessional exploitation of peatlands. These ditches often remain open after peat extraction, increasing the numbers of introduced beaver and promoting changes in the hydrology of the mire.

Main restoration approach used: Ecological Restoration

Approach: Natural (spontaneous) regeneration

Intervention type: Removal of artificial drainages

The approach used was the closure of drains to enable the hydrological recovery of the mire: the water level rises, decomposition decreases, peat-producing mosses have a chance to re-establish themselves on the surface. The closures were implemented using different methods / materials: 1) closures with asbestos-cement plates and peat, 2) double wood sheet piling closures, and 3) PVC sheet piling.

Other approaches:

Building capacity: Field training visits to the site with students from the University of Tierra del Fuego, using the project as a pilot case for peatland conservation

Information exchange: Technical guidelines published documenting the restoration experience and available to be used in the promotion of the project approaches.

Ecosystem services:

- Climate regulation: sources of and sink of greenhouse gases; influence local and regional temperature precipitation, and other climate processes
- Water regulation (hydrological flows): ground water recharge/discharge
- Recreational: opportunities for recreational activities,
- Educational: opportunities for formal and informal education and training



Outcomes achieved:

Hydrological restoration of the mire was achieved. Groundwater recharge estimated at more than 20,000 m³ of water accumulated in the mire

Tolhuin community and students from the University of Tierra del Fuego aware of the importance of peatland ecosystems

This was the first attempt to restore a degraded mire in the island of Tierra del Fuego, Argentina. It was a "learning case" for replication in other degraded mires within the island. The peatlands are still monitored by local partners and provide an example for developing province restoration guidelines.

Key lessons learned:

Peatland ecological restoration takes time and the impact is more visible many years after the project's completion. Establishing partnerships and developing local capacities to monitor long-term recovery is a key issue in peatland restoration projects.

Project partners: Universidad Nacional de Tierra del Fuego, Antártida e Islas del Atlántico Sur; Dirección General de Recursos Hídricos, Secretaría de Ambiente, Desarrollo Sostenible y Cambio Climático. Provincia de Tierra del Fuego, Antártida e Islas del Atlántico Sur

Main donors: Fundación Vida Silvestre Argentina (WWF Argentina partner) & Coca Cola Argentina
Budget: US\$ 18,570 (1-year Project)

Contact person: Daniel Blanco (deblanco@humedales.org.ar)

2: Restoration Laguna Llancanelo Ramsar Site

Type of wetland under restoration:

Ts -- Seasonal/intermittent freshwater marshes/pools on inorganic soils; includes sloughs, potholes, seasonally flooded meadows, sedge marshes.

Tp - Permanent freshwater marshes/pools; ponds (below 8 ha), marshes and swamps on inorganic soils; with emergent vegetation water-logged for at least most of the growing season

Abstract: The "Laguna Llancanelo" Provincial Reserve was designated a Ramsar Site in 1995. The Reserve protects the lagoon and associated ecosystems. Problems of prolonged droughts, fires, impact of wild boar on vegetation and the invasion of tamarisks, in addition to livestock overgrazing in some sectors, led to the degradation of marshes surrounding the lagoon, gradually changing its lentic characteristic to lotic (the marsh became a stream). This means that fresh water stays in the system for less time, affecting primary production (cattle foraging areas) and biodiversity. This project aimed to recover ecosystem services from the Carapacho freshwater marsh and to lay out the methodological basis for the management and control of tamarisks. For this we worked with local ranchers in the sector called "Pozos de Carapacho", with ecological restoration actions in the marsh (works for flow management, retention of sediments, recovery of base levels of watercourses and revegetation of marshy trenches), including the eradication of tamarisks plants.

Primary cause of degradation: The lack of appropriate hydrological management, the invasion of tamarisks, the impact of wild boars on emerging macrophytes and overgrazing as a result of extensive livestock farming since 1987, have caused changes in the ecological characteristics of the system.

Main restoration approach used: Ecological Restoration / Assisted regeneration (biotic and abiotic)

Restoration actions included the construction of coated weirs in different sectors of the eroded stream channel that transport water to the marsh, which allowed the base level to be raised to recover the hydrological catchment in the system, the islands and islets of marshy vegetation. These restoration actions were agreed upon and carried out with the participation of local communities and the Reserve authorities. Patches of tamarisk (*Tamarix* sp.) which invaded some sectors of the marshes were extracted and these areas were re-vegetated with native marshy species (reed, etc.). It was estimated that thanks to the project interventions (tamarisks extraction and revegetation with macrophytes), up to 30% of the total stream flow was recovered for the marsh system (flooding of degraded areas, natural irrigation of wetland pastures, recovery of marshy patches associated with stream channels). The project included capacity building / training of park rangers and students, and has allowed Wetlands International to support the implementation of the protected area management plan.

Ecosystem services:

- Fresh water: storage and retention of water for domestic, industrial, and agricultural use
- Water regulation (hydrological flows): ground water recharge/discharge
- Erosion regulation: retention of soil and sediments
- Soil formation: sediment retention and accumulation of organic matter

Key Facts

Region:	LAC
Country:	Argentina
Wetland Type:	Freshwater Marshes / pools
Location:	Laguna Llancanelo, Mendoza
Area:	282 ha (marshes & lagoon's coast)
Time frame:	2014-2021 (divided into 3 pjs)
WI Lead Office:	LAC - Argentina

Outcomes achieved:

- 282 ha of freshwater marshes and coasts of the lagoon under rehabilitation (162 ha marshes under restoration and 120 ha of tamarisk eradicated), recovering ecosystem services like native pastures for livestock.
- Training of 80 students of TECONA and 10 Park Rangers on wetland restoration and management.
- Grazing management plan for sustainable livestock developed and agreed with local ranchers and Reserve Park Rangers, with management guidelines included in the Management Plan of the Reserve.
- This was one of the first wetland restoration projects in Argentina, providing the methodological baseline and inspiring future projects like the GEF Project on controlling alien species, which included a tamarisk pilot in Laguna Llancanelo.

Key lessons learned: Not currently available

Project partners: Dirección de Recursos Naturales Renovables (provincia de Mendoza); Municipio de Malargüe (Mendoza); Tecnicatura Superior en Conservación de la Naturaleza (TECONA); Fundación AVINA Argentina; Reserva Natural Villavicencio and Fundación EISA.

Main donors:

First project= Fund for the Americas (Argentina) + Danone

Second project= Coca Cola, through Fundación AVINA Argentina

Third project= Coca Cola, through Fundación Vida Silvestre Argentina

Budget: This restoration work was implemented under 3 consecutive projects:

First project= € 60,000 (including matching contributions)

Second project= € 250,000 (including matching contributions)

Third project= € 13,500 (including matching contributions)

Contact person: Heber Sosa (sosafabre@yahoo.com.ar); Daniel Blanco (deblanco@humedales.org.ar)



3: Saving High Andean Wetlands

Type of wetland under restoration:

N -- Seasonal/intermittent/irregular rivers/streams/creeks.

Ts -- Seasonal/intermittent freshwater marshes/pools on inorganic soils; includes sloughs, potholes, seasonally flooded meadows, sedge marshes.

U -- Non-forested peatlands; includes shrub or open bogs, swamps, fens.

Abstract: High Andean wetlands provide a wide variety of ecosystem services such as pastures for domestic livestock, high-quality drinking water, climate regulation and plants and wildlife as food resources. These wetlands are relatively scarce and highly vulnerable. They are threatened by climate change and at a local scale by livestock grazing and trampling (mainly non-native goats, cattle, horses and sheep). This project aims to improve the conservation status of five threatened High Andes wetlands of great importance for biodiversity and local communities in Argentina and Peru: Lake Junín, Pozuelos lagoon, Carampoma-Marcapomacocha, Salinas Grandes and Altiplano of Catamarca. This project aims to restore certain wetlands and tests these approaches and tools to upscale and replicate improved wetland management and restoration. We plan this to become a regional initiative.

Key Facts

Region:	Latin America & Caribbean
Country:	Argentina & Peru
Wetland Type:	Lakes, salt flats, peatlands
Location:	5 high Andes wetlands*
Area:	238 ha under management with restoration actions
Time frame:	2017-2024
WI Lead Office:	LAC - Argentina

* 5 high Andes wetlands: Lake Junín, Pozuelos lagoon, Carampoma-Marcapomacocha, Salinas Grandes and Altiplano of Catamarca

Primary cause of degradation: Domestic livestock overgrazing; peat (champa) exploitation and drainage of peatbogs; Climate change.

Main restoration approach used: Ecological Restoration & Ecosystem Rehabilitation

Actions to restore the wetlands hydrology that improve water storage and rainwater-holding capacity as well as improved management practices were put in place, thus achieving higher soil moisture content resulting in enhanced pasture productivity. These seek to counteract the effects of large fluctuations between dry and humid periods to alleviate overgrazing.

Implementation of peatbogs management and restoration practices to create an environment with high productivity and natural diversity as a consequence of improving the vegetation cover recovery rate and optimizing rainwater harvesting and distribution.

Promotion of more sustainable peat extraction practices to reduce the negative impact of its exploitation, leading to more resistant and resilient systems.

Ecosystem services:

- Fresh water: storage and retention of water for domestic, industrial, and agricultural use
- Fiber and fuel: production of fuelwood, peat, fodder
- Water regulation (hydrological flows): ground water recharge/discharge
- Water purification and waste treatment: retention, recovery, and removal of excess nutrients and other pollutants.
- Erosion regulation: retention of soil and sediments
- Soil formation: sediment retention and accumulation of organic matter

Outcomes achieved:

By December 2021: ca. 238 ha of wetlands (vegas) under management with restoration actions. ca. 20,000 hectares under improved livestock grazing management practices across the project sites, supporting ecosystem restoration. On 13 ranches, excavated artificial cattle watering spots were converted to use solar pumps, reducing evaporation losses.



Local communities capacity reinforced by promoting the conservation and sustainable use of wetlands in the Puna region. 630 families engaged in programme activities and 137 shepherds trained in better management practices. The recovery of wetlands and natural pastures offers more productive grazing areas that, together with the sustainable management of cattle grazing, increase the profitability of livestock raising and improves the livelihoods of families that depend on livestock ranching.

The management approaches promoted by this programme are being included in the Pozuelos MAB Reserve and the Junin National Reserve management plans.

Key lessons learned: Participatory approaches work: Agreements were reached with the communities that manage to re-establish practices that contribute to better water and pasture management. The exchange of knowledge and our technical support show that low-tech peatland and grazing marsh restoration practices at local scale do work in the High Andes. Changes at local scale, delivered by local communities are possible.

Replication and up-scaling is essential: changes that impact whole wetlands need measures that facilitate upscaling and replication. These require additional investments in community, government and civil society capacity building and improving governance from local-to-basin scale. This goal demands a long-term regional programme.

Sustainable development is key: The challenges facing the Puna’s wetlands are typically driven by sectoral development pressures. This demands a more integrated and longer-term development vision built on principles of sustainability. Improving communities’ socio-economic opportunities is important if local-scale interventions are to become sustainable.

Collating and managing knowledge: The importance of traditional knowledge, ancestral practices and local visions, in addition to science based information was particularly clear. Gathering the science and experiences related to high altitude wetland conservation and restoration in the southern Andes would provide both a pool of wisdom and a nursery of ideas. Wetlands International has the experience and skills to lead such an initiative.

Time is needed to see results: Community engagement is essential to the success of this work. Working in the High Andes is logistically challenging due to the remoteness, altitude and extreme climate. Field visits and interventions are complex. All this compounds the need for longer-term commitment and investment.

Project partners: Asociación Ecosistemas Andinos (ECOAN), Perú; Fundación Ambiente y Recursos Naturales (FARN), Argentina

Main donors: DOB Ecology

Budget: Estimate of 1,000,000 € (around 33% of the total budget for the period April 2017 - March 2024)

Contact person: Román Baigún (rbaigun@humedales.org.ar)

4: Corredor Azul: Cattle raising in Parana Delta

Type of wetland under restoration:

P -- Seasonal/intermittent freshwater lakes (over 8 ha); includes floodplain lakes.

Ts -- Seasonal/intermittent freshwater marshes/pools on inorganic soils; includes sloughs, potholes, seasonally flooded meadows, sedge marshes.

L - Inland deltas (permanent)

Abstract: The Paraná River Delta region is a huge mosaic of wetlands. It covers over 17,500 km² in the final 330 km of the Lower Paraná River basin. This region is characterized by high environmental heterogeneity providing a variety of productive habitats (all freshwater wetlands) rich in biodiversity and a wide array of ecological functions. These regions support cattle ranching, commercial fishing, agriculture and mining which depend mainly on wetlands environmental goods and services. Livestock systems have a number of impacts on wetlands due to cattle grazing, the construction of polders and artificial dikes or changes in river courses and water bodies. Our restoration project seeks to improve the ecological integrity of 20,000 ha under production, thanks to the implementation of better management practices. In addition, a monitoring programme of ecological parameters (e.g. water quality, native vegetation, soil conservation) will assess the practices being implemented. We are also developing a “wetlands friendly” cattle label to provide further incentives to producers who implement better practices.

Key Facts

Region:	Latin America & Caribbean
Country:	Argentina
Wetland Type:	Lakes, floodplains & marshes
Location:	Parana Delta
Area:	18,327 ha by Dec. 2021*
Time frame:	2017-2027**
WI Lead Office:	LAC - Argentina

* under restoration

** 2 of the 6 years remaining for the implementation of this project have funding.

Primary cause of degradation: Land use changes related to urban development, forestry, soy expansion and intensive cattle ranching involving the development of polders and embankments to prevent water from coming in (conversion of wetlands into terrestrial systems; overgrazing, changes in water courses and lagoons, use of fire). Impacts related to climate change are also important factors leading to wetlands degradation and biodiversity loss in the region.

Main restoration approach used: Ecosystem Rehabilitation

Our project falls under a passive restoration approach, focusing on encouraging better livestock management. The assumption is that when better management practices (focused on water resource, soil, vegetation and wildlife care) are implemented, the impacts of cattle raising can be reduced resulting in the recovery of ecological functions such as hydrological flux and storage, biological productivity, biogeochemical cycling and storage, decomposition and wildlife habitat. We work with cattle ranchers and their staff building their capacity to manage the livestock differently.

We are also developing a certification scheme for “Wetlands Friendly Cattle Raising”, to provide economic returns that will benefit local producers who commit to the implementation of better practices. Information and technical evidences from this project will provide advice for land use planning policies and regulations, as well as to influence investments.

Ecosystem services:

- Climate regulation: sources of and sink of greenhouse gases; influence local and regional temperature, precipitation, and other climate processes
- Water regulation (hydrological flows): ground water recharge/discharge
- Water purification and waste treatment: retention, recovery, and removal of excess nutrients and other pollutants.



- Erosion regulation: retention of soil and sediments
- Soil formation: sediment retention and accumulation of organic matter
- Nutrient cycling: storage, recycling, processing, and acquisition of nutrients.

Outcomes achieved:

Better management practices are being implemented through agreements with producers and a cattle raising protocol. By 2023, we expect to have more than 20,000 ha of the Parana Delta under restoration (ecological function improved).

This project has already had an impact on a regulation seeking to influence the modalities under which cattle raising activities should be developed within the Parana Delta island sector of Victoria’s Multiple Use Reserve in the province of Entre Rios.

Key lessons learned: The first lesson learned from the baseline development period (under the Ecosystem Alliance) is how important it is to develop guidelines with cattle producers, who know very well the territory.

Project partners: Universidad Nacional de San Martín (UNSAM), Universidad de Buenos Aires (UBA), Instituto Nacional de Tecnología Agropecuaria (INTA), Universidad de Lomas de Zamora

Main donors: DOB Ecology; DGIS - Ecosystem Alliance Programme provided a pre-investment (2012-2015)

Budget: 290,000 € (budget of the sub-component; period 2017-2023) 17,000 € as a pre-investment from Ecosystem Alliance (DGIS) for the baseline and the publication of the first “Guidelines for island cattle raising”

Contact person: Gaston Fulquet (gfulquet@humedales.org.ar)

5: Restoration of “Lagunas de Guanacache”

Type of wetland under restoration:

P -- Seasonal/intermittent freshwater lakes (over 8 ha); includes floodplain lakes.

Ts -- Seasonal/intermittent freshwater marshes/pools on inorganic soils; includes sloughs, potholes, seasonally flooded meadows, sedge marshes.

Abstract: The Guanacache, Desagüadero and Bebedero lagoons Ramsar Site cover some 962,000 ha in the provinces of Mendoza, San Juan and San Luis, in central-western Argentina. At present, the site is inhabited by some 2,000 people, including 12 Huarpe communities and Creole settlers (laguneros), who live mainly by raising goats. In the 1950-60s, the Guanacache lagoons suffered a drying process and other alterations due to natural and anthropic causes. Since 2010, the diversion of the river for agriculture use upstream, combined with extreme climatic events, resulted in the Guanacache lagoons drying up. This water crisis coupled with extreme drought threatens the survival of the Ramsar Site inhabitants, who do not have water for irrigation or for their livestock. This project worked with local communities to restore wetlands with a participatory approach and to collect rainwater for use in local productive activities.

Key Facts

Region:	LAC
Country:	Argentina
Wetland Type:	Fresh-water marshes/pools
Location:	Guanacache, Desagüadero & Bebedero lagoons Ramsar Site
Area restored:	1,000 ha
Time frame:	2011-2020
WI Lead Office:	LAC - Argentina

Primary cause of degradation: Agricultural irrigation in the upper basin led to significant modification of basin hydrology. Deforestation, loss of vegetation cover due to overgrazing and the invasion of alien species within the basin accelerated the process.

Main restoration approach used: Ecological Restoration / Assisted regeneration (abiotic)

Wetlands were restored by constructing embankments as sediment traps in eroded gullies that were draining the wetlands. These embankments trap sediment and helped retain water allowing water to infiltrate and replenish nearby wetlands. As sediment accumulates behind the embankments, the base level in the gullies rises, thereby allowing the restoration of the wetland in the area around the embankments. The borders of the embankments were then re-vegetated to prevent erosion with macrophyte rhizomes (reed (*Phragmites australis*) and cattail (*Typha dominguensis*) and to create a natural lining. These areas were then maintained and adjusted annually.

Alongside this restoration work we raised awareness and built local capacities about the need for wetlands conservation and restoration.

Ecosystem services:

- Fresh water: storage and retention of water for domestic, industrial, and agricultural use
- Water regulation (hydrological flows): ground water recharge/discharge
- Erosion regulation: retention of soil and sediments
- Educational: opportunities for formal and informal education and training.
- Soil formation: sediment retention and accumulation of organic matter

Outcomes achieved: After 9 years of implementation, rainwater and sediment have accumulated contributing to the restoration of about 1,000 ha of wetlands. Biodiversity in the intervention site has improved and key ecosystem services, such as the availability of fresh water for livestock and pasture irrigation, have been recovered.



Some 300 families benefited from this restoration works within the Ramsar Site with improved access to water in a context of water crisis and extreme drought. The hydrological benefit was around 1,300,000 m³/year of water (2014), supplying the demand of some 2,000 head of cattle, mainly goats.

Key lessons learned: Local community involvement was a key factor to the success of this program. Workshops and meetings were important for decision-making regarding where interventions could take place, their construction and subsequent maintenance. Participatory monitoring, following on-site training, allowed local communities to measure rain fall through the installation of rain gauges in strategic positions, in houses near the works.

Project partners: Fundación AVINA Argentina, Secretaría de Medio Ambiente y Desarrollo Sustentable (Mendoza Province), Tecnicatura Superior en Conservación de la Naturaleza (TECONA, Mendoza Province)

Main donors: Coca Cola Argentina

Budget: ca. 400,000 € (2011-2020)

Contact person: Heber Sosa (sosafabre@yahoo.com.ar); Daniel Blanco (deblanco@humedales.org.ar)

6: Mangrove Restoration on Isla Galeta

Type of wetland under restoration:

I -- Intertidal forested wetlands; includes mangrove swamps, nipah swamps and tidal freshwater swamp forests.

Abstract: This project seeks to restore a mangrove ecosystem in an area totally modified for military use. An area of the Galeta Island was part of a former United States armed forces telecommunications base. The wetlands were filled and channels used to divert water from the mangrove forests, leading to a total modification of the landscape and the loss of the mangrove forest. Thanks to this restoration project the area is now surrounded by a beautiful mangrove forest and is a protected area called Galeta Island Protected Landscape.

To restore this area Wetlands International constructed water channels to improve the areas hydrology and planted three species: *Rhizophora mangle* in the most flooded areas and in channels, *Laguncularia racemosa* and *Conocarpus erectus* in the less flooded areas. We measured the success of the channels by how connected they were with the surrounding wetland restoration area and we evaluated marine, estuarine and freshwater fish species as indicators of salinity and marine influence on the canals.

Primary cause of degradation: The site was completely modified for military use. The wetland was drained and filled with earth to build a US Army base.

Main restoration approach used: Ecological Restoration

An ecological restoration program aspired to substantial recovery of the native biota and ecosystem functions. Channels were built to restore the areas hydrology and mangrove species planted (see above).

Ecosystem services:

- Food: production of fish, wild game, fruits, and grains
- Fresh water: storage and retention of water for domestic, industrial, and agricultural use
- Genetic materials: genes for resistance to plant pathogens, ornamental species, and so on
- Climate regulation: sources of and sink of greenhouse gases; influence local and regional temperature, precipitation, and other climate processes
- Water regulation (hydrological flows): ground water recharge/discharge
- Water purification and waste treatment: retention, recovery, and removal of excess nutrients and other pollutants.
- Erosion regulation: retention of soil and sediments
- Natural hazard regulation: flood control, storm protection
- Pollination: habitat pollinators
- Soil formation: sediment retention and accumulation of organic matter
- Nutrient cycling: storage, recycling, processing, and acquisition of nutrients.

Key Facts

Region:	LAC
Country:	Panama
Wetland Type:	Mangroves
Location:	Galeta Island protected area, Colón
Area restored:	6.2 ha
Time frame:	2018-2024
WI Lead Office:	LAC - Panama

Outcomes achieved: 6,320 mangrove seedlings were planted in the Las Lajas lagoon, restoring 150 ha of mangroves. This has resulted in a greater abundance of fish resources and an increase in plant and animal biodiversity.

Key lessons learned: This project is complex given the length of time the ecosystem has been degraded and the actions needed to improve its hydrology. This coastal lagoon is flooded during 8 months and during 4 months its waters withdraws. We have learned: to plant at the beginning of the flood period; use species adapted to direct contact with water; take advantage of the islets and higher areas to plant other species; Involving farmers, local authorities and the civil community creates a sense of commitment to the result and ownership of the project, which helps to achieve the results; reclaiming a large area using natural dispersal can take more than two decades.

Project partners: AES Energy and Ministry of Environmental Panamá

Main donors: Moore Charitable Foundation and The Islas Secas Foundation Grant.

Budget: 85,000.00 USD.

Contact person: Andres Fraiz (andres.fraiz@wetlands.org)



7: Las Lajas Lagoon, San Félix District

Type of wetland under restoration:

J -- Coastal brackish/saline lagoons; brackish to saline lagoons with at least one relatively narrow connection to the sea.

In the past it was a coastal lagoon with mangrove vegetation which we seek to restore.

Abstract: Laguna de Las Lajas is located in the district of San Felix in the Province of Chiriqui. This wetland was degraded over the years due to the change in land use and water obstructions that disrupted its hydrological regime. The project's objective is the restoration of mangrove wetlands in the lagoon.

The restoration site was surrounded by a wood-based perimeter fence using discarded high-voltage electrical cables that was donated to prevent cattle grazing from the surrounding area. The 2000 linear meters of cable (electric cable lined with plastic making it more resistant to salinity) was donated by the Naturgy S.A.. We initiated a dialogue with governmental authorities and the local community in 2015, as well as studies of the area. Restoration work started in earnest in 2017, mainly planting different mangrove species. Bamboo (an adaptation of Riley's methodology) was used as a support for seedlings.

Primary cause of degradation: Changes in land use such as conversion to agriculture, fumigation of the land together with water obstructions made it difficult for water to enter the lagoon. Dikes or dams hindered both the tidal entry of water and the exit of excess water by precipitation.

Main restoration approach used: Ecosystem Rehabilitation

This rehabilitation project aspires to reinstate certain level of ecosystem functioning for renewed and ongoing provision of ecosystem services potentially derived from non-native ecosystems. Rehabilitation is one of many restorative activities aligned along a continuum that includes ecological restoration and its allied and complementary activities, all of which contribute to improving ecosystem integrity and social-ecological resilience.

Three techniques were used to plant mangroves: direct planting of seedlings (*Conocarpus erectus*) in the ground with covered roots, direct planting of propagules (*Rhizophora* sp.) and planting of propagules on bamboo or Riley stakes. The implementation of new restoration techniques such as bamboo stakes will provide us with an alternative to use and replicate in other degraded sites.

Ecosystem services:

- Food: production of fish, wild game, fruits, and grains
- Fresh water: storage and retention of water for domestic, industrial, and agricultural use
- Climate regulation: sources of and sink of greenhouse gases; influence local and regional temperature, precipitation, and other climate processes
- Water regulation (hydrological flows): ground water recharge/discharge
- Water purification and waste treatment: retention, recovery, and removal of excess nutrients and other pollutants.
- Erosion regulation: retention of soil and sediments
- Pollination: habitat pollinators
- Soil formation: sediment retention and accumulation of organic matter
- Nutrient cycling: storage, recycling, processing, and acquisition of nutrients.

Key Facts

Region:	LAC
Country:	Panama
Wetland Type:	Mangroves
Location:	Las Lajas Lagoon in San Felix
Area restored:	150 ha
Time frame:	2017-2025
WI Lead Office:	LAC - Panama



Outcomes achieved:

6,320 mangrove seedlings were planted in the Las Lajas lagoon, restoring 150 ha of mangroves. This has resulted in a greater abundance of fish resources and an increase in plant and animal biodiversity.

Key lessons learned: This project is complex given the length of time the ecosystem has been degraded and the actions needed to improve its hydrology. This coastal lagoon is flooded during 8 months and during 4 months its waters withdraws. We have learned: to plant at the beginning of the flood period; use species adapted to direct contact with water; take advantage of the islets and higher areas to plant other species; Involving farmers, local authorities and the civil community creates a sense of commitment to the result and ownership of the project, which helps to achieve the results; reclaiming a large area using natural dispersal can take more than two decades.

Project partners: AES energy and Ministry of Environmental Panamá

Main donors: Moore Charitable Foundation and The Islas Secas Foundation Grant

Budget: average of US\$20,000 was been spent in 2017, US\$5,000 in 2018, US\$5,000 in 2019, US\$10,000 in 2021.

Contact person: Andres Fraiz (andres.fraiz@wetlands.org)

8: CHOICE Pantanal

Type of wetland under restoration:

M -- Permanent rivers/streams/creeks; includes waterfalls.
 N -- Seasonal/intermittent/irregular rivers/streams/creeks.

Abstract: This Project aims to significantly reduce the frequency and intensity of fires on 20.000 ha of forest and through this reduce approximately 1M t CO2e of GHG emissions over a 60-year timeframe. We intend to protect a strategic region of the Pantanal – the Sesc Pantanal Ramsar Site in Mato Grosso, where there is high risk of fire damage. Whilst integrated fire management is a traditional and permitted practice for vegetation management in the Pantanal during the rainy season, uncontrolled fire has devastated large areas, threatened livelihoods and released huge quantities of GHG. We will restore around 25 ha of burnt forest through participatory approaches with local communities while also intensifying efforts to prevent fires at 20.000 ha of forest, avoiding CO2 and other GHG emissions. The Project will also act as a catalyst. This five-year project builds on community fire management and restoration experience in the Sesc Pantanal Ramsar Site and acts as an exemplar approach that inspires and motivates fire management by others.

Key Facts	
Region:	Latin America & Caribbean
Country:	Brazil
Wetland Type:	Rivers and Peatlands
Location:	Sesc Pantanal Private Reserve
Area restored:	25 ha.
Time frame:	2022-2026
WI Lead Office:	Brazil

Primary cause of degradation: Climate change and wetland fires caused by agricultural expansion

Main restoration approach used: Ecological Restoration

We aim to restore of burnt forest with the involvement of local communities by replanting, re-seedling and natural regeneration.



Ecosystem services:

- Food: production of fish, fruits, and grains
- Climate regulation: sources of and sink of greenhouse gases; influence local and regional temperature, precipitation, and other climate processes
- Natural hazard regulation: flood control, storm protection
- Recreational: opportunities for recreational activities
- Aesthetic: many people find beauty or aesthetic value in aspects of wetland ecosystems
- Educational: opportunities for formal and informal education and training.

Outcomes achieved: This project has only just begun. Too early to say.

Key lessons learned: This project has only just begun. Too early to say.

Project partners: Sesc Pantanal; LASA/UFRJ; INAU/ CPP - National Institute for Wetlands

Main donors: Greenchoice.

Budget: Total budget: EUR 1.861.652 for Restoration: EUR 230.000

Contact person: Rafaela Nicola (rafaela.nicola@wetlands-brazil.org)



9: Corredor Azul: Kadiwéu Indigenous Community

Type of wetland under restoration:

M -- Permanent rivers/streams/creeks; includes waterfalls.

N -- Seasonal/intermittent/irregular rivers/streams/creeks.

Abstract: This restoration project is an ongoing intervention within the Corredor Azul Program. It aims to build the capacity of local communities in the Kadiwéu Indigenous Territory, Southern Pantanal to restore wetlands affected by fire using native seedlings.

We have identified priority areas for restoration in the Indigenous Territory, defining pilot areas for restoration along a 10 ha riparian forest. A native plant nursery has been created producing 700 seedlings. Seedling methodologies are under assessment for 10 native species and 25 families have actively engaged in the project's restoration activities.

This work also aims to increase the long-term capacity of local communities to intervene over degraded wetlands.

Primary cause of degradation: Climate change causing severe drought and fires are degrading wetlands in the Pantanal.

Main restoration approach used: Ecological Restoration

Development of a nursery for native plant species to enable local people to plant seedlings and replant trees in the degraded areas to restore wetlands affected by fires.

Key Facts

Region:	Latin America & Caribbean
Country:	Brazil
Wetland Type:	Rivers
Location:	Kadiwéu Indigenous Territory, Pantanal
Area restored:	Too early to tell
Time frame:	2020 - 2024
WI Lead Office:	Brazil



Ecosystem services:

- Food: production of fish, wild game, fruits, and grains
- Fresh water: storage and retention of water for domestic, industrial, and agricultural use
- Fiber and fuel: production of logs, fuelwood, peat, fodder
- Water purification and waste treatment: retention, recovery, and removal of excess nutrients and other pollutants.
- Erosion regulation: retention of soil and sediments
- Spiritual and inspirational: source of inspiration; many religions attach spiritual and religious values to aspects of wetland ecosystems
- Aesthetic: many people find beauty or aesthetic value in aspects of wetland ecosystems
- Educational: opportunities for formal and informal education and training.
- Soil formation: sediment retention and accumulation of organic matter
- Nutrient cycling: storage, recycling, processing, and acquisition of nutrients.

Outcomes achieved: Too early in the project to report outcomes.

Key lessons learned: Too early in the project to report lessons learned.

Project partners: ABINK - Fire Fighter Brigade from the Kadiwéu Nation PrevFogo - IBAMA MMA Federal University of Mato Grosso do Sul State – UFMS

Main donors: DoB Ecology

Budget: 30,000 Euros for 2 years

Contact person: Julio Fernandes (julio.fernandes@wetlands-brazil.org)

10: Corredor Azul: “Aquarela Pantanal”

Type of wetland under restoration:

M -- Permanent rivers/streams/creeks; includes waterfalls.

N -- Seasonal/intermittent/irregular rivers/streams/creeks.

Xf -- Freshwater, tree-dominated wetlands; includes freshwater swamp forests, seasonally flooded forests, wooded swamps on inorganic soils.

Abstract: This project aims to restore 56 ha of riverine forests that have been affected by fires over the last few years enhancing wetland health. Two local communities are working with native seedling nurseries to provide for restoration, increasing the income of 20 families. The project aims to build natural barriers in the future to prevent the spreading of fires over the protected area, helping to build the capacity of local communities as “wetland guardians”.

Primary cause of degradation: System modification: Dams & water use, fire or fire suppression: in particular fires for pasture cleaning, opening areas for cattle ranching.

Main restoration approach used: Ecological Restoration

Natural regeneration; using seedlings and replanting. Seedlings will be planted in riparian forest restoration areas, which were affected by fires in the region. The aim is to restore 46 ha of riverside flooded-forest with native seedling according to the existing macrohabitats and to pilot natural barriers for fire prevention (10ha).

Ecosystem services:

- Food: production of fish, wild game, fruits, and grains
- Fresh water: storage and retention of water for domestic, industrial, and agricultural use
- Genetic materials: genes for resistance to plant pathogens, ornamental species, and so on
- Climate regulation: sources of and sink of greenhouse gases; influence local and regional temperature, precipitation, and other climate processes
- Erosion regulation: retention of soil and sediments
- Natural hazard regulation: flood control, storm protection
- Recreational: opportunities for recreational activities
- Aesthetic: many people find beauty or aesthetic value in aspects of wetland ecosystems
- Educational: opportunities for formal and informal education and training.
- Soil formation: sediment retention and accumulation of organic matter
- Nutrient cycling: storage, recycling, processing, and acquisition of nutrients.

Key Facts

Region:	LAC
Country:	Brazil
Wetland Type:	Riverside forests
Location:	RPPN Sesc Pantanal & surroundings
Area	56 ha under restoration
Time frame:	2020-2022
WI Lead Office:	Brazil



Outcomes achieved: It is too early in the project to access outcomes achieved.

Key lessons learned: It is too early in the project to list lessons learned.

Project partners: CPP - Pantanal Research Centre; Sesc Pantanal; INAU - National Institute for Wetlands.

Main donors: GEF Terrestre (IADB, Ministry of Environment - MMA, GEF, Funbio) and DoB through the Corredor Azul Programme.

Budget: USD 327,000

Contact person: Áurea Garcia (aurea.garcia@wetlands-brazil.org)

11: Peatlands Restoration, Ruoergai Plateau

Type of wetland under restoration:

U -- Non-forested peatlands; includes shrub or open bogs, swamps, fens.

Abstract: The peatlands of the Ruoergai Plateau in west Sichuan support an extremely wide range of globally important biodiversity, including many endangered or endemic animal and plants. They provide breeding areas for many globally threatened migratory bird species as well as regulating the water flow in the upper Yellow River. Sustainable use of wetlands ensures water supply, medicine, energy and thus livelihoods for local Tibetan communities. Natural peatland benefits include mitigation of flooding, regulation of micro-climate, and bio-treatment of pollutants. Land development and degradation in recent years has led to the reduction in area of the peat and the removal of this stored carbon. The project aims to address the capacity of peatlands to act as carbon deposits, provide recommendations for how these areas could be managed to maintain or even improve this function while protecting biodiversity. This project aimed to also help develop guidance for future management interventions. Restoration included protecting natural peatland system; blocking drainage canals and restoring and enhancing peatlands.

Primary cause of degradation: Agriculture: Drainage or conversion of peatland for agriculture; Large-scale drainage for pasture improvement combined with overgrazing and peat mining. Large parts of peatlands were degraded, indicating that grazing had made the peatlands prone to degradation long before recent intensification of peatlands use.

Main restoration approach used: Ecological Restoration

The blocking of canals with sand bags and wooden planks resulted in a rise in the water table. This rewetting reduced CO2 emissions and vegetation colonized the rewetted peat soils. Fences helped reduce trampling by yaks. Concrete dams were used to restore the peat mining site.

Ecosystem services:

- Food: production of fish, wild game, fruits, and grains
- Fresh water: storage and retention of water for domestic, industrial, and agricultural use
- Fiber and fuel: production of logs, fuelwood, peat, fodder
- Biochemical: extraction of medicines and other materials from biota
- Climate regulation: sources of and sink of greenhouse gases; influence local and regional temperature, precipitation, and other climate processes
- Water regulation (hydrological flows): ground water recharge/discharge
- Water purification and waste treatment: retention, recovery, and removal of excess nutrients and other pollutants.
- Erosion regulation: retention of soil and sediments
- Natural hazard regulation: flood control, storm protection
- Pollination: habitat pollinators
- Spiritual and inspirational: source of inspiration; many religions attach spiritual and religious values to aspects of wetland ecosystems
- Recreational: opportunities for recreational activities
- Aesthetic: many people find beauty or aesthetic value in aspects of wetland ecosystems
- Soil formation: sediment retention and accumulation of organic matter
- Nutrient cycling: storage, recycling, processing, and acquisition of nutrients.

Key Facts

Region:	Asia
Country:	China
Wetland Type:	Peatlands
Location:	Ruoergai, Sichuan Province
Area restored:	200 ha
Time frame:	2003-2006
WI Lead Office:	China

Outcomes achieved: Ruoergai was designated a Ramsar Site in 2008, 5 years after the project began. The rewetting reduced CO2 emission and vegetation was able to re colonized the rewetted peat soil. These areas now provide a suitable habitat for breeding Black-necked Cranes and support pollination insects. The Black-necked Cranes are a sign of good luck to local Tibetan herders. The restored peatlands provide attractive landscapes in the remote Plateau promoting local tourism. It also provides drinking water for cattle, has benefited grass growth and increased the values of cattle in the market.

Local government recognized the importance of peatlands protection and restoration for ecology as well as social economic reasons. This project stimulated local government involvement in peatlands conservation in Sichuan province. The Aba Prefecture issued a wetlands regulation to encourage local communities and governmental agencies to protect peatlands from degradation and biodiversity loss. It also encouraged trans-boundary cooperation with neighbouring Gansu, resulting in UNDP/GEF up-scaling this approach in Gansu and Altai mountains.

This project helped Wetlands International apply successfully for EU funding between 2007-2010 to continue peatlands conservation work and was recognised as one of the Global Environment Facility' top 20 world projects.

Ruoergai peatlands restoration has been a positive example of restoration at national, regional and international levels, raising public awareness amongst decision makers. This project has promoted the transboundary cooperation between Sichuan and Gansu provinces and brought governmental stakeholders together to have developed the Ruoergai high altitude peatlands conservation strategy and established conservation committee engaged by prefecture and provincial levels with coordination by Wetlands International. In 2021, the provincial governments of Sichuan and Gansu worked jointly for the establishment of Ruoergai National Park to effectively conserve these contiguous peatlands.

Key lessons learned: It is essential to ensure that local partners maintain peatland management after restoration is completed to avoid sites being trampled by yaks. The post monitoring on those restored peatlands is important to maintain restoration with follow up actions.

Project partners: Global Environment Centre, Sichuan Forestry Department, Ruoergai National Nature Reserve, Hongyuan Riganqiao Nature Reserve

Main donors: UNEP/GEF

Budget: USD 103,500

Contact person: Zhang Xiaohong (Xiaohong.Zhang@wetlands.org)



12: Nile Basin Transboundary Restoration

Type of wetland under restoration:

I -- Intertidal forested wetlands; includes mangrove swamps, nipah swamps and tidal freshwater swamp forests.

O -- Permanent freshwater lakes (over 8 ha); includes large oxbow lakes.

Xp -- Forested peatlands; peatswamp forests.

Abstract: The Nile Basin is endowed with rich and diverse wetlands crucial for the provision of multiple ecosystem goods and services, beneficial to its citizens, economies and associated ecosystems. Despite the benefits offered by these wetlands, they continue to be heavily fragmented, degraded and reclaimed due to human activities such as encroachment for settlement, conversion for agriculture due to population pressure, grey infrastructural development and weak implementation of policies protecting wetlands. These challenges are exacerbated for transboundary wetlands, further compromising their health and integrity. In order to maintain their biological diversity and productivity, and to permit the wise use of their resources, there is a need to develop and implement focused management actions and conduct regular reviews to address emerging issues. This project focused on three wetland landscapes: Sio-Siteko (Kenya and Uganda), Semliki (Uganda and the Democratic Republic of Congo) and Sango Bay-Minziro (Uganda and Tanzania). A three-pronged strategy for the implementation of the pilot actions was employed. These are:

- i. Establishment of transboundary governance mechanisms to enhance cross-border cooperation, understanding and agreement in wetland management;
- ii. Development of instruments to finance the implementation of priority measures in the Transboundary Wetland Management Plans;
- iii. Implementation of sustainable livelihood measures to incentivise wetland conservation.

Primary cause of degradation: Human activities such as encroachment for settlement, conversion for agriculture, grey infrastructural development

Main restoration approach used: Ecosystem Rehabilitation

Hundreds of kilometres of degraded sites in the three wetlands were restored using river buffer zone establishment, river bank stabilisation by use of bamboo and indigenous tree species (fruit tree and bamboo intercropping was carried out by farmers along the wetland landscape), as well as Farmer Managed Natural Regeneration (FMNR). We also ensured linkages between River Basin Management and Wetland Planning with the understanding that activities and water resource management decisions upstream impact downstream ecosystems. This ensured synergies with ongoing river basin planning and management processes.

Ecosystem services:

- Food: production of fish, wild game, fruits, and grains
- Fresh water: storage and retention of water for domestic, industrial, and agricultural use
- Fiber and fuel: production of logs, fuelwood, peat, fodder
- Biochemical: extraction of medicines and other materials from biota
- Climate regulation: sources of and sink of greenhouse gases; influence local and regional temperature, precipitation, and other climate processes

Key Facts

Region:	Africa
Country:	Kenya, Uganda, Democratic Republic of Congo and Tanzania
Wetland Type:	Mangroves, peatlands, lakes
Location:	Nile Basin
Area restored:	Hundreds of kms
Time frame:	2019-2021
WI Lead Office:	East Africa



- Water regulation (hydrological flows): ground water recharge/discharge
- Water purification and waste treatment: retention, recovery, and removal of excess nutrients and other pollutants.
- Erosion regulation: retention of soil and sediments
- Natural hazard regulation: flood control, storm protection
- Pollination: habitat pollinators
- Spiritual and inspirational: source of inspiration; many religions attach spiritual and religious values to aspects of wetland ecosystems
- Educational: opportunities for formal and informal education and training.
- Soil formation: sediment retention and accumulation of organic matter
- Nutrient cycling: storage, recycling, processing, and acquisition of nutrients.

Outcomes achieved: Too early to tell.

Key lessons learned: This type of project requires a relatively long period of implementation to yield impact because it depends on policy processes which are not entirely dependent on planning but on external political issues. Holding meetings where transparency about project work plans and budgets what can and cannot be influenced - when and in what way – were key to managing expectations.

Project partners: Nile Basin Initiative, GIZ, Acacia Water

Main donors: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, on behalf of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) under its International Climate Initiative (IKI)

Budget: 10% of 900,000 Euros used for restoration

Contact person: Lilian Nyaega (lnyaega@wetlands-eafrica.org)

13: Mangrove Capital Africa, Rufiji Delta

Type of wetland under restoration:

I -- Intertidal forested wetlands; includes mangrove swamps, nipah swamps and tidal freshwater swamp forests.

Abstract: The Rufiji Delta is the largest single mangrove forest in Tanzania and Eastern Africa. The delta has been severely affected by a complex set of factors including anthropogenic pressures and climate change giving rise to increased concern, including ecosystem encroachment; pollution and salinization of soils, estuaries and aquifers; degradation of resources; shoreline erosion and conflicts of interest among stakeholders. The Mangrove Capital Africa Programme is working to address these challenges by supporting mangrove restoration and sustainable livelihood activities in the Delta. This has been done through: developing and disseminating knowledge about the functions, values and threats to mangroves as a basis for improved mangrove conservation and management; strengthening the capacity of institutions and individuals on the values of mangroves and are able to conserve and restore them as part of broader development plans; and supporting the development and implementation of policies and plans at local, national and regional to levels. So far (2022), we have restored 265 hectares of degraded mangrove areas and supported about 21,000 community members with sustainable livelihood activities.

Key Facts	
Region:	Africa
Country:	Tanzania *
Wetland Type:	Mangroves
Location:	Rufiji Delta
Area restored:	265 ha
Time frame:	2017-2022
WI Lead Office:	East Africa
* The project has taken place mostly in Tanzania and recently upscaling to Kenya	

Primary cause of degradation: Agriculture - Clearing of land for rice farming and destruction of forested areas by pastoralists overgrazing in mangroves. Other causes are listed above.

Main restoration approach used: Ecological Restoration

Community Based Ecological Mangrove Restoration approach: This approach focuses on understanding the ecology and hydrology of the site and correcting the problems that caused the mangrove loss in the first place which ensures successful restoration.

We have also developed management instruments such as the Mangrove Management Plan and harvesting plans and supported their implementation. These are linked with national and regional policy influencing actions such as demonstrating the value of mangroves in Tanzania’s Nationally Determined Contributions. We strengthen the capacity of Community-Based Organisations and governments on the best restoration approaches and the values of mangroves, set up Environmental Education awareness through mangrove school clubs and the dissemination of knowledge products on the values of mangroves. We also aim to inspire others to join our work - upscaling and growing the programme.

Ecosystem services:

- Food: production of fish, wild game, fruits, and grains
- Fiber and fuel: production of logs, fuelwood, peat, fodder
- Biochemical: extraction of medicines and other materials form biota
- Climate regulation: sources of and sink of greenhouse gases; influence local and regional temperature, precipitation, and other climate processes
- Natural hazard regulation: flood control, storm protection
- Pollination: habitat pollinators

- Spiritual and inspirational: source of inspiration; many religions attach spiritual and religious values to aspects of wetland ecosystems
- Recreational: opportunities for recreational activities
- Aesthetic: many people find beauty or aesthetic value in aspects of wetland ecosystems
- Educational: opportunities for formal and informal education and training.
- Soil formation: sediment retention and accumulation of organic matter
- Nutrient cycling: storage, recycling, processing, and acquisition of nutrients.



Outcomes achieved: We are currently conducting an assessment to get an accurate idea of ecological impacts from our restoration action.

Enhanced appreciation of mangroves by communities living outside the delta. For example, pastoralists now understand the values of mangroves for those who live next to them and as such, are more sensitive in their grazing areas.

Adjacent mangrove communities were introduced to sustainable livelihood activities and where they were already being conducted, these were supported. This has helped to reduce dependence on the mangroves.

Key lessons learned: We need to better organise our monitoring activities to ensure efficiency and adequate data collection. This includes sharing impact stories in an interesting manner. Restoration is not a straight-jacket activity. There is need to contextualise approaches and communicate the same to donors. For example, stressors to mangroves in East Africa are different to those in West Africa or other parts of the world. It takes time to address them particularly if they are socio-economic in nature. This needs to be communicated to the donor clearly.

Project partners: DOB Ecology (donor); Tanzania Forest Service; Kibiti District; National Environment Management Council

Main donors: DOB Ecology, Swedish International Development Cooperation Agency, Blue Action Fund Waterloo, COMON, Waterloo and Turing Foundations

Budget: The Mangrove Capital Africa Project has a budget of 10 Million Euros for 10 countries between 2017 - 2027. These countries include Tanzania. Exact budgets are discussed and decided based on progress, gaps and needs. Since the programme began, we have been able to mobilise additional resources from different sources to continue supporting restoration in the Rufiji Delta. These include the Blue Action Funded Project on 'Strengthening Marine Protected Area Management in Rufiji-Mafia-Kilwa'; the action research Project on restoration referred to as To Plant or Not to Plant and a Sida funded project referred to as 'Source to Sea'. In the Rufiji delta, about 200,000 Euros have been directly used for restoration work.

Contact person: Lilian Nyaega (lnyaega@wetlands-eafrica.org)

14: Partners for Resilience (PfR)

Ramsar wetland type under restoration:

I -- Intertidal forested wetlands; includes mangrove swamps, nipah swamps and tidal freshwater swamp forests.

K -- Coastal freshwater lagoons; includes freshwater delta lagoons.

Abstract: Wetlands have the function of reducing seawater waves that enter the mainland, tackling abrasion and improving the income of communities around wetlands. The main restoration approach has been the rehabilitation of mangroves and coastal plants by applying the Bio-Rights concept. This is an effort to increase the economic viability of communities by providing conditional loans for an environmentally friendly economic business with the obligation to carry out restoration activities. Funds are disbursed after an agreement has been reached between the facilitator and the group in the form of a written agreement with the approval of the village head. At the end of the project, depending on the result of the joint monitoring session, if the community group managed to fulfill a certain agreed percentage (usually 70 – 80%) of successful restoration works, the loan will then be switched to become a loan. As a result of this work, communities have the capacity and equipment to reduce hazard risks and are able to prepare for disasters through better cooperation with stakeholders both within and between communities (Community Resilience).

Primary cause of degradation: Climate change and severe weather: abrasion and flooding on beaches or river mouths.

Main restoration approach used: Ecological Restoration & ecosystem Rehabilitation

Rehabilitation of mangroves and coastal plants by applying the Bio-Rights concept to encourage the planting of seedlings (with more than 80% success). This is facilitated by creating village regulations related to wetlands, mangrove rehabilitation and the coastal environment. These regulations are used as a legal basis in the event of destruction of mangrove forests. In addition a disaster management forum was created at the district level.

Ecosystem services:

- Food: production of fish, wild game, fruits, and grains
- Fresh water: storage and retention of water for domestic, industrial, and agricultural use
- Climate regulation: sources of and sink of greenhouse gases; influence local and regional temperature, precipitation, and other climate processes
- Water purification and waste treatment: retention, recovery, and removal of excess nutrients and other pollutants.
- Erosion regulation: retention of soil and sediments
- Natural hazard regulation: flood control, storm protection
- Spiritual and inspirational: source of inspiration; many religions attach spiritual and religious values to aspects of wetland ecosystems
- Recreational: opportunities for recreational activities
- Educational: opportunities for formal and informal education and training.
- Soil formation: sediment retention and accumulation of organic matter

Key Facts

Region:	Asia
Country:	Indonesia
Wetland Type:	Mangroves and coastal
Location:	Sikka & Ende Districts, Flores Island
Area:	20 ha mangroves & 10 ha non-mangrove
Time frame:	2011-2014
WI Lead office:	Indonesia

Outcomes achieved:

- plantings of mangroves and coastal plants with more than 80 percent success
- new regulations put in place are still respected on the island of Flores
- the creation of new businesses have increase income from milkfish production, buying and selling, raising chickens, etc.
- Regent regulations related to the Mangrove Moratorium No 263/HK/2012 Protection of Sikka District and 4 village regulations related to coastal management including mangroves
- village facilitators have been trained to approach the assisted communities
- Facilitate the development of disaster contingency plans at the village level

Key lessons learned: Self-help group activities have been successful especially for planting actions.

Project partners: Netherlands Red Cross lead party, PMI, CARE, Red Cross/Red Crescent, Climate Centre and Wetlands International, LPTP

Main donors: DGIS- Ducth Government LRC

Budget: Euro 1,014,000

Contact details: Eko Budi Priyanto (eko.has@gmail.com)



15: Banten Bay Carbon Offset Project

Type of wetland under restoration:

I -- Intertidal forested wetlands; includes mangrove swamps, nipah swamps and tidal freshwater swamp forests.

Abstract: The Banten Bay Carbon Offset project aims to achieve a 10,000 metric ton CO2 equivalent in 15 years through the planting of at least 50,000 mangrove seedlings in approximately 20 ha of Banten Bay (near the Pulau Dua Nature Reserve) in Banten Province, Indonesia. To secure the sustainability of the project, Wetlands International Indonesia will partly procure, loan or steward the land to be rehabilitated and will involve the local community surrounding the reserve. As well as planting mangrove, the project will carry out awareness raising campaigns and renovate the facilities of the Reserve. During the 15 years' project implementation, we will monitor and evaluate progress as described in the Project Work Plan.

Key Facts

Region:	Asia
Country:	Indonesia
Wetland Type:	Mangroves
Location:	Banten Bay, Sawah Luhur Village
Area:	20 ha
Time frame:	2009-2023
WI Lead Office:	Indonesia

Primary cause of degradation: Development: Residential, Commercial & industrial, Tourism & recreation, Land reclamation

The problems that exist are abrasion, decreased productivity of ponds and spatial planning for the area as an industrial area.

Main restoration approach used: Ecological Restoration & Ecosystem Rehabilitation

Planting of mangrove seedlings in pond embankments with 20 cm x 20 cm. 10,000 mangrove plants per ha. In 2012, a mud trap was built on the beach with used nets. These trapped sediment creating a mangrove habitat over an area of 1 ha. After 3 years, *Avicennia* sp have grown naturally.

Ecosystem services:

- Food: production of fish, wild game, fruits, and grains
- Fresh water: storage and retention of water for domestic, industrial, and agricultural use
- Climate regulation: sources of and sink of greenhouse gases; influence local and regional temperature, precipitation, and other climate processes
- Erosion regulation: retention of soil and sediments
- Recreational: opportunities for recreational activities
- Educational: opportunities for formal and informal education and training.
- Soil formation: sediment retention and accumulation of organic matter

Outcomes achieved:

Local communities understand the benefits of silvo-fishery planting patterns.

Natural mangrove regeneration of *Avicennia* species thanks to trapping sediment with used nets on the beach.

Ponds planted with mangroves can reduce the level of salt content, making these suitable for the growth of fish and shrimp. Every day, an average of 3 kg of shrimp enter the ponds. Meanwhile, aquaculture ponds produce an average of 300 quintals/ha during 3-4 months of cultivation.

The district government is in the process of developing a strategic plan for mangrove management for the establishment of a coastal green belt.



Key lessons learned:

Mangrove planting can be successful in aquaculture ponds resulting in reduced salinity.

Project partners: Community Group

Main donors: Fundación Natura

Budget: Total grant of 165,086.11 USD over a 15 year period.

- Payment 1 upon signature of Grant Agreement = 82,543.06 USD
- Payment 2 after project commencement = 16,508.61 USD
- Payment 3 2 (two) years after project commencement = 16,508.61 USD
- Annual payments of 3,809.68 USD per year starting year 3 up to year 15 (13 instalments)

Contact person: Eko Budi Priyanto (eko.has@gmail.com)

16: Peatland Restoration, North Sumatra

Type of wetland under restoration:

Xp -- Forested peatlands; peatswamp forests.

Abstract: The aim of this project (Peatland Restoration, North Sumatra (PME-IKI)), in Muara Manompas and Terapung Raya Village, Muara Batang Toru Sub District, is to restore the function of peat as a water reservoir and increase the income of the people living around the peat forest. The program focuses on enhancing community capacity to prevent and mitigate peatland fires, combined with efforts to restore peatland hydrology – by rewetting, replanting native tree species and revitalizing community livelihoods (alternative livelihoods).

Primary cause of degradation: Peat clearing for oil palm plantations, leading to land subsidence, due to peat drainage, making it more likely to burn due to temperatures rising and rainfall becoming less frequent.

Main restoration approach used: Ecosystem Rehabilitation

Community members are trained to plant peat swamp species and construct canal blocks to restore the water storage function of peatlands. After rewetting, communities plant seedlings and take care of tree nurseries. A campaign on the importance of planting native peatland species for Paludiculture (2 types of paludiculture: jelutung (*Dyera* spp.) for the production of natural rubber and rattan/pakkat, and pineapple) will also contribute to this restoration work.

Ecosystem services:

- Food: production of fish, wild game, fruits, and grains
- Fresh water: storage and retention of water for domestic, industrial, and agricultural use
- Fiber and fuel: production of logs, fuelwood, peat, fodder
- Climate regulation: sources of and sink of greenhouse gases; influence local and regional temperature, precipitation, and other climate processes
- Water purification and waste treatment: retention, recovery, and removal of excess nutrients and other pollutants.
- Erosion regulation: retention of soil and sediments
- Spiritual and inspirational: source of inspiration; many religions attach spiritual and religious values to aspects of wetland ecosystems
- Educational: opportunities for formal and informal education and training.
- Soil formation: sediment retention and accumulation of organic matter, specifically canal blocking

Outcomes achieved: Native peat species have been planted; local communities are starting to become aware of self-help rehabilitation activities; alternative economic activities such as catfish farming and cultivated plants have been initiated; at the village level there is an agreement to manage peat in a sustainable manner. The Government's Department of Environment and Forestry has begun to understand the concept of sustainable peat management using paludiculture.

Key lessons learned: Regular assistance to local communities can create a greater sense of belonging and hence action.

Key Facts

Region:	Asia
Country:	Indonesia - North Sumatra
Wetland Type:	Peatlands
Location:	Muara Batang Toru Sub District
Area:	200 ha
Time frame:	2019-2022
WI Lead Office:	Indonesia



Project partners: Conservation International

Main donors: IKI-PME Project

Budget: Total of 432.521 EUD (380.121 EUD spent so far)

Contact person: Eko Budi Priyanto (eko.has@gmail.com)

17: Climate Change Forest & Peatlands in Indonesia (CCFPI)

Type of wetland under restoration:

U -- Non-forested peatlands; includes shrub or open bogs, swamps, fens.

Xp -- Forested peatlands; peatswamp forests.

Abstract: Climate Change Forest & Peatlands in Indonesia or CCFPI's objectives are to enhance the management of two core peatland areas in Indonesia, and the national capacity to participate in climate change mitigation initiatives. The pilot sites are under different resource management regimes, including: national park buffer zone, national park, former logging concession area, and the ex-mega rice development project. Project components include:

- supporting the establishment of practical community-based management approaches for peatland forests. Including:
 - i) the development of alternative livelihood options for communities reliant on peatland areas; ii) the restoration of hydrological regimes to sustain natural peatland processes and to maintain peatland carbon storage capacity and other important environmental services; iii) the replanting of degraded peatland forests; and iv) collaboration with local agencies on integrated spatial planning.
- Compilation of materials and experiences on peatland best management practices in Indonesia and elsewhere
- Integration of community-based peatland management into national climate change policy
- Partnership and sustainability mechanisms. Including: Capacity development to enhance the engagement of Indonesian stakeholders in existing or emerging climate change initiatives;

Primary cause of degradation: The two main causes are peatlands drainage for conversion to plantations (resulting in land and forest fires) and illegal logging

Main restoration approach used: Ecosystem Rehabilitation

The primary canal of ex-mega rice projects were blocked using simple technology, local materials and engaging local people through Bio-Rights mechanism, while also integrating re-planting activities. In Jambi areas, a mounted-planting method was applied as the areas are commonly inundated during the wet season.

In Berbak National Park, Jambi, the rehabilitation of the park entrance enabled an adversarial relationship between park rangers and local communities to improve. As a result community members are planting trees in the park and rangers feel safer to stay on site reducing the amount of illegal logging taking place. The number of community members engaging in illegal logging has decreased thanks to alternative livelihoods.

Ecosystem services:

- Food: production of fish, wild game, fruits, and grains
- Fresh water: storage and retention of water for domestic, industrial, and agricultural use
- Water regulation (hydrological flows): ground water recharge/discharge
- Climate regulation: sources of and sink of greenhouse gases; influence local and regional temperature, precipitation, and other climate processes
- Natural hazard regulation: flood control, storm protection: control of land and forest fires

Key Facts

Region:	Asia
Country:	Indonesia
Wetland Type:	Peatlands
Location:	Jambi, S. Sumatra, Central Kalimantan*
Area restored:	>10,000 ha
Time frame:	2001-2005
WI Lead Office:	Indonesia

- This project covers several sites: Ex-Mega Rice Project, Central Kalimantan, 2) Berbak National Park, Jambi (including buffer zone areas), and 3) Merang Kepahiyang Peat Swamp Forest, South Sumatra

- Spiritual and inspirational: source of inspiration; many religions attach spiritual and religious values to aspects of wetland ecosystems
- Recreational: opportunities for recreational activities
- Aesthetic: many people find beauty or aesthetic value in aspects of wetland ecosystems
- Educational: opportunities for formal and informal education and training.

Outcomes achieved:

Sustainable management of forests and peatlands has led to carbon sequestration. The intervention in and around Berbak National Park, Jambi, have led to a total gain of 1,970,868 tonnes C or 7,226,516 tonnes CO₂ equivalent. In Central Kalimantan, the canal blocking work indicated a total carbon gain of 2,541,222.78 tonnes C or 9,317,816.85 tonnes CO₂equivalent.

Alternative livelihoods such as honey production and sustainable fishing practice in blocked canals have improved local community incomes.

The canal blocking pilot initiative in the ex-mega rice project has helped reduce the ecological devastation resulting from this mega rice project. Setting the way for future actions.

Key lessons learned:

Building trust between project implementers, local government and local communities is essential to reach consensus. Successful interventions are determined by the level of collaboration between local communities, local and national government. It is essential to bring solid science to the planning, implementation and evaluation phases of a restoration project.

Project partners: Wildlife Habitat Canada, the Global Environment Centre and Indonesian and Canadian partners.

Main donors:/Budget: The Canadian Climate Change Development Fund of the Canadian International Development Agency have approved funding of \$3,900,000 Cdn for project implementation. The Global Environment Facility and the Global Peat Initiative have provided co-funding of approximately \$200,000 Cdn.

Contact person: Yus Rusila Noor (yus.noor@gmail.com)



18: Building with Nature, Indonesia

Type of wetland under restoration:

I -- Intertidal forested wetlands; includes mangrove swamps, nipah swamps & tidal freshwater swamp forests.

Abstract: Communities in Northern Java suffer from coastal erosion affecting hundreds of kilometres of coastline. In the district of Demak more than 3 kilometres of land, including entire kampongs (sub-villages) have already been swallowed up by the sea. The important nursery function of mangroves for several fish species have been lost.

This project uses a *Building with Nature* approach to address these root causes, integrating mangrove and river restoration, civil engineering and sustainable land use to build safe and adaptive coastlines. Technical measures to protect the coastline in Demak include restoration of the sediment balance using permeable structures, alongside mangrove rehabilitation. Socio-economic measures to promote sustainable land-use include the development and introduction of sustainable aquaculture and livelihoods diversification. This approach will be replicated across Northern Java, mainstreaming coastal zone management through national level policy, dialogue and training and will build on the lessons learned from the flagship project in Demak.

Primary cause of degradation: The main causes of the erosion are sea level rise, abrasion, the removal of mangrove belts for aquaculture development, the construction of coastal infrastructure that disturbs sediment build-up from offshore sources, and groundwater extraction, which causes land subsidence and river canalisation.

Main restoration approach used: Ecological Restoration – Building with Nature

Technical measures to protect the coastline include restoration of the sediment balance using permeable structures, made from local brushwood and bamboo attached to poles alongside mangrove rehabilitation. There have been setbacks. Some structures have been damaged by shipworms, others by storms. The rest have required frequent maintenance. To increase their durability, we have changed designs and materials – for instance replacing wood poles with hollow PVC filled with concrete. But behind most of the maintained structures, sediment more than 25 centimetres deep accumulated in the first three years. The aim is for a restored belt of mangroves to take over the role of these structures, recreating a natural defence against further erosion. In coastlines where erosion is less severe, we have endeavoured to create a restored greenbelt of mangroves by encouraging villagers to reconnect abandoned, degraded and unproductive aquaculture ponds with the ocean. The aim is to allow sediment to enter these basins, along with water containing mangrove seeds leading to natural regeneration (our main approach). In some places, where natural growth did not occur, we regenerate mangroves species through seed dispersal, or when we wished to enrich the mangroves with specific mangrove species. Socio-economic measures to promote sustainable land-use include the development and introduction of sustainable aquaculture and livelihoods diversification.

Ecosystem services:

- Food: production of fish, wild game, fruits, and grains
- Climate regulation: sources of and sink of greenhouse gases; influence local and regional temperature, precipitation, and other climate processes
- Water regulation (hydrological flows): ground water recharge/discharge
- Water purification and waste treatment: retention, recovery, and removal of excess nutrients and other pollutants.
- Erosion regulation: retention of soil and sediments

Key Facts

Region:	Asia
Country:	Indonesia
Wetland Type:	Mangroves
Location:	Demak District, Central Java
Area restored:	118.8 ha
Time frame:	2015-2021
WI Lead Office:	Indonesia

- Natural hazard regulation: flood control, storm protection
- Spiritual and inspirational: source of inspiration; many religions attach spiritual and religious values to aspects of wetland ecosystems
- Recreational: opportunities for recreational activities
- Aesthetic: many people find beauty or aesthetic value in aspects of wetland ecosystems
- Educational: opportunities for formal and informal education and training.
- Soil formation: sediment retention and accumulation of organic matter
- Nutrient cycling: storage, recycling, processing, and acquisition of nutrients.



Outcomes achieved: Permeable structures were placed along more than nine kilometres of the Demak coast with the Indonesian government. Despite setbacks, sediment accumulated in the first three years and helped restore mangrove belts that will take over the role of these structures, recreating a natural defence against further erosion.

Among the ten community groups involved, more than two dozen farmers gave up almost 80 hectares of ponds to green-belt recovery. By allowing sediment to enter these basins, along with water containing mangrove seeds further mangrove regeneration will take place. This exceeded the programme target. However, farmers find it challenging to maintain the basins' hydrological connectivity with the sea, and as a result so far there is limited mangrove recovery, leaving these areas at continued risk of erosion.

We also set up field schools and Bio-rights projects. Having previously regarded regular flooding and low pond productivity as inevitable, communities are now much more optimistic, creative in their thinking and collaborative in making strategic decisions to improve their lives and sustain their surroundings. This is seen perhaps most clearly in the way that the ten community groups have organised themselves into a Community Group Forum, called Bina Noto Segoro (BINTORO), which is Javanese means "to manage the sea". BINTORO now plans and implements the restoration and livelihood measures begun under the project. It also represents the communities to local government and other external parties and has released its own independent assessments of the coastal situation in Demak, which called for further action to address land subsidence. This statement was also used in Water Dialogues on land subsidence for Semarang and Demak. Following the collaboration in Demak, the Indonesian Ministry of Marine Affairs and Fisheries installed 23.5 kilometres of structures in 13 districts between 2015 and 2019 across Indonesia. PusAir, the research department of the Ministry of Public Works and Housing, has developed and tested new semi-permeable structure designs, and is producing technical guidelines on their use that are being accepted nationally.

Key lessons learned:

1. Proactive and early stakeholder engagement is essential
2. Exploiting the broad range of benefits for nature and surrounding communities gives more sense to the project implementation
3. Multi-financing streams are necessary
4. Understanding the system at a site, using natural dynamics to deal with future uncertainties, allows us to prepare better for future management of the site

Project partners: Deltares, Witteveen Bos, Indonesia Ministry of Marine Affairs and Fisheries, Indonesia Ministry of Public Works, University of Diponegoro (UNDIP), Kota Kita, Wageningen University and Research, Von Lieberman, UNESCO – IHE, TU Delft, and Blue Forest.

Main donors: Sustainable Water Fund (SWF) and International Climate Initiative (IKI)

Budget: 5.069.657 € (2015-2021)

Contact person: Apri Susanto Astra (apriastra@wetlands.or.id)

19: Yatsu-higata (tidal flats) Restoration

Type of wetland under restoration:

G -- Intertidal mud, sand or salt flats.

Abstract: Yatsu-higata is a 40 ha tidal flats, located approximately 2km inland of Tokyo Bay. Tokyo Bay once had extensive tidal flats, but most were reclaimed by rapid industrialization and urbanization. Yatsu-higata survived thanks to active conservation efforts by the local community. It connects to Tokyo Bay via two channels, through which the tidal water flows in and out. Yatsu-higata is an important stopover area for migratory birds, mainly shorebirds and was designated as a Ramsar site in 1993. However, environmental conditions have deteriorated over the last ten years, due to reduced tidal water flow caused by sedimentation of channels and less exposure time and area of the tidal flat because of run off muds and ground subsidence. Wetlands International Japan has been involved in this restoration project, carried out by the Japanese Ministry of the Environment, by taking a coordinating role and chairing experts meetings. After more than ten years of discussion and trials (using thorough PDCA (Plan-Do-Check-Act) cycle), sediment removal from two flow channels and accumulation of sands on tidal flat in 2019 have led to a recovery of the tidal flats.

Key Facts

Region:	Asia
Country:	Japan
Wetland Type:	Tidal Flats
Location:	35°40'N 140°00'E Tokyo Bay
Area restored:	40 Has
Time frame:	2010-2019
WI Lead Office:	Japan

Primary cause of degradation: Sedimentation of flow channels, mud run off and ground subsidence, partially caused of an earthquake.

Main restoration approach used: Ecological Restoration & Ecosystem Rehabilitation

After careful research the following approaches were used:

1. Sediments removal from two flow channels
2. Sand accumulation on subsidence tidal flats

This improved tidal flats condition by i) increasing tidal water flow, ii) increasing tidal flats exposure time and area, and iii) preventing decay of seaweeds covering tidal flats which made living condition for benthos better (important shorebirds prey).

This work was carried out using a PDCA (Plan-Do-Check-Act) cycle starting small scale (removing sediments by 10cm depth and accumulating sands 1m x 1m square with 50cm depth by changing sand-mud ratio.) Once no significant negative impact was observed by checking the tidal water flow speeds, and composition and the number of benthos species, we entered a larger scale second cycle (removing sediments by 20cm depth and accumulating sand 5m x 5m square with 50cm). We carried out this cycle several times, simulating the consequences, checking effectiveness, implementing further activities, and monitoring again. In 2019, we implemented an even larger scale restoration, by removing all sediments from two flow channels and accumulating sands on the tidal flats where it was above sea water at the low tide in 1993 when the Yatsu-higata was designated a Ramsar site.

Ecosystem services:

- Water purification and waste treatment: retention, recovery, and removal of excess nutrients and other pollutants. By improving living condition for benthos
- Recreational: opportunities for recreational activities
- Aesthetic: many people find beauty or aesthetic value in aspects of wetland ecosystems
- Educational: opportunities for formal and informal education and training.
- Yatsu-higata is famous for birdwatching and good environmental education site for school children.



Outcomes achieved: Improvement of tidal flats ecological condition and living condition of benthos species which are important prey for shorebirds.

Preventing the decay of seaweeds reduced the awful smell resulting in a better living environment for local people. Locals became more concerned about Yatsu-higata and some actively participated in restoration activities.

The prefectural and municipal governments became more concerned about Yatsu-higata and took on responsibility for Yatsu-higata. Relevant central government (Ministry of Land, Infrastructure, Transport and Tourism) also showed greater awareness about Yatsu-higata.

Frequent dissemination of information about this project and restoration events allowed local stakeholders to become more aware of these tidal flats and encouraged their participation in restoration activities.

Key lessons learned: It was very important to use a Plan-Do-Check-Act cycle (PDCA) in this wetland restoration project given the sensitivity of this natural environment.

Frequently disseminating information about the development of the restoration project to relevant stakeholders, including surrounding local community was very important to raise awareness and get their by-in. Encouraging the participation of local people in small scale restoration activities is useful to generate ownership. Restoration project can be used for environmental education.

Project partners: University experts, NGOs and Local government officials (both prefectural and municipal) Yatsu-higata Nature Observation Center and Private sector (consulting company)

Main donors: Ministry of the Environment of Japan

Budget: The project financed by the Japanese Ministry of the Environment. WI Japan did not spend any of its own budget on implementation.

Contact person: Yoshihiro Natori (natori@wi-japan.org)

20: Agusan River Basin

Type of wetland under restoration:

M -- Permanent rivers/streams/creeks; includes waterfalls.

Abstract: Agusan River is one of 18 major rivers in the Philippines. At the mid-section of the river, Agusan Marsh Wildlife Sanctuary (AMWS) is a Ramsar Site 1009 listed in 1999. The site has a marsh and the largest peatland swamp (Caimpugan) in the Philippines. The Agusan River Basin is threatened by mining upstream, illegal fishing and burning of peatland forest midstream, and by bad agricultural practices in many parts of the river. These threats result in pollution, landslide, erosion of river bank and excessive sedimentation of the river. Wetlands International demonstrated forest landscape restoration (FLR) to reduce landslide (and loss of top soil) on slopes and riparian buffer forest restoration (RBFR) along river banks to reduce erosion and risk to flooding. Native trees and fruit trees were planted and grew successfully in the sites and communities were inspired to replant more areas to reduce erosion and flooding.

Primary cause of degradation: Illegal logging, slash and burn agricultural, burning of peat forest, illegal fishing and mining

Main restoration approach used: Ecosystem Rehabilitation

We collected wildlings of native species and purchased fruit tree saplings to replant the slope in Talacogon and along the river in Monkayo (in the mid-stream of the Agusan River). The trees were grown in between areas of crops (mainly bananas) to hold top-soil and prevent landslide on the slope while, along the river (Monkayo), we planted grass, native trees, shrubs, fruit trees (from water edge to inland – the ecological zone) to reduce the risk of erosion to the river banks and to reduce the risk of flooding. In addition, we supplemented the livelihood of farmers by providing them with cacao trees that produce beans for chocolate.

We also built the capacity of the DENR for sustainable financing, Payment for Ecosystem Services; communicated the need for wetlands restoration (through stakeholder meetings); and built partnerships with local universities and other stakeholders.

Ecosystem services:

- Erosion regulation: retention of soil and sediments
- Natural hazard regulation: flood control, storm protection
- Spiritual and inspirational: source of inspiration; many religions attach spiritual and religious values to aspects of wetland ecosystems
- Aesthetic: many people find beauty or aesthetic value in aspects of wetland ecosystems
- Soil formation: sediment retention and accumulation of organic matter

Outcomes achieved:

Indigenous people in the Talacogon (banana farmers mostly with whom we worked) observed a change in their environment. They no longer complained of landslips after the tree planting. The local community is convinced that the restoration approach is beneficial. In addition, vegetable farmers along the river in Monkayo are protected from flooding by the rehabilitation of the ecological zone and are now growing vegetables more or less throughout the year.

We have received reports that farmers in Talacogon have increased their income from the sale of cacao beans.

Key Facts

Region:	Asia
Country:	Philippines
Wetland Type:	River & Riparian landscape
Location:	Agusan River Basin
Area restored:	< 20 ha
Time frame:	2017-2020
WI Lead Office:	Philippines

This project has contributed to the formulation of the Climate Change Resilient Agusan River Basin Management Plan, in particular a provision on nature-based solutions.

A broad group of stakeholders, including soldiers, local government officers, farmers, etc. took part in the planting. The project has also inspired local schools to establish their own tree planting activities.

The cost of RBFR is low and considered affordable for local government and local organization. The estimated cost for 1 hectare (500 m X 20 meters) was Php 484,000 (Euro 8,417) over 3 years. The first year cost was 56 % of the total and decreasing to the last 2 years; the second expense was 24% and 20 % for the remaining years.

Key lessons learned:

1. Restoring degraded sloping lands and riparian buffer zones is feasible thanks to working with local people and institutions; this helps smooth implementation.
2. Providing alternative livelihood options (i.e., cacao-growing) helps to engage farmers;
3. Providing proof-of-concept of restoration (a nature-based solution) is important as it is desired and appreciated by the stakeholders;
4. Monitoring restoration results should be done by capable people, e.g., representatives of local universities, in parallel with a "citizen-science" approach for efficiency

Project partners: Department of Environment and Natural Resources, Local Governments of Monkayo and Talacogon

Main donors: Partners for Resilience Project (Ministry of Foreign Affairs, Netherlands)

Budget: Euro 89,000 over 4 years (2017-2020)

Contact person: Annadel S. Cabanban (Annadel.Cabanban@wetlands.org)



Before

After

21: Restoring Peatlands in Russia – for fire prevention and climate change mitigation

Type of wetland under restoration:

U -- Non-forested peatlands; includes raised bogs, fens and transitional mires.

Xp -- Forested peatlands.

Abstract: This project aims to contribute to the restoration and sustainable management of degraded peatlands in order to reduce fire incidents and GHG emissions from drainage of European Russian peatlands. Our work focuses on the following areas: 1) compilation of a peatland inventory in 11 subnational regions, identification of priorities for rewetting, and guidance on appropriate rewetting techniques; 2) establishment of long-term capacity for hydrological restoration of drained peatlands. This includes: development of rewetting project designs and their implementation in pilot areas; development of methodologies and a knowledge base for further application of diverse rewetting techniques; monitoring of their effectiveness; and optimal management; capacity development for Russian institutions including training courses and seminars, international exchanges; 3) development of recommendations for policy and legislative reforms; 4) promotion of approaches and mechanisms for sustainable peatland management, such as the introduction of paludiculture. Since 2011, the project has contributed to the restoration of natural peatland ecosystems, creation of suitable wet lands for paludiculture, and the reduction of fire risk over a total area of 95,000 ha; by the end of 2023 we plan to achieve 140,000 ha.

Primary cause of degradation: In European Russia, 10 M ha of peatlands were drained and used for agriculture, forestry and peat extraction. Presently, most of these lands are no longer in use. These peatlands become permanent sources of greenhouse gases (GHG) and are prone to fire.

Main restoration approach used: Ecological Restoration & Ecosystem Rehabilitation and paludiculture

The approach is based on green engineering solutions and does not demand high investment for its implementation, but does demand highly scientific and engineering inputs, genuine support and understanding by all stakeholders and the involvement of local communities.

Rewetting is achieved by blocking drainage ditches so that the natural hydrological regime is restored. This creates conditions for the launch of natural processes of ecosystem self-restoration. The complete recovery of peatland ecosystems can be reached in 10 to 20 years.

The implementation process of a peatland rewetting project can be divided into stages: basic survey, concept development, engineering design, implementation, and monitoring–assessment–correction. These stages comprise an adaptive management cycle, where further improvements can be proposed based on the results of monitoring and assessment.

The project has also introduced paludiculture (wet agriculture on restored peatlands) and sustainable management practices at several sites.

Ecosystem services:

- Food: production of wild game, berries, wet cultures
- Fresh water: storage and retention of water for domestic, industrial, and agricultural use
- Climate regulation: sources of and sinks of greenhouse gases; influence local and regional temperature, precipitation, and other climate processes

Key Facts

Region:	Europe
Country:	Russia
Wetland Type:	Peatlands
Location:	Central European Russia
Area restored:	22,000 ha by ecological restoration*
Time frame:	2011-2023
WI Lead Office:	Russia



- Water regulation (hydrological flows): ground water recharge/discharge
- Water purification and waste treatment: retention, recovery, and removal of excess nutrients and other pollutants.
- Spiritual and inspirational: source of inspiration; many religions attach spiritual and religious values to aspects of wetland ecosystems
- Recreational: opportunities for recreational activities
- Aesthetic: many people find beauty or aesthetic value in aspects of wetland ecosystems
- Educational: opportunities for formal and informal education and training.
- Soil formation: sediment retention and accumulation of organic matter
- Nutrient cycling: storage, recycling, processing, and acquisition of nutrients.

Outcomes achieved: Peatland ecosystem restoration activities were carried out on 22,000 ha (by 2020). Monitoring conducted in subsequent years after rewetting shows that the restoration of targeted ecosystems is progressing well at most sites. In several areas, corrective measures have been proposed and implemented.

*Fire risks have been significantly reduced over 95,000 ha. Various activities and facilities for awareness raising were supported, including an education and visitor centre, a peat museum, 4 rewetting demonstration sites, and two educational trails in restored peatlands. Best practices for peatland use are promoted, including paludiculture. In addition, 11 subnational governments have joined the project and included peatland wise use measures in their development plans.

Key lessons learned: It is essential to really work with local people, to explain everything so that they understand the importance of this work and how it is being done, otherwise they would remove the dams and not participate.

Project partners: Institute of Forest Science, Russian Academy of Sciences, the Michael Succow Foundation and the Institute of Botany and Landscape Biology, Greifswald University

Main donors: This Project is financed under the International Climate Initiative (IKI) by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), facilitated through the KfW German Development Bank

Budget: EUR 8,000,000 (2011-2023)

Contact person: Irina Kamennova (IKamennova@wwf.ru)

22: Sand dune restoration - Inner Niger Delta

Type of wetland under restoration:

M -- Permanent rivers/streams/creeks; includes waterfalls.

Abstract: Once the flagship of local food self-sufficiency with flourishing agriculture, livestock and fishing, the village of Sobé, located 6 km east of Youwarou, in the Inner Niger Delta, Mopti region, is threatened by climate change (floods, droughts, desertification and siltation). With its 1041 inhabitants in 196 households Sobé, is one of several villages facing this crisis. Sand dunes have invaded the entire east side of the village threatening to engulf houses, block fields and the river. The accumulated sand buries crops, communication infrastructures, dwellings, waterways, etc. Silting is the result of grains of sand transported by the wind, settling and accumulating when they encounter an obstacle. This type of erosion, which is the ultimate manifestation of desertification, occurs whenever the soil is loose, dry and finely crumbled; when surfaces are uniform or absent of vegetation.

This situation led the Municipal Council of Déboye and Wetlands International to focus on Sobé. Dune restoration has managed to save village houses and has helped iron out disagreement between villagers and promote the creation of a small village irrigated perimeter (PPIV).

Primary cause of degradation: Climate change leading to floods, droughts, desertification and siltation. Sand deposits bury crops, communication infrastructures, dwellings and waterways.

Main restoration approach used: Ecosystem Rehabilitation

Community approach: training local people in techniques to restore dunes and providing them with the necessary equipment, so that they can create a permeable barrier from local materials to decrease wind speed, while reducing the mobility of sand particles.

Ecosystem services:

- Food: production of fish, wild game, fruits, and grains
- Fresh water: storage and retention of water for domestic, industrial, and agricultural use
- Erosion regulation: retention of soil and sediments
- Natural hazard regulation: flood control, storm protection
- Spiritual and inspirational: source of inspiration; many religions attach spiritual and religious values to aspects of wetland ecosystems
- Soil formation: sediment retention and accumulation of organic matter

Outcomes achieved:

The restoration or fixing of sand dunes has achieved many positive outcomes: The river has benefited because the effect of wind erosion has become moderate. This stabilization will revive old village activities such as okra, cowpea and peanut cultivation. The planting of shade trees, ornaments and groves all around the village has become possible. It is anticipated that the grassy carpet, which had disappeared, will return.

Thanks to slowing and even stopping the movement of sand several houses and dozens of inhabitants were saved. Dune stability has enabled the construction of several concessions on the sand thanks to the terrain

Key Facts

Region:	Africa
Country:	Mali
Wetland Type:	Rivers and sand dunes
Location:	Sobé village, Mopti region
Area:	20 ha
Time frame:	2011-2015
WI Lead Office:	Sahel (Mali)



which has become flat and safe. The fixation of the dunes encouraged 128 village women to create market gardens increasing their income.

This work has contributed to the implementation of a local development plan and to climate change policy.

Key lessons learned:

Effective capacity building of local communities enables activities to continue through very strong community mobilization.

Use of the local specie "euphorbia" has made sand dune fixing possible because it is easily accessible and does not need watering to fix itself in the sand.

Surrounding villages have adopted this technique to restore their dunes.

It is a cuttings technique that requires patience and time in order to achieve success.

Project partners: Regional Direction of water and forest in Mopti

Main donors: Dutch Ministry of Foreign Affairs

Budget: Approximately 7,900 euros

Contact person: Ibrahima Sadio Fofana (ifofana@wetlands-saheloffice.org)

23: Ecosystem Restoration Sakarani Basin

Type of wetland under restoration:

M -- Permanent rivers/streams/creeks; includes waterfalls.

Abstract: Farabacoura is an old gold panning site located in the Sakarani Basin of the Upper Niger. Gold panning activities degraded the region's ecosystems and biodiversity, while also contaminating water with heavy metals. This project aims to restore and conserve ecosystems and biodiversity through forest regeneration. Community mobilization supported by Wetlands International enabled local people to plant trees (e.g. baobabs (*Adansonia Digitata*)) thanks to a supply of seedlings. After three years of monitoring, many species have returned including birds, monkeys, reptiles, etc. Local incomes have increased as a result of honey sales thanks to hives and training provided by Wetlands International. The main challenge encountered during this pilot project was bush fires caused by hunters looking for game around the site.

Key Facts

Region:	Africa
Country:	Mali
Wetland Type:	Rivers
Location:	Farabacoura
Area restored:	10 ha
Project time frame:	2017-2021
WI Lead Office:	Sahel (Mali)

Primary cause of degradation: Traditional gold panning

Main restoration approach used: Ecosystem Rehabilitation

Conservation and restoring of the forest ecosystem has been achieved by mobilising the local community to plant trees (e.g. baobabs (*Adansonia Digitata*)) thanks to a supply of seedlings. Following a decision by the communities to protect the site and improve its biodiversity and increase community resilience through honey production, bushfires, woodcutting and gold mining were prohibited on the site. Monitoring and control, by voluntary surveillance guardians, during daytime was put in place by the local community to help achieve this.

Ecosystem services:

- Food: production of fish, wild game, fruits, and grains
- Climate regulation: sources of and sink of greenhouse gases; influence local and regional temperature, precipitation, and other climate processes
- Erosion regulation: retention of soil and sediments
- Pollination: habitat pollinators
- Spiritual and inspirational: source of inspiration; many religions attach spiritual and religious values to aspects of wetland ecosystems
- Recreational: opportunities for recreational activities
- Aesthetic: many people find beauty or aesthetic value in aspects of wetland ecosystems
- Soil formation: sediment retention and accumulation of organic matter
- Nutrient cycling: storage, recycling, processing, and acquisition of nutrients.

Outcomes achieved:

Since the implementation of this project, local communities have noticed the return of biodiversity, in particular birds, reptiles, monkeys and bees. Forest species have increased. The project raised awareness among local communities about the importance of healthy ecosystems and the practice of beekeeping. It led to the practice of traditional rites on the site and the exploitation of natural resources for traditional medicines (pharmacopoeial practices).



This project also inspired the municipality to include the restoration of gold panning sites in their development plan. The municipality is currently looking for technical and financial partners to up-scale restoration of old gold panning sites in the Sankarani Basin.

Key lessons learned: It is possible, in the medium-term, to restore ecosystems in gold panning sites located in hydrological basins.

Project partners: The local Municipality, Water and Forest Services and the Water Committee

Main donors: Netherlands Embassy in Mali

Budget: € 32220 (CFA 21 135000)

Contact person: Mr. Zongo Beteo (bzongo@wetlands-saheloffice.org)

24: Flooded Forest, Inner Niger Delta

Type of wetland under restoration:

P -- Seasonal/intermittent freshwater lakes (over 8 ha); includes floodplain lakes.

Abstract: Flood forests, in the Inner Niger Delta function as a shelter for endangered aquatic animals (including hippos), manatees and migratory birds and are highly productive ecosystems in terms of fish production for local communities. They play a nesting, dormitory and feeding functions for water birds. They have been threatened by severe droughts over the years and human pressure including egg and chick harvesting for food. This has led to a decline in water bird species such as the African darter and the Black night heron leading to fewer nutrients in the water to sustain the fish populations. In addition, when water recedes, Fulani shepherds intensively cut tree branches to feed small ruminants. The combination of these threats led to the creation of this project.

Primary cause of degradation: Climate change and severe weather: droughts struck the Inner Delta in the late 1970s and early 1980s, destroying the Akka flood forest and continue to threaten it today. Egg and chick exploitation as well as intense tree branch harvesting for small ruminants by shepherds add to its decline.

Main restoration approach used: Ecological Restoration & Ecosystem Rehabilitation

Community based restoration to conserve water birds and to increase fish harvesting included planting trees secured with wires and grasses. Fencing was used to prevent harvesting and tree cutting and to cover the greatest forest area and reduce the costs associated with the purchase of seedlings and their transplantation.

Information and awareness raising of local communities about the exploitation and management of forest resources were carried out through three FM radio stations and village public criers.

State local water and forest technical services were involved to support rural communities in conservation techniques and monitoring of the forest and its fauna. Four supervisors, funded by this project, ensure close monitoring and control of the forest. Synergies between community stakeholders, state technical services, the municipalities and NGO have led to the success of this restoration project. Results are measured in terms of the number of water bird nesting colonies and reduced tree cuttings.

Ecosystem services:

- Food: production of fish, wild game, fruits, and grains
- Fresh water: storage and retention of water for domestic, industrial, and agricultural use
- Fiber and fuel: production of logs, fuelwood, peat, fodder
- Water regulation (hydrological flows): ground water recharge/discharge
- Water purification and waste treatment: retention, recovery, and removal of excess nutrients and other pollutants.
- Natural hazard regulation: flood control, storm protection
- Spiritual and inspirational: source of inspiration; many religions attach spiritual and religious values to aspects of wetland ecosystems
- Educational: opportunities for formal and informal education and training.
- Nutrient cycling: storage, recycling, processing, and acquisition of nutrients.

Key Facts

Region:	Africa
Country:	Mali
Wetland Type:	Flood Forests
Location:	Akka-Goun, Inner Niger Delta
Area restored:	200 ha
Time frame:	2015-2021
WI Lead Office:	Sahel (Mali)

Outcomes achieved:

Community resilience in Deboye and Youwarou communes has improved. Forest restoration has benefited pastoralism, has helped extend fish spawning grounds, protected waterbird habitats and mammals such as hippos and manatees. The perennial bourgou grass plays important ecological and socio-economic functions for local communities. A good organizational based has been put in place to maintain this link.

The economic, social and societal benefits as well as the ecological and culture advantages this restoration work have brought, have inspired and mobilized local actors to take further action. This is the main reason why local communities are committed to restoration activities regardless of the level of insecurity in the Inner Niger Delta. This has led to inclusive multispectral dialogue on sustainable management of ecosystems with local village at the centre.

Key lessons learned:

Three key lessons emerge: carrying out conservation work by defending forest access to enable regeneration is less expensive than creating nurseries and transplanting; Communities can use the flooded forest for rice cultivation during short floods. Strong organization and an effective supervisory committee for the management of the restored sites are necessary in particular to control the re-entry and exit of animals in order to respect carrying capacity.

Project partners: National Directorate for Forest and Water, National Directorate for Agriculture, National Directorate for Animal Production and Industry, National Directorate for Fishing

Main donors: Germany Cooperation through the IKI Netherland Cooperation through the Ministry of Foreign Affairs

Budget: Between 2015 and 2021 the estimated budget is 20 000 euro. Wetlands international and IUCN projects like PAGEIT and WPRP (water and poverty reduction) started contributing to this restoration work in 1985.

Contact person: Diallo Mori (mdiallo@wetlands-saheloffice.org)



25: Noga Village Ponds, Inner Niger Delta

Type of wetland under restoration:

N -- Seasonal/intermittent/irregular rivers/streams/creeks.

O -- Permanent freshwater lakes (over 8 ha); includes large oxbow lakes.

P -- Seasonal/intermittent freshwater lakes (over 8 ha); includes floodplain lakes.

Abstract: In the municipality of Dialloubé in the Inner Niger Delta (Mopti region), 2104 meters of supply channel for large ponds were cleared and recalibrated in 2014 in the village of Noga. One of the delta's main channels flows past the village of Noga, but was dry for much of the year. Even in the rainy season, it no longer flowed onto the village's farms and grazing lands. The villagers decided to change this and with advice from Wetlands International, dug a gap in the river bank to allow water to flow once more onto the flat lands, through depressions excavated by the villagers to provide wet pastures, and on to a cascade of fish ponds. This made it possible to flood and restore the ecosystem services of an additional 5 ponds and plains. These plains cover an area of approximately 5000 ha benefiting Noga village and five other villages. Their functions include ecological (spawning grounds for fish, feeding areas, dormitories and breeding sites for birds, etc.), economic (source of income, improvement of milk quality, quantity and quality of livestock, etc.), cultural (animal crossing, ecotourism, etc.) as well as regulatory functions (buffer zone against strong winds, reservoir). Despite their importance, the bourgoutières are subject to several threats such as reduced flooding caused by the construction of dams upstream, climate change, the extension of agricultural land, the increase in the pastoral load, etc. Restoration success is high (90%) thanks to the existence of water point in the village (ponds and traditional wells) and the presence of the river which serves as a watering place for animals during most of the dry season.

Primary cause of degradation: Construction of dams upstream, climate change, the extension of agricultural land, the increase in the pastoral load, etc

Droughts due to climate change and fewer trees, abusive wood cutting, overgrazing, water erosion, and silting. Silting and obstruction of feeding channels is at the root of ecosystem imbalance and increases the risk of water supply difficulties for the lakes, which leads to a very dangerous reduction of the floodable areas.

Main restoration approach used: Ecological Restoration & Ecosystem Rehabilitation

The reconstitution of the ecosystem services in 5 ponds and plains by cleaning out their main supply channels. The process leading to this restoration was as follows:

- Assessment of the vulnerability of the village populations - Identification of necessary actions - Precision study - Recruitment of a company after national call for tenders - Execution of works - Control of the regional directorate of rural engineering - Protection of the canal by the populations.

Ecosystem services:

- Food: production of fish, wild game, fruits, and grains
- Fresh water: storage and retention of water for domestic, industrial, and agricultural use
- Climate regulation: sources of and sink of greenhouse gases; influence local and regional temperature, precipitation, and other climate processes
- Water regulation (hydrological flows): ground water recharge/discharge
- Erosion regulation: retention of soil and sediments

Key Facts

Region:	Africa
Country:	Mali
Wetland Type:	Flood plains and lakes
Location:	Noga, Dialloubé
Area restored:	5,000 ha
Time frame:	2011-2015
WI Lead Office:	Sahel (Mali)



- Natural hazard regulation: flood control, storm protection
- Spiritual and inspirational: source of inspiration; many religions attach spiritual and religious values to aspects of wetland ecosystems
- Recreational: opportunities for recreational activities
- Aesthetic: many people find beauty or aesthetic value in aspects of wetland ecosystems
- Educational: opportunities for formal and informal education and training.
- Soil formation: sediment retention and accumulation of organic matter
- Nutrient cycling: storage, recycling, processing, and acquisition of nutrients.

Outcomes achieved:

More than 5000 hectares regained their vitality thanks to the drainage of water and the interconnection of a string of ponds. This has had the impact of the return vegetation cover, the arrival of migratory birds, the regeneration of pasture sites, free flooding rice cultivation, collective fishing, etc... These fish contribute substantially to family diets and represent an important source of income.

Key lessons learned: An essential element of any project is ensuring ownership of the project by the communities from the start to ensure their strong involvement.

Project partners: Regional Directorate of Rural Engineering of Mopti and local NGO

Main donors: Dutch Ministry of Foreign Affairs

Budget: 20,000 Euros

Contact person: Ibrahima Sadio Fofana (ifofana@wetlands-saheloffice.org)

26: Bourgour Restoration, Walado Debo

Type of wetland under restoration:

M -- Permanent rivers/streams/creeks; includes waterfalls.

O -- Permanent freshwater lakes (over 8 ha); includes large oxbow lakes.

Ts -- Seasonal/intermittent freshwater marshes/pools on inorganic soils; includes sloughs, potholes, seasonally flooded meadows, sedge marshes.

Abstract: The restoration of Bourgour site in the Inner Niger Delta has been carried out in several localities since 2000 to improve the resilience of communities, to restore ecosystems and biodiversity in the context of climate change and water management. This project was carried out through a community approach thanks to the support of Wetlands International over several years. Bourgour (*echinochloa stagnina*) performs several functions and provides several ecosystem services in the Inner Niger Delta. These functions are, among others: ecological (spawning areas for fish, feeding areas, dormitories and breeding sites for birds, etc.), economic (source of income, improvement in the quality of milk, quantity and quality of livestock, etc.), cultural (animal crossing, ecotourism, etc.), and regulation (buffer zone against violent winds, reservoir). Despite their importance, "bourgoutières" or Bourgour sites are subject to several threats, including reduced flooding caused by the construction of dams upstream, climate change, the extension of agricultural areas, the increase in the pastoral load, etc. This project succeeded in restoring 80% of the plots; maintaining and conserving water bird species (111 species identified), fish (more than 55 species); and helping to diversify community income sources (sale of Bourgour, grazing fees).

Primary cause of degradation: Climate change leading to reduced rainfall: rainfall being the main provider of the river flow in the upstream area of the river basin.

Main restoration approach used: Ecological Restoration & Ecosystem Rehabilitation

Community-based organisations were put in place to organize restoration activities such as transplanting, transporting, cuttings and monitoring the site until the final phase of bourgour grass restoration and its future exploitation by users was secured. Support to finance actions such as the purchase of seeds and the functioning of the management committee were provided by an innovative micro-credit mechanism called Bio-rights that links improved livelihood production and habitat protection to sustainable environmental protection. It is a type of clause contract between WISO, a microfinance institution and the beneficiary communities of the project. In addition, capacity building was offered on bourgour cultivation and credit management at the local level. A partnership was established between the State Technical Services, local authorities and NGOs. Advocacy documents on water sharing, as the engine for village restoration were published.

Ecosystem services:

- Food: production of fish, wild game, fruits, and grains
- Fresh water: storage and retention of water for domestic, industrial, and agricultural use
- Water regulation (hydrological flows): ground water recharge/discharge
- Water purification and waste treatment: retention, recovery, and removal of excess nutrients and other pollutants.
- Spiritual and inspirational: source of inspiration; many religions attach spiritual and religious values to aspects of wetland ecosystems
- Soil formation: sediment retention and accumulation of organic matter
- Nutrient cycling: storage, recycling, processing, and acquisition of nutrients.

Key Facts

Region:	Africa
Country:	Mali
Wetland Type:	Flood Forests
Location:	Deboye & Youwarou Inner Niger Delta
Area restored:	1280 ha
Time frame:	2019-2021
WI Lead Office:	Sahel (Mali)

Outcomes achieved: Since 2019, fishermen and herders in the communes of Youwarou and Deboye have improved their living conditions thanks to an increase in the qualitative and quantitative production of fish and milk. The extension of the restored areas in bourgour has allowed fishermen to increase the quality of fish production. This has enabled fishermen to process the fish caught and improve other fish production and processing chains. Herders have improved the quality and quantity of milk because animals remain closer to the villages facilitating the delivery of the product.

Two political outcomes have been achieved. An more equitable sharing of water in the Niger Basin in general and the Inner Niger Delta in particular which is threatened by the construction of dams upstream and the extension of irrigation in the Office du Niger area. These different constructions result in a decrease in flow of 14 to 30% depending on whether the flood is good or bad. The decrease in the flow rate in the IND can affect the loss of floodplains by more than 15% which is unfavorable for the village and therefore causes ecological and economic loss. Second, the areas has been designated a hot spot and as a RAMSAR site by the Government of Mali. So its conservation is a priority and particularly as a favorite area for the migratory palarctic and as a stop-over zone in the African-European and Asian migration routes.

Key lessons learned: Bourgour restoration requires the presence of a sufficient quantity of water allowing the development of the bourgour and its ability to produce seeds. A strong organization and an effective supervisory committee are necessary for the management of the restored sites and in particular to control the re-entry and exit of animals in order to respect its carrying capacity.

Project partners: National Directorate for Forest and Water, National Directorate for Agriculture, National Directorate for Water and Energy, National Directorate for Fishing, National Directorate of animal and Industry Production.

Main donors: Bilateral organisation, EU, Foundations etc..

Budget: There is no accurate budget but the base line budget is through experience of restauration would be about an average budget of 500 euro per ha of bourgour restored.

Contact person: Diallo Mori (mdiallo@wetlands-saheloffice.org)



27: Loktak Lake Complex

Type of wetland under restoration:

O -- Permanent freshwater lakes (over 8 ha); includes large oxbow lakes.

P -- Seasonal/intermittent freshwater lakes (over 8 ha); includes floodplain lakes.

Abstract: Located in the Manipur Valley, Loktak, Pumlen, Ikop, Khoidum and Kharung form an extensive riverine wetland complex supporting food, water and energy security. Spanning 470 km² during peak monsoon, these shallow waterbodies are the largest source of fish, edible plants and freshwater for the state, besides providing flood attenuation and water purification functions. Each winter the complex teems with migrating birds from Central Asian and East Asian-Australasian Flyways. Communities living in and around attach high cultural significance and embed wetlands strongly within their customs and belief systems. The southern portion of Loktak is a habitat to globally endangered ungulate species *Rucervus eldii*. Loktak Lake was designated of International Importance under the Ramsar Convention in 1990.

Loktak Lake complex is under stress due to lopsided developmental planning within the basin. The Loktak Development Authority was created in 1986 to address these threats. In 2006, LDA was accorded the status of statutory body under the Manipur Loktak (Protection) Act, thus conferring it management responsibilities for Loktak Lake. Since 1990, Rs. 491 crore has been spent on the conservation of Loktak Lake, with financial assistance from the North Eastern Council, the Planning Commission, the India Canada Environment Facility, the Ministry of Environment, Forest and Climate Change, Government of India and state plans. The interventions thus far have led to the creation of comprehensive baseline on the wetland, improvement of the ecological health of the lake and its catchments and well as a strengthened institutional architecture for integrated management. The desired objectives of the wetland management, as articulated in the management plan for the complex, could not be achieved. The lake continues to be in Montreux Record of the Ramsar Convention.

Primary cause of degradation: System modification: lopsided developmental planning

Water resource development projects for flood mitigation, agriculture and hydropower have modified hydrological regimes. The construction of Ithai barrage downstream of Loktak in 1984 and its barrage that converted a naturally fluctuating wetland into a reservoir, lead to inundation of peripheral areas, loss of migratory fisheries, reduction and degradation of national park habitat, and a decline in water quality. The rapid population growth has led to an expansion in area under shifting cultivation enhancing lake siltation and loss of flood attenuation capacity. Urbanisation with inadequate sewerage systems has led to the dumping of untreated sewage and sewerage into the lake leading to declining water quality. Inundation of peripheral areas due to constant water levels forced a shift from traditional agriculture – fisheries based livelihood systems to fisheries. Declining resource base with increasing population pressure forced propagation of harmful fishing practices ultimately leading to phumdi proliferation and choking of the central sector of the lake. The effect has been a loss of livelihoods and greater poverty within wetland communities.

Main restoration approach used: Ecological Restoration & Ecosystem Rehabilitation

Management planning for Loktak wetland complex calls for an approach which recognises the interconnectedness of wetland biological diversity and ecosystem services with land and water management in the river basin taking into account the external, natural and induced factors. The approach also needs to address climate change. There is a need to maintain ecological character while providing for sustainable utilization of wetland resources for the benefit of stakeholders, particularly local communities.

Key Facts

Region:	Asia
Country:	India
Wetland Type:	Permanent & seasonal lakes
Location:	Loktak Lake, Manipur Valley
Area restored:	25,600 Has
Time frame:	1996-ongoing (5 more years funding)
WI Lead Office:	South Asia

To this end some of the following approaches were used:

Restoration of open water area through removal of 17.5 MCM of phumdi and athaphum • Revegetation of 25,212 ha of degraded catchments to reduce siltation • Enhanced flow regimes through desiltation of ten inflowing streams and rivulets • Formulated water allocation plan for Loktak Lake balancing human needs for water (for hydropower production and irrigation) with ecological requirements (maintenance of KLNPH habitat, water circulation and mixing) • Improved water quality through reduced nutrient leaching from peripheral settlements and removal of phumdi from central sector • Established regulatory basis for lake management through Loktak (Protection) Act, 2006 • Enhanced awareness of wetland values and functions through regular events, seminars, workshops and newsletters.

Ecosystem services:

- Food: production of fish, wild game, fruits, and grains
- Fresh water: storage and retention of water for domestic, industrial, and agricultural use
- Fiber and fuel: production of logs, fuelwood, peat, fodder
- Climate regulation: sources of and sink of greenhouse gases; influence local and regional temperature, precipitation, and other climate processes
- Water regulation (hydrological flows): ground water recharge/discharge
- Water purification and waste treatment: retention, recovery, and removal of excess nutrients and other pollutants.
- Natural hazard regulation: flood control, storm protection
- Spiritual and inspirational: source of inspiration; many religions attach spiritual and religious values to aspects of wetland ecosystems
- Recreational: opportunities for recreational activities
- Aesthetic: many people find beauty or aesthetic value in aspects of wetland ecosystems
- Educational: opportunities for formal and informal education and training.
- Nutrient cycling: storage, recycling, processing, and acquisition of nutrients.



Outcomes achieved:

While a significant improvement in the overall ecological health of the lake has been achieved, open water area and tourism values increased and a regulatory regime for the wetland been established, the envisaged restoration (as set out in the Management Plan) was not achieved. Despite the availability of a well-evidenced science-base to guide restoration and an expenditure of nearly US\$ 90 million to implement management plans, the restoration is far from being effective and complete, primarily due to lack of adaptability within the Authority to respond to changes in wetland social-ecological systems, and effective use of monitoring mechanisms to decide on optimal pathways.

Key lessons learned: Institutions and governance arrangements play a critical role in steering wetlands restoration towards clearly defined goals and pathways, enabling the incorporation of stakeholder views and knowledge in the process. Persistent mismatches of governance arrangements with the wetland social ecological system may put these ecosystems in a 'social-ecological systems trap' wherein piecemeal and incremental changes fail to deliver the restoration outcomes aligned with the overarching goal of maintenance of ecological character.

Main project partners: Loktak Development Authority

Main donors: Indian Ministry of Environment, Forest and Climate Change; Planning Commission

Budget: 90 million US\$

Contact details: Ritesh Kumar (ritesh.kumar@wi-sa.org)

28: Chilika Lake, India

Type of wetland under restoration:

J -- Coastal brackish/saline lagoons; brackish to saline lagoons with at least one relatively narrow connection to the sea.

Abstract: Along the east coast of India, in the Mahanadi River delta, the Chilika catchment forms a landscape of some 356,000 hectares with the lagoon at its heart covering 116,500 hectares. The landscape encompasses a mosaic of sand dunes, forest, mudflats, seagrass, aquatic vegetation and open water, surrounded by predominantly agricultural land. The Chilika landscape is a hotspot of biodiversity supporting at least 569 plankton, 22 algae, 726 plants, 136 molluscs, 29 crustacea, 317 fish, 225 birds, 7 amphibian, and 19 mammalian species, several of which are of high conservation value nationally, regionally and globally. The lagoon hosts over a million migratory waterbirds and is one of the largest congregation sites in the Central Asian Flyway. It is also one of the two lagoons in the world inhabited by the globally vulnerable Irrawaddy Dolphin. The highly productive ecosystem of the lagoon with its rich fishery resources sustains the livelihood of more than 0.15 million fisher folk who live in and around the lagoon and a further 0.8 million farmers living in the catchment. Changing land and water management in the 1990s led to siltation, shrinkage of the water area, the choking of inlet channels and a shift in its connection to the sea. These in turn affected fishery resources, allowed the proliferation of freshwater invasive species, the widespread loss of biodiversity and a general decline in productivity. In 1993 the lagoon, designated a Ramsar site by the Government of India, was placed in the Montreux record due to the adverse changes in its ecological character.

In 1992, the Chilika Development Authority (CDA) was created, charged with the restoration and the overall development of the catchment. The CDA engineered a new mouth to the lagoon in 2000, to restore the salinity and ensure hydrological and ecological exchange with the Bay of Bengal. Despite successful restoration of the salinity gradient and fish catch it became clear that a landscape wide approach was needed to balance local natural resource use and development goals with biodiversity conservation and restoration. Wetlands International undertook bottom-up consultation with local communities and natural resource users on their use and values associated with the landscape, which brought these into the development of a first management plan for the Chilika catchment in 2012.

Primary cause of degradation: In the 1990s, changing land and water management in the catchment delivered increased sediment to the lagoon driving siltation, shrinkage of water extent, choking inlet channels and shifting its connection to the sea. A series of sand shoals had coalesced to create an extended sand barrier blocking the lagoon's connection to the sea, reducing flushing of freshwater through the system, decreasing sediment transport and leading to a decline in marine water inflow.

Main restoration approach used: Ecological Restoration and Ecosystem Rehabilitation

An intensive awareness campaigns on values and functions of wetland systems, particularly amongst the villages in and around the lake and school children was undertaken in participation with civil society. To support systematic management, an intensive hydrological and ecological monitoring programme was put in place. These programmes were coordinated through the Wetland Research and Training Center constructed on the shorelines of Chilika in 2002. Over the years, CDA has also established collaborations with over fifty organizations of international and national repute to support scientific studies related to various dimensions.

Ecosystem services:

- Food: production of fish, wild game, fruits, and grains
- Fresh water: storage and retention of water for domestic, industrial, and agricultural use
- Climate regulation: sources of and sink of greenhouse gases; influence local and regional temperature, precipitation, and other climate processes
- Water regulation (hydrological flows): ground water recharge/discharge

Key Facts

Region:	South Asia
Country:	India
Wetland Type:	Lake
Location:	Chilika, Mahanadi river delta
Area restored:	116,500 ha
Time frame:	1992 to present
WI Lead office:	South Asia

- Water purification and waste treatment: retention, recovery, and removal of excess nutrients and other pollutants.
- Natural hazard regulation: flood control, storm protection
- Spiritual and inspirational: source of inspiration; many religions attach spiritual and religious values to aspects of wetland ecosystems
- Recreational: opportunities for recreational activities
- Aesthetic: many people find beauty or aesthetic value in aspects of wetland ecosystems
- Soil formation: sediment retention and accumulation of organic matter
- Nutrient cycling: storage, recycling, processing, and acquisition of nutrients.

Outcomes achieved:

The changes in salinity and recovery of submerged macrophytes have led to a near 10-fold recovery in fish catch from the low point in 1996 to 2001. During 2011-15, the annual landing averaged 12,465 MT, valued at Rs. 1463 million annually. Populations of the Irrawaddy dolphin, a flagship species for the lake which draws many tourists increased with population growing to 144 individuals in 2015. Sea grass beds, which had an insignificant presence in the lagoon prior to the ecological restoration, now span 104 km² with a diversity of 14 species. Water flows have now been optimized, reducing the peak monsoonal flows that were regularly threatening human security in balance with productive flows essential to the lagoon ecology and local economy.

Key lessons learned: Inclusive governance is key to success and ongoing management and adaptation.

We need to adopt an adaptive approach to restoration and subsequent management. The restoration of the landscape was highly successful, but these achievements are themselves creating new challenges. Increasing tourism is driving increased pollution and physical threats to species such as dolphins.

The land use intensification is creating pressures on upstream freshwater use and leading to pollution from agriculture runoff and untreated sewage. Climate change will pose new challenges making it clear that future management goals are going to have to adapt to system changes.

Project partners: Chilika Development Authority working with several state government departments, IIT Madras, NIO, Wetlands International South Asia, several grass root organizations

Main donors: Ministry of Environment, Forest and Climate Change; Finance Commission; Government of Odisha

Budget: US\$ 26.82 million at 2021

Contact person: Ritesh Kumar (ritesh.kumar@wi-sa.org)



29: Mangrove Capital Africa, West Africa

Type of wetland under restoration:

I -- Intertidal forested wetlands; includes mangrove swamps, nipah swamps and tidal freshwater swamp forests.

Abstract: Tropical mangroves provide millions of people with food, drinking water and raw materials. They are home to many iconic species, such as manatees, sea turtles and millions of migratory birds. These wetlands act as buffers against storms, tsunamis and sea level rise. However, Africa's mangroves are facing dramatic challenges (large-scale rice cultivation and irrigation development, oil and gas and bauxite mining, coastal infrastructure development, coastal erosion and significant and increasing human pressure). To face these threats, Wetlands International with DoB Ecology set up the MCA programme in 2017 involving 10 countries in East and West Africa including Senegal. The programme's vision is "Mangroves and their biodiversity are healthy, improving the livelihoods of millions of people and protecting them against the dangers of climate change". MCA aims to contribute to this vision through four building blocks*. Since 2017, MCA-Senegal has conserved more than 86,000 ha by helping Parks managers carry out better surveillance of their dedicated areas. By providing fuel and motivation we have increased the number of patrols (outings) and raised awareness among local neighbouring communities in the Sine Saloum, Casamance and Gambia. MCA-Senegal has helped improve the livelihoods of more than 150,000 people through a variety of income-generating activities, has created a mangrove platform, environmental education and awareness-raising activities.

Key Facts	
Region:	Africa
Country:	Senegal & Gambia
Wetland Type:	Mangroves
Location:	Saloum Delta, Casamance & Niomi National Park
Area restored:	810 ha restored & 86.500 ha conserved
Time frame:	2017-ongoing (funding secured till 2025)
WI Lead Office:	West Africa

Primary cause of degradation: The main causes of degradation are logging and wood harvesting, as well as fishing and the harvesting of aquatic resources. Climate Change and changes in hydrological conditions, as well as infrastructure developments are also seriously damaging these habitats.

Main restoration approach used: Ecological Restoration & Ecosystem Rehabilitation

Restoration work starts with capacity building. It is followed by either a planting campaign or Assisted Natural Regeneration (ANR):

- 1) Planting consists of a) Identifying and validating suitable sites for planting mangrove trees b) Collecting propagules (or setting up nurseries) c) Conducting a planting campaign with local actors.
- 2) Assisted Natural Regeneration aims to restore the underlying hydrology and adjusting the topography of a disturbed area, so that mangroves can regenerate naturally, resulting in true restoration of the ecosystem with richer biodiversity.
- 3) Monitoring restored sites is essential and involves a) Setting up a monitoring protocol; b) Conducting periodic monitoring campaigns of biological and ecological parameters.

* Four building blocks of MCA:

- 1) ACT: Mangrove management and rehabilitation as well as sustainable livelihoods are supported in 10 sites where mangroves are threatened and scaled up by local stakeholders;
- 2) KNOWLEDGE: Knowledge of the functions, values and threats to mangroves in Africa is compiled and made available to the public as a basis for better coastal zone management;
- 3) LEARN: Civil Society Organisations and coastal zone managers, both from government and the private sector, in 10 countries are aware of the values of mangroves and are able to conserve and rehabilitate them as part of broader development plans;
- 4) PLAN: Policies and plans at local, national and regional levels promote the conservation, rehabilitation and rational use of mangroves and prevent their destruction by large development projects.

Ecosystem services:

- Food: production of fish, wild game, fruits, and grains: *Production and processing of oysters, honey and non-timber forest products- Poultry and animal rearing (Caw), Market Gardening*
- Climate regulation: sources of and sink of greenhouse gases; influence local and regional temperature, precipitation, and other climate processes
- Water purification and waste treatment: retention, recovery, and removal of excess nutrients and other pollutants.
- Erosion regulation: retention of soil and sediments
- Natural hazard regulation: flood control, storm protection
- Pollination: habitat pollinators
- Spiritual and inspirational: source of inspiration; many religions attach spiritual and religious values to aspects of wetland ecosystems
- Recreational: opportunities for recreational activities
- Aesthetic: many people find beauty or aesthetic value in aspects of wetland ecosystems
- Educational: opportunities for formal and informal education and training.
- Soil formation: sediment retention and accumulation of organic matter
- Nutrient cycling: storage, recycling, processing, and acquisition of nutrients.



Outcomes achieved:

In total we have restored 810 ha of mangroves a significant part using ANR. We have thus demonstrated that ecological mangrove restoration (ANR) is more sustainable and cost-effective than conventional restoration approaches. ANR is now widely replicated by other organisations in the Saloum.

We have improved the livelihood status of 34k people living in the Grand Saloum and set up 157 loans and saving groups in Saloum, Casamance and Gambia with at least 3,925 women involved, to sustain livelihood activities.

We also achieved the development of three (3) management plans in Saloum and Casamance for a better mangrove forests conservation.

Key lessons learned: ANR works and is greatly appreciated by our partners in the Saloum Delta and Casamance. Wetlands International's participatory approach is welcomed by the local population who have taken ownership of the savings and credit groups, which, in addition to contributing to their economic wellbeing are a means of social mobilisation.

Project partners: Local administrative authority; Technical departments; Managers of protected areas and Parks; Local communities; The Academic Inspectorate Universities and Research Institutes; the Media.

Main donors: DoB Ecology

Budget: Total project budget = 1,000,000 euros per year with two implementation sites (Western and Eastern African coastlines). Since 2017, we estimate having spent 550,00 on restoration and conservation work in The Saloum delta and Casamance.

Contact person: Yakhya GUEYE (ygueye@wetlands-africa.org)

30: Conservation of Mangroves in Senegal

Type of wetland under restoration:

I -- Intertidal forested wetlands; includes mangrove swamps, nipah swamps and tidal freshwater swamp forests.

K -- Coastal freshwater lagoons; includes freshwater delta lagoons.

Abstract: Mangrove forests, in the Saloum Delta and in Casamance, face degradation due to the non-rational exploitation of their resources. Local communities are often aware of the economic and ecological value of mangroves and the dangers of over exploiting them. However, poverty has led communities to misuse natural resources just to survive. This conservation project was implemented from 2012 to 2016 and aimed to reduce mangrove degradation by introducing sustainable management practices and reforesting mangroves in order to sustain the local population livelihoods. To ensure local participation in the adoption of implementation measures, it is important to establish genuine integrated rural development to reply to the needs of all the actors concerned. This is why alternative livelihoods measure were central to this restoration work. This project also contributes to Senegal’s climate change adaptation strategy, is fully in line with the implementation of Senegal’s national biodiversity conservation strategy and West Africa’s regional action plan for mangrove forests conservation. This project has enabled us to gather scientific data and empirical knowledge as well as to develop certain practices of capital importance for the success of actions aimed at the restoration of mangrove ecosystems and their sustainable use for the benefit of biodiversity and communities.

Key Facts	
Region:	Africa
Country:	Senegal
Wetland Type:	Mangroves
Location:	Saloum delta & Casamance
Area restored:	350 ha
Time frame:	2012-2016
WI Lead Office:	West Africa

Primary cause of degradation: The main causes of degradation are logging and wood harvesting, as well as fishing and the harvesting of aquatic resources. Climate Change and changes in hydrological conditions, as well as infrastructure developments are also seriously damaging these habitats.

Main restoration approach used: Ecosystem Rehabilitation by planting and setting up nurseries

A participatory approach was adopted for all activities. Restoration plans were signed annually with protected area and park managers, who carried out restoration work with the full participation of local people (women’s groups, loan and saving groups, students benefiting from environmental education activities, etc.). Restoration work always started with capacity building sessions organised by Wetlands International. Mangrove species nurseries were set up. Rhizophora planting was done by first identifying suitable mangrove planting sites, collection propagules and then carrying out a planting campaign with local actors. Planting of *Avicennia africana* started with the identification of suitable nursery sites (between May and June in suitably shady spots). Seeds were collected and pre-treatment carried out to remove the cuticle from the seed while encouraging the lifting of dormancy (pre-germination) and removing any parasites. Seeds were then sown (potting, stowing and watering). Finally all restored sites were monitored.

In parallel to planting, beekeeping and oyster farming, as well as market gardening were promoted and oyster and honey value chains developed. Improved cooking stoves were developed and disseminated to reduce the pressure on mangroves for wood.

Ecosystem services:

- Food: production of fish, wild game, fruits, and grains: in particular the production and processing of oysters and honey
- Climate regulation: sources of and sink of greenhouse gases; influence local and regional temperature, precipitation, and other climate processes
- Erosion regulation: retention of soil and sediments



- Natural hazard regulation: flood control, storm protection
- Pollination: habitat pollinators
- Spiritual and inspirational: source of inspiration; many religions attach spiritual and religious values to aspects of wetland ecosystems
- Recreational: opportunities for recreational activities
- Aesthetic: many people find beauty or aesthetic value in aspects of wetland ecosystems
- Educational: opportunities for formal and informal education and training.
- Soil formation: sediment retention and accumulation of organic matter
- Nutrient cycling: storage, recycling, processing, and acquisition of nutrients.

Outcomes achieved: 350 hectares were reforested. The methods used are being widely replicated by other organisations in the Saloum. These reforestation sites continue to grow with a high success rate. We have also tried both in situ and ex situ *Avicennia* nursery methods. In situ method seems to be the most effective. We have enriched mudflats at some restoration sites.

Key lessons learned: Local community involvement is essential for the success of restoration and conservation projects. It was extremely important to gather solid scientific data before initiating the project. Linking restoration/conservation work with alternative livelihoods activities was key. Developing and promoting an improved cooking stove allowed us to reduce the pressure for mangrove wood.

Project partners: WWF WAMER implemented this project from 2012 to 2014 before its office was closed. The project was taken over fully by Wetlands International. Other partners involved were local administrative authority; Technical departments; Managers of protected areas and Parks; Local communities; The Academic Inspectorate Universities and Research Institutes; the Media.

Main donors: German Ministry for Cooperation and Development (BMZ - Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung)

Budget: The project’s total budget amounted to €859,920 (€719 753 (83.7%) from the German Ministry for Cooperation and Development (BMZ) as co-financing). Of this total, WIA spent €342,285 over 1.5 years on the project’s implementation, €249,664 of which was used for field work.

Contact person: Yakhya GUEYE (ygueye@wetlands-africa.org)



Annex 3.- Projects and streams of work

Stream	Name of Restoration Project
Deltas & Coasts	#6: Mangrove restoration on Isla Galeta, Panama
	#7: Las Lajas Lagoon, Panama
	#13: Mangrove Capital Africa (MCA), East Africa, Rufiji Delta
	#14: Partners for Resilience (PFR), Indonesia
	#15: Banten Bay Carbon Offset Project, Indonesia
	#18: Building with Nature, Indonesia
	#19: Yatsu-higata (tidal flats) Restoration, Japan
	#22: Sand dune restoration in the Inner Niger Delta, Mali
	#29: Mangrove Capital Africa, West Africa
Deltas & Coasts + Rivers & Lakes	#30: Conservation of Mangroves in Senegal
	#4: Corredor Azul: Cattle raising in Parana Delta
Rivers & Lakes	#2: Restoration of "Laguna Llanquanelo" Ramsar Site
	#5: Restoration of "Lagunas de Guanacache" Ramsar Site
	#9: Corredor Azul: Kadiwéu Indigenous Community
	#27: Restoration of Loktak Lake complex, India
	#10: Corredor Azul: "Aquarela Pantanal", Brazil
	#20: Agusan River Basin, Philippines
	#23: Ecosystem restoration in Sakarani Basin, Mali
	#24: Flooded forest Akka-Goun, Inner Niger Delta, Mali
	#25: Noga Village Ponds, Inner Niger Delta
#26: Bour gour restoration, Walado Debo, Inner Niger Delta	
Rivers & Lakes + Peatlands	#28: Chilika Lake Complex, India
	#3: Saving High Andean Wetlands for People and Nature
	#8: CHOICE Pantanal
Peatlands	#12: Nile Basin, Transboundary project
	#1: Río Valdés Reserve Peatland Restoration, Argentina
	#11: Integrated Management of Peatlands for Biodiversity and Climate Change, Ruoergai Plateau, China
	#16: Peatland Restoration, North Sumatra (PME-IKI)
	#17: Climate Change, Forest & Peatlands, Indonesia
	#21: Restoring Peatlands in Russia – for fire prevention and climate change mitigation

Annex 4.- Duration of projects in years

# & Name of Restoration Project	Length of project implementation to date (yrs)	Time frame	
#1: Río Valdés Reserve Peatland Restoration	1	2016	2017
#12: Nile Basin: Transboundary project	2	2019	2021
#10: Corredor Azul: "Aquarela Pantanal", Brazil	2	2020	2027
#26: Bourgour restoration, Inner Niger Delta, Mali	2	2019	2021
#9: Corredor Azul: Kadiwéu Indigenous Community	2	2020	2022
#14: Partners for Resilience (PFR), Indonesia	3	2011	2014
#16: Peatlands North Sumatra PME-IKI, Indonesia	3	2020	2023
#11: Peatlands restoration Ruergai Plateau, China	3	2003	2006
#20: Agusan River Basin: Philippines	4	2016	2020
#22: Sand dune fixing in the Inner Niger Delta	4	2011	2015
#23: Ecosystem restoration in Sakarani Basin, Mali	4	2017	2021
#17: Climate Change, Forest & Peatlands, Indonesia	4	2001	2005
#25: Noga Village pond channels Niger Delta, Mali	4	2011	2015
#8: CHOICE Pantanal	4	2022	2026
#30: Conservation of Mangroves in Senegal	4	2012	2016
#29: Mangrove Capital Africa, West Africa	5	2017	On-going
#13: Mangrove Capital Africa, East Africa Rufiji Delta	5	2017	On-going
# 24: Flooded forest in Inner Niger Delta, Mali	6	2015	2021
#18: Building with Nature, Indonesia	6	2015	2021
#6: Mangrove restoration on Isla Galeta, Panama	6	2018	2024
#2: Restoration of "Laguna Llancañelo" Ramsar Site	7	2014	2021
#3: Saving High Andean Wetlands for People and Nature	7	2017	2024
#7: Las Lajas lagoon, Panama	8	2017	2025
#19: Yatsu-higata (tidal flats) Restoration, Japan	9	2010	2019
#5: "Lagunas de Guanacache" Ramsar Site	9	2011	2020
#4: Corredor Azul: Cattle raising in Parana Delta	10	2017	2027
#21: Restoring Peatlands in Russia	12	2011	2023
#15: Banten Bay Carbon Offset Project, Indonesia	14	2009	2023
#27: Restoration of Loktak, India	26	1996	Ongoing
#28: Chilika Complex, India	30	1992	On-going

Annex 5.- Number of projects per wetland type, following the Ramsar Classification System

Wetlands types (Ramsar Classification System of wetland types)	# of projects
I - Intertidal forested wetlands; includes mangrove swamps, Nipah swamps and tidal fresh-water swamp forests.	8
M - Permanent rivers/streams/creeks; includes waterfalls.	7
N - Seasonal/intermittent/irregular rivers/streams/creeks.	5
P - Seasonal/intermittent freshwater lakes (over 8 ha); includes floodplain lakes.	5
Ts - Seasonal/intermittent freshwater marshes/pools on inorganic soils; includes sloughs, potholes, seasonally flooded meadows, sedge marshes.	5
U - Non-forested peatlands; includes shrub or open bogs, swamps, fens	5
O - Permanent freshwater lakes (over 8 ha); includes large oxbow lakes	4
Xp - Forested peatlands; peat swamp forests.	4
J - Coastal brackish/saline lagoons; brackish to saline lagoons with at least one relatively narrow connection to the sea.	3
K - Coastal freshwater lagoons; includes freshwater delta lagoons	2
Xf - Freshwater, tree-dominated wetlands; includes freshwater swamp forests, seasonally flooded forests, wooded swamps on inorganic soils.	2
G - Intertidal mud, sand or salt flats.	1
Tp - Permanent freshwater marshes/pools; ponds (below 8 ha), marshes and swamps on inorganic soils; with emergent vegetation water-logged for at least most of the growing season	1
L - Inland deltas (permanent)	1

Annex 6.- Main project partners by office

Office	Partners
LAC - Argentina	<p>Universidad Nacional de Tierra del Fuego</p> <p>Dirección de Recursos Hídricos, Province of Tierra del Fuego, Antártida e Islas del Atlántico Sur</p> <p>Secretaría de Ambiente, Province of Tierra del Fuego, Antártida e Islas del Atlántico Sur</p> <p>Dirección de Recursos Naturales Renovables, Province of Mendoza</p> <p>Municipio de Malargüe, Province of Mendoza</p> <p>Tecnicatura Superior en Conservación de la Naturaleza (TECONA), Province of Mendoza</p> <p>Fundación AVINA Argentina</p> <p>Reserva Natural Villavicencio, Province of Mendoza</p> <p>Fundación EISA, Province of Mendoza</p> <p>Universidad Nacional de San Martín (UNSAM)</p> <p>Universidad Nacional de Buenos Aires (UBA)</p> <p>Instituto Nacional de Tecnología Agropecuaria (INTA)</p> <p>Asociación Ecosistemas Andinos (ECOAN), Peru</p> <p>DOB Ecology (donor)</p>
Brazil	<p>Sesc Pantanal</p> <p>LASA/UFRJ</p> <p>INAU/CPP - National Institute for Wetlands</p> <p>ABINK - Fire Fighter Brigade from the Kadiwéu Nation</p> <p>PrevFogo - IBAMA MMA</p> <p>Federal University of Mato Grosso do Sul State – UFMS</p> <p>CPP - Pantanal Research Centre</p> <p>ARSAPEJO & APPR</p>
China	<p>Global Environment Centre</p> <p>Sichuan Forestry Department</p> <p>Ruoergai National Nature Reserve</p> <p>Hongyuan Rigangqiao Nature Reserve</p>
Japan	<p>Universities and NGOs</p> <p>Local government officials (both prefectural and municipal)</p> <p>Yatsu-higata Nature Observation Center</p> <p>Private sector (consulting company)</p>
South Asia	<p>Loktak Development Authority</p> <p>Chilika Development Authority + 100 local partners</p>
Indonesia	<p>Care</p> <p>Karina</p> <p>LPTP Indonesia Endowment Fund for Education (Lembaga Pengelola Dana Pendidikan)</p> <p>Caritas Keuskupan maumere</p> <p>Conservation International</p> <p>Global Environment Center (GEC)</p> <p>Deltares</p> <p>Witteveen Bos</p> <p>Indonesia Ministry of Marine Affairs and Fisheries</p> <p>Indonesia Ministry of Public Works</p>

Office	Partners
East Africa	<p>Nile Basin Initiative</p> <p>GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit)</p> <p>Acacia Water</p> <p>DOB Ecology (donor)</p> <p>Tanzania Forest Service</p> <p>Kibiti District</p> <p>National Environment Management Council (Tanzania)</p>
Sahel	<p>Regional Direction of water and forest in Mopti</p> <p>Regional Directorate of Rural Engineering of Mopti</p> <p>local NGOs in Mopti</p> <p>Farabacoura Municipality</p> <p>Local Water Committee</p> <p>National Directorate for Forest and Water</p> <p>National Directorate for Agriculture</p> <p>National Directorate for Animal Production and Industry</p> <p>National Directorate for Fishing</p> <p>National Directorate of Water and Energy</p>
LAC - Panama	<p>AES energy Corporation</p> <p>Ministry of Environmental Panamá</p>
Philippines	<p>Department of Environment and Natural Resources</p> <p>Local Governments of Monkayo and Talacogon</p>
Russia	<p>Institute of Forest Science, Russian Academy of Sciences</p> <p>Russian Academy of Sciences</p> <p>Michael Succow Foundation</p> <p>The Institute of Botany and Landscape Biology</p> <p>Institute of Botany and Landscape Ecology, Greifswald University</p>
West Africa	<p>Administrative authorities</p> <p>Technical departments</p> <p>Managers of protected areas and Parks</p> <p>Local communities</p> <p>Academic Inspectorate Universities</p> <p>Research institutes</p> <p>The media</p>

Annex 7.- Main projects donors by office

Office	Main Donors
LAC - Argentina *	DOB Ecology DGIS (Ecosystem Alliance Programme) Fund for the Americas (Argentina) Danone Argentina Coca Cola Argentina, through Fundación Vida Silvestre Argentina Coca Cola Argentina, through Fundación AVINA Argentina
Brazil	DOB Ecology Greenchoice (Dutch energy company with a sustainable mission) GEF Terrestre (IADB, Ministry of Environment - MMA, GEF, Funbio)
China	UNEP / Global Environment Facility
Japan	Ministry of the Environment of Japan
South Asia	Indian Ministry of Environment, Forest and Climate Change; Lokta Lake Planning Commission Ministry of Environment, Forest and Climate Change: Finance Commission Government of Odisha
Indonesia	Sustainable Water Fund (SWF) International Climate Initiative (IKI) Canadian Climate Change Development Fund / Canadian International Development Agency Global Environment Facility The Global Peat Initiative IKI-PME Project Fundación Natura DGIS- Dutch Government LRC
East Africa **	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, on behalf of the German Federal Ministry for the Environment Nature Conservation & Nuclear Safety (BMU) / International Climate Initiative (IKI) DOB Ecology Swedish International Development Cooperation Agency Blue Action Fund Waterloo COMON Foundation Waterloo and Turing Foundations
Sahel (Mali)	Dutch Ministry of Foreign Affairs Netherlands Embassy in Mali Germany Cooperation through the IKI Netherlands Cooperation through the Ministry of Foreign Affairs
LAC - Panama	Moore Charitable Foundation The Islas Secas Foundation Grant AES Energy Ministry of Environmental of Panama
Philippines	Partners for Resilience Project (Ministry of Foreign Affairs, Netherlands)
Russia	International Climate Initiative (IKI), German Federal Ministry for the Environment Nature Conservation & Nuclear Safety (BMU), facilitated through KfW German Development Bank
West Africa	DOB Ecology German Ministry for Cooperation and Development (BMZ - Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung)

*including work in Peru.

**including work in Uganda, Democratic Republic of Congo and Tanzania.

Annex 8.- Project budgets

It is important to note that for some projects it was only possible to get an overall budget (which includes the costs of different interventions like restoration work, communications and advocacy, capacity building, etc), while for other projects it was possible to obtain the specific cost of the restoration interventions.

WI Office	No.	Project name	Budget provided in Euros	Budget provided in US\$
LAC - Argentina	1	Río Valdés Reserve Peatland Restoration		18,570
	2	Restoration of "Laguna Llanquanelo" Ramsar Site	323,500	
	3	Saving High Andean Wetlands for People and Nature	1,000,000	
	4	Corredor Azul: Cattle raising in Parana Delta	290,000	
	5	Restoration of "Lagunas de Guanacache" Ramsar Site	400,000	
LAC - Panama	6	Mangrove restoration on Isla Galeta		60,000
	7	Las Lajas lagoon		40,000
Brazil	8	CHOICE Pantanal	230,000	
	9	Corredor Azul: Kadiwéu Indigenous Community	30,000	
	10	Corredor Azul: Aquarela Pantanal		327,000
China	11	Peatlands restoration in the Ruergai Plateau		103,500
East Africa	12	Nile Basin: Transboundary project	90,000	
	13	Mangrove Capital Africa: Rufiji Delta	200,000	
Indonesia	14	Partners for Resilience (PFR)	1,014,000	
	15	Banten Bay Carbon Offset Project		165,086
	16	Peatlands North Sumatra (PME-IKI)	432,521	
	17	Climate Change, Forest & Peatlands (CCFPI)		3,242,000
	18	Building with Nature	5,069,657	
Japan	19	Yatsu-higata (tidal flats) Restoration	N/D	
Philippines	20	Agusan River Basin	89,000	
Russia	21	Restoring Peatlands in Russia – for fire prevention and climate change mitigation	8,000,000	
Sahel (Mali)	22	Sand dune fixing in the Inner Niger Delta	7,900	
	23	Ecosystem restoration in Sakarani Basin	32,220	
	24	Flooded forest in Inner Niger Delta	20,000	
	25	Noga Village Pond channels, Inner Niger Delta	20,000	
	26	Bourgour restoration, Akka-Gooun, Inner Niger Delta	500/ha	
South Asia	27	Restoration of Loktak, India		90,000,000
	28	Chilika Lake, India		26,820,000*
West Africa	29	Mangrove Capital Africa: Saloum delta, Casamance and Niimi National Park	550,000	
	30	Conservation of Mangroves in Senegal	249,664	

* Budget for Chilika at 2021

N/D= No data



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