Downstream Voices
Wetland Solutions to Reducing Disaster Risk
by Fred Pearce
While no one can overlook the increasing reports of devastating human suffering linked to water-related disasters like floods, droughts and landslides, few people realize the extent to which this has been caused or exacerbated by environmental degradation. Or in other words, mismanagement of land and water resources. And the consequent loss of natural environmental buffers, especially wetlands.

Climate change is of course part of the story — and is accentuating the hazards. But it is evident that climate is too often used as a mask for these underlying problems that play out at a landscape scale. Typically it’s the poorest and most disadvantaged communities who are hit the hardest when a disaster occurs. They are often the least able to withstand and recover from the impacts and have the least say in managing the natural resources on which they depend. Wetlands International has seen these scenes and situations — after the 2004 Asian tsunami and in the recent Sahelian droughts for example. We have shown on a small scale that by helping local communities improve water resource management and the condition of wetlands, it is possible to make them more resilient to the shocks and stresses of extreme weather events and better adapted to climate change.

Significantly, over the last decade, we have joined hands with the development and humanitarian NGOs to share our expertise and to work alongside them with vulnerable, rural communities. This has proven to be very effective — since together we have been able to test and characterise a new way of working that can greatly enhance disaster resilience. We have identified the need for significant shifts in vision and approach. Resulting environmental interventions are still very considered as a relevant part of the toolkit for disaster risk reduction. Another problem is field of view.

Often, the occurrence of hazards is considered a given and then measures are designed for use at a local, household or village level to prepare for or cope with these events. Little attention is paid to the fact that hazards often emerge from changes in land use or water flows elsewhere, sometimes far away in the landscape and over long timescales. Big infrastructure investments such as dams for hydropower and irrigation, or upstream mining and forest clearance can create risks for downstream communities. There comes a point when just coping and recovering with the impacts is no longer viable. Landscape scale solutions are needed, often requiring the collaboration of government agencies and the private sector.

We are now keen to share our experiences and push for programmes that scale-up community-based approaches to address vulnerabilities alongside the root causes of natural hazards. What’s needed is the adoption of integrated risk reduction programmes that combine ecosystem rehabilitation with other disaster risk reduction measures, at multiple scales, from the village all the way up to the whole landscape or watershed. Together with our humanitarian partners, we are calling for more joined up policies, Investments and praction from the humanitarian, development and environment sectors to help achieve this.

This book presents the case for ecosystem-based solutions and gives some insights and examples of an ecosystem approach to disaster risk reduction from India, Mali, Senegal, the Philippines and Kenya. Based on Wetlands International’s work in this field over the past few years, the renowned international journalist Fred Pearce shines a light on the changes and challenges that vulnerable rural communities face in relation to environmental hazards — and how they can be assisted to take action that makes a real difference on behalf of their livelihoods and security. I hope you agree that these stories give good cause for optimism on that a healthier, safer world for people and nature is possible to achieve, if new ways of thinking can be embraced and brought to scale.

Jane Madgwick, CEO Wetlands International
Youth replanting mangroves in Indonesia

Introduction

Until recently, the world’s response to inevitable climate change was based on producing ever more precise forecasts of what would happen locally – running ever more sophisticated climate models to generate data on the climate in Bamako, Mali in 2040, for instance – and then working out how to “adapt” to the change.

While even bigger super-computers with ever more sophisticated climate models still attempt that, there is a growing realisation that we will never know in any detail what is coming down the track.

Some generalities emerging from the models may hold. Wet areas will generally get wetter and dry areas drier. Most of the world will be warmer most of the time. The extra energy in a warmer global climate system will tend to create more climatic extremes of all sorts – more storms of course, but also sudden cold spells, droughts even in wetter areas and worse floods even in the driest.

A defining feature of future climate is likely to be the greater unpredictability of day to day weather, new for most of us, though equally evident in areas we are used to and areas even more prone to floods and storms. All the major regional models of climate change forecast “increased variability” and “high climate sensitivity” – in other words, the climate will change and the severity of impacts in a changing world.

Building resilience to climate change, therefore, needs to be part of wider systems of responding to a range of systemic, social and environmental risks – one that places emphasis on natural ecosystems with growing reliability and adaptability, rather than physical structures, which cannot change in response to new threats. It suggests paying much more attention to ensuring our world is more resilient to whatever surprise a changing climate system may throw our way.

And that means that engineered adaptation is not always a realistic option. We simply won’t know what we are adapting to. Creating engineered structures to protect people will be difficult, expensive and often either impossible or a waste of money. This new perspective suggests a different approach. Rather than an engineered response to known threats, it suggests paying much greater attention to ensuring our world is more resilient to whatever surprise a changing climate system may throw our way.

The IPCC report calls in particular for reforestation and, in coastal regions, for “increased mangrove, coral reef, and seagrass protection.” As one former IPCC author, Colin Thorne of Nottingham University, puts it: “The best hurricane protection is three kilometres of mangroves.”

Meanwhile farmers can build their resilience against floods, droughts, heat waves and hurricanes, by planting more climate-resilient seed varieties, by enhancing wetlands, floodplains and lakes, by terracing hillsides, and by opting for farming systems such as agroforestry.

This report makes the case for addressing ecosystem degradation as one of the root causes of risk and vulnerability and for opting for ecosystem-based solutions as a way to reduce disaster risk and build community resilience. It focuses on water-related hazards in particular, as they make up a vast majority of risks, and are often exacerbated by inadequate water and natural resource management.

Fred Pearce, August 2014
Key lessons for policy and practice derived by Wetlands International

• Healthy ecosystems make a crucial contribution to the resilience of communities and nations. Ecosystems provide a range of benefits that help to reduce, buffer and in certain circumstances, mitigate hazards, as well as social circles in adapting to increasing disaster risk and preventing risk accumulation. Fully-functioning ecosystems such as wetlands are also the basis of community resilience by sustaining livelihoods and providing services such as food and water. These services are furthermore vital to help communities recover after disaster strikes.

• In spite of the important contributions to resilience made by ecosystems, they are being lost and degraded at a rapid rate. Ecosystem degradation erodes nature’s ability to regulate hazards, and to provide services such as food and water. The result is that more people are caught in a vicious circle of poverty, risk and vulnerability. This drives mounting social, economic and environmental issues and imposes ever greater costs of relief and rehabilitation on government and donor agencies. In particular, the over exploitation of water resources and the draining of wetlands exposes societies to increased disaster risk, as the ability of wetlands to moderate floods and droughts, purify water, and support water and food security is impeded. Ecosystem degradation should therefore be considered as one of the root causes of disaster risk.

• Investing to address underlying risk factors is more cost-effective than disaster response and recovery, and contributes to saving lives and protecting assets. Hence ecosystem-based approaches such as wetlands restoration and Integrated Water Resource Management should be at the centre of solutions to reduce disaster risk, alongside other risk reduction measures. Ecosystem-based approaches should be considered as “no-regret” actions – and always a good investment – as they serve multiple purposes, including the development of sustainable livelihoods and climate change adaptation and mitigation, in addition to reduced disaster risk.

• While long-term changes resulting from global warming will have impacts upon ecosystems and therefore on people, most immediate ecosystem degradation occurs from flawed spatial planning or inappropriate water management policies and practices and not in “man-made” hazards. It therefore essential to understand the environmental root causes of risk in a given context and ensure sound land, water and natural resource use policies, ensuring that ecosystem services are sustained. Simultaneously, the conservation, restoration and improved management of ecosystems and natural resources should rank high in risk reduction and climate change adaptation planning and strategies.

• The design and implementation of ecosystem-inclusive risk reduction measures require collaboration with multiple sectors. For instance, it requires collaboration with engineers and land-use planners to ensure the integration of wetlands management and restoration in large-scale infrastructural development approaches for disaster risk reduction. It is also essential to work together with development organisations and local communities to ensure integration of ecosystem management and restoration in small-scale community-based risk reduction initiatives, linking environmental, humanitarian and development approaches. Ecosystem-based approaches to reduce disaster risk need to be implemented alongside other measures of risk reduction, including avoidance of high-risk zones, building codes, early warning and evacuation procedures.

Wetlands International presents some pointers for governments, practitioners and the private sector for integrating ecosystems into resilience practice:

 Restoration of coastline using permeable dams in Timbuk Sloko, Indonesia

1. Key lessons for policy and practice derived by Wetlands International

2. Key lessons for policy and practice derived by Wetlands International
Chapter 1: How Wetlands Can Help Reduce Disaster Risk

Damaged ecosystems are the hidden hand behind many supposedly natural disasters. They can be what turns extreme weather events that wipe out hard-earned gains in poverty reduction.

And yet humanitarian and development professionals dedicated to protecting vulnerable communities and building their social resilience have usually ignored ecological dimension. While addressing immediate humanitarian concerns and trying to reduce socio-economic vulnerability, they have been blind to ecological vulnerability.

Wetlands International believes that ecological resilience needs to be a component of future efforts to increase resilience to natural hazards and help communities adapt to unavoidable climate change.

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The approach combines three elements:

Empowering civil society organisations, including village disaster committees and women’s groups to analyse risks and respond appropriately; Strengthening community resilience by helping vulnerable groups to protect and rehabilitate their surrounding environment as a means to protect and rehabilitate their surrounding environment; and soil erosion from mining and logging operations upstream is gradually filling the swamp with silt. So its capacity to moderate floods is declining. Tens of thousands of people in the river valley now suffer regularly from floods and landslides. During storms in January 2014, more than 30,000 people were evacuated from some villages downstream of the swamp. The country has long termed it a flood-irregular monsoon, presenting downstream communities by absorbing big volumes of water from upstream. The governor of Agusan del Sur province has organised workshops with local government authorities to encourage them to work on protecting river banks from erosion and reforesting uplands. The government of Agusan del Sur province has organised workshops with local government authorities to encourage them to work on protecting river banks from erosion and reforesting uplands.

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For years, humanitarian organisations have tried to stem victims of flooding and landslides in the Philippines. But relief aid, preparations for evacuation and efforts to prevent damage have all failed to do much about the devastation because the root cause, deforestation, has not been addressed. Logging, hogs and farmers remain as much as the main source of the coming floods, after storms. Only ecosystem-based solutions hold our hope for a long-term solution.

Wetlands International is attempting to build the case for action to stem the ecological destruction upstream, as its long-term solution to avoid flooding downstream. It will not be easy, but they are working together with government authorities, community organisations and environmental NGOs to promote sustainable land management and ecological thinking into planning, including reforestation of degraded uplands and wetlands. The agency’s Ecological Resilience in Flood-prone Areas (ERIF) project works with local government authorities and NGOs on projects to help protect environmentally sensitive areas by encouraging local authorities to work on protecting river banks from erosion and reforesting uplands.
As demand for water grows in river basins, downstream users often suffer. This is especially true when those users depend on rivers and natural wetlands, which many still regard as “wasted” water. That is the case on the river Ewaso Ngiro in Kenya, which drains from the glaciers of Mount Kenya through the heavily populated agricultural region of Laikipia in central Kenya, to the Lorian Swamp in the arid northeast.

The 2300 square kilometre Lorian Swamp is an oasis for people and their animals in the dry season. Pastoralists depend on it and the river’s floodplain for grazing. The river used to flow all year round, but in recent years has become a seasonal river. Water now fails to reach the swamp for 100 days in a typical year. This threatens both pastoralists and the wildlife of the swamp, including birds and a large crocodile population.

The river faces several threats: abstraction for irrigated agriculture, including intensive horticulture in Laikipia, increased pressure from tourist lodges and deforestation along its course, which reduces the basin’s ability to store water. So, despite drying up much more than in the past, it also suffers occasional intense flash floods. Climate change may also play a role in the changing hydrology. A further potential threat is the planned construction of a new 100 million US dollar supply dam on the river at Crocodile Jaws near Oldonyiro.

Wetlands International, the Kenya Red Cross and Cordaid’s local partners are helping communities adapt to the changing river flows and its impact on the floodplain and the Lorian Swamp. Conventional community risk reduction does not address the ecosystem threat from upstream. So Wetlands International and its partners have encouraged 50 downstream communities to organise themselves in the Waso River Users Empowerment Platform. The network has empowered them to link up with stakeholders further upstream, both to rethink their own development and use, and to share information about river flows and early warning about floods coming downstream.

In both 2013 and 2014 the platform grabbed national attention when they organised Camel Caravans with local water users from the Samburu, Turkana, Gabra and Borana pastoral communities. Caravans travelled both upstream and downstream, and met in the middle of the river Ewaso Ngiro. This galvanised the attention of communities and attracted national media coverage that put pressure on the government, local authorities and private sector. A subsequent conference with all the stakeholders resulted in commitments to support local organisations in order to protect and restore the river and reduce abstractions.

Downstream communities are now organising themselves to link up with stakeholders upstream to rethink the river’s development and share information about river flows and floods coming downstream.
Chapter 2: Living with floods in the Mahanadi Delta, India

In October 2013, one of the fiercest cyclones in the Bay of Bengal hit coastal Orissa, killing its trade winds and bringing the country’s monsoon crop to near zero in many areas. It was a different story for the people of the Mahanadi Delta. The city of Cuttack, which forms the capital of Orissa, saw more than 200 kilometres per hour of wind, causing massive damage to crops and infrastructure. Thousands of homes, cropland and livestock were destroyed across the delta of the River Mahanadi, one of India’s largest deltas. There were 400,000 homeless and millions of dollars worth of damage to the infrastructure. In places like the delta, the high winds were accompanied by a two-metre storm surge.

Mahanadi was struck by the so-called “super-cyclone” Fani, which hit the area in 1999 and claimed more than 2,000 lives. And this time it was different. When the winds were still a minimum, millions of people were in shelters, with only 50 deaths reported.

The structural damage from cyclone Fani was catastrophic. Fast winds of more than 200 kilometres per hour, landfall on the low-lying delta coast of the River Mahanadi, one of India’s largest deltas. There were uprooted trees, fast-moving floodwaters and massive destruction across the delta. High winds were accompanied by a three-metre storm surge.

Trees were uprooted, cars were upturned and power lines were broken across the delta as high winds were accompanied by a three-metre storm surge. In October 2013, one of the fiercest cyclones accompanied by a three-metre storm surge. It was Fani, the so-called “super-cyclone” that hit the area, causing massive damage to crops and infrastructure. Thousands of homes, cropland and livestock were destroyed across the delta of the River Mahanadi, one of India’s largest deltas. There were 400,000 homeless and millions of dollars worth of damage to the infrastructure. In places like the delta, the high winds were accompanied by a two-metre storm surge.

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The ICZMP has the ability to affect the Mahanadi delta and wider coastal lands, ranging from the banks of old flood-influenced rivers, creeks, and estuaries, up to the delta's outer bay. But, even if Khan is right, it has not yet reached the same point. In 2012, the Indian Ministry of Water Resources was tasked with completing a comprehensive study of the coastal zone management plan for the Mahanadi delta. However, this study is yet to be completed, and the management plan remains in draft form. The Mahanadi delta, with its unique ecological diversity and cultural heritage, faces multiple challenges, including rapid coastal erosion, saltwater intrusion, and flooding. The delta is also home to several important wetlands, including the Chilika Lake, which is a UNESCO World Heritage Site.

The Mahanadi delta is located in the eastern part of India, in the state of Odisha. It is a complex ecosystem, with diverse flora and fauna, and is home to a significant human population. The delta is also a major source of water for the region, and its freshwater resources are crucial for agriculture, industry, and domestic use. However, the delta is under threat from a range of environmental challenges, including climate change, sea-level rise, and over-exploitation of natural resources.

Kumar's hope is that the discussion that Wetlands International and its partners have about the management of ecosystems and resilience issues can generate a wider debate to increase community resilience to disasters and climate change. They imagined discussing about delta resilience, understanding the vulnerabilities of the delta, and learning how to better manage the challenges it faces. The task of finding landscape solutions to flooding and other disaster risks on the Mahanadi delta is clearly beyond the reach of the ICZMP and other local management agencies. The Odisha State Wetland Management Authority is working with the ICZMP and the Odisha State Water Resources Management Authority to change the management regime of both the Hirakud dam and the Rengali dam, on the River Brahmani, to address the water needs of downstream ecosystems and reduce disaster risks on the Mahanadi delta.
Map of village developed for disaster preparation, India

BHUTAPADA

Bhutapada is close to the coast on the Mahanadi delta. Its inhabitants pride themselves on being very organised. They have painted a big sign at the roadside so you know when you get there. And a wall in the centre of the village has a large map showing every one of its 114 households, as well as emergency phone numbers in case disaster strikes.

But it is also poor, with most landholdings massively less than a hectare. It is very vulnerable to floods. The village is caught between the ever-present risk of cyclones and storm surge coming in off the nearby Bay of Bengal, and rising river flows coming downstream off the delta.

The river embankments, which once protected the village, can now be a curse. Once the water comes over the top, it has no means of escape. The banks prevent the water from returning to the river. After Phailin, the village embankment and its fields remained waterlogged long after the water level in the river had returned to normal, he said. Crop-loss was very severe.

How do the villagers cope with this unexpected vulnerability? The disaster plan developed under the programme aims, among other things, to help villagers diversify their incomes. With assistance in providing seeds, saplings and training, they have been growing palms, as well as coconuts, and planting vegetables such as brinjal, potatoes and onions for the first time – mostly for sale in local markets.

The programme has also helped protect vital village infrastructure by raising the community’s boreholes and sanitation blocks onto concrete platforms, clear of most floods.

But the villagers also want better natural protection against floods. They have planted some 3000 acacia and other trees on the river embankments and land around the village, and have planned 20,000 more. They hope the deep roots will stabilise the banks and prevent floods from washing away their fields.

They know that the erosion adds to the already heavy silt load in the river. This silt is clogging up the nearby river mouth, causing water levels to back up and worsen flooding in the village. “This year, we will be dredging the mouth,” they said.

But no village can insulate itself from the wider forces at work on the delta – forces that are too often increasing disaster risks for everyone. The people of Bhutapada told me regretfully that they had no plan to manage the sediment that is washing onto their fields. “One reason the floods are getting worse,” said village elder Ramesh Mallick, “is that other villages are facing the same problems.”

But the water has to go somewhere. The banks that keep the river embankments on either side of the river are high. But not high enough, he said. Every year, they are overtopped. Standing on top of the banks, he pointed to his chest. “In the floods, the water comes this high.”

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Only by bringing villagers together to manage their common problems can they hope to stem the damage from brutal floods that wash across their land most years.

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Sanapatna is more exposed to the elements than most coastal villages on the Mahanadi delta. The community of some 2000 people, mostly fishers, is surrounded by water. It is perched on a sand spit between Lake Chilika, the largest coastal lagoon on the east coast of India, and the Bay of Bengal.

Nobody died in the village when Phailin made landfill barely 50 kilometres from here in 2013. That was a triumph. But the damage to their village and livelihoods was extensive.

Six months later, Wetlands International and Netcoast, a network of local NGOs helping coastal communities on the delta to fend off disasters, were working to bring Sanapatana back from the brink. This included helping them coordinate the work of other foreign donors eager to build infrastructure. Driving into the village, I saw mechanical diggers from the state water department rebuilding the village's flood defences on the lakeshore.

But the task was huge, said villagers I met upstairs in the cyclone shelter. Many houses in the village were still uninhabitable. Worse, they had lost many of their fishing grounds – probably forever. The cyclone had burst through the sand spit near the village and moved the lake's main exit to the sea. Before Phailin, the main channel to the sea passed just off the village. It contained a good brackish-water fishery that was the main business of the village. Now the channel was 10 kilometres away and the fishery was gone due to the loss of brackish water.

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Their main hope for the future was tourism. The ICZM project is building a jetty close by, where the villagers hope that the small jetty that lets Lake Chilika could soon be dishing up. But meanwhile, fearing the waters will encroach further, the villagers have identified 25 hectares of high land just beyond the estuary that they want to annex as an emergency retreat.

They were not without hope. But, as they described their plans, it was clear they had little confidence. The village had been here on the edge of the lake for several generations. But as migrant fishers, they didn’t have legal title to the land on which they lived, still less the land they want to move to. “We want legal ownership,” said Chelbera. “If we had that, we would have got compensation for the houses we lost in the cyclone because we didn’t get nothing.”

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TANAHAR AND KEUTAJANGA

The villages of Tandahar and Keutajanga sit at either side of the mouth of the River Keluni, one of the delta “distributary” rivers that distribute the flow of the Mahanadi. Water is threatening the villages from all sides – from the increasingly silted up river, and from the ocean, which comes closer every year thanks to rapid coastal erosion.

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The sand dunes behind Tandahar once provided ample protection from ocean surges. But, despite being planted with a shelter belt of trees, the dunes are disappearing fast. “The sea is coming ever closer,” said the secretary of the disaster committee, Pramod Swain. “Our fathers’ land is now under the water. In 50 years it has come in about 1.5 kilometres.”

When he was young, Swain said, “you could walk 20 minutes through the trees to the sea. But now the trees are almost gone.” The pace of loss has accelerated in recent years, despite community planting of trees on the dunes.

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In recent years, Tandahar has had a growing problem with the mouth of the River Keluni silt ing. Unable to escape to the ocean, river waters spread right into the village. “The river mouth got completely closed at times, flooding our fields,” said Prabull Rout, secretary of the Tandahar disaster committee.

After Phailin, the sea water was gone within hours, but the river water took nine days to go.

Other villages upstream were hit too. In 2012, the villages assembled a group of labourers to dig out the silt. After the story of their efforts got in the local media, the state government lent its heavy equipment to do further dredging.

Dredging of river mouths exacerbates coastal erosion along parts of the delta coast.

In April this year, workers were rebuilding Keutajanga’s sea defences, before the next cyclone season. But the question arose: were the dredging and the destruction of the sea wall linked?

British geomorphologist John Pethick, adviser to both the World Bank and Odisha government, says dredging of river mouths exacerbates coastal erosion along parts of the delta coast. And both the timing and the close proximity of the two events have been worrying. But, says Kumar, nobody can say for sure.

Undaunted, the people of Keutajanga are fighting against the elements, with assistance from Wetlands International and its partners. Ashok Biswal proudly showed off his quarter-hectare thicket of betel vines, surrounded by bamboo frames to protect them against the wind. The stand, along with a number of others between the village and the shore, had been planted since Phailin, with assistance from the programme. Biswal looked forward to a net annual profit of 20,000 rupees ($200). Even closer to the shore, they were planting mangroves and a shelter belt of trees. Nobody was giving up here.
The Inner Niger Delta is one of a giant green oasis in the edge of the Sahara desert. It is a delta of rivers originating in the Bobo Doumbia mountain range in Guinea, France, Belgium, and Senegal. The region is also known for its unique and diverse flora and fauna, and to manage water in ways that can sustain those ecosystems and the communities that depend on them.

As I discovered on a previous visit in January, travel is by boat, across a remote place where the tarmac roads turn into rutted tracks and ways through the savanna, where herds of cattle and camels roam. The inner Niger Delta is a region of extremes. In May, the lakes are dry and their beds turned to scrubby woodland, dry grass, and parched earth. The villages are silent. Travel is by four-wheel drive across dried up lake beds.

The floods in the delta are likely to be poor. So soon we will be advising the rice farmers to plant drought-resistant varieties. Many communities were developing their own strategies to adapt, usually through more sophisticated management of their natural environment, such as channelling water into fish ponds and animal grazing pastures. In some cases, the programme simply helps them to do what they already plan by providing them with technical expertise.

Environmental forces outside the wetland were shaping their world, while valuable in the short term, had its limits. They were also well aware that ecosystem management in the heart of the delta, they reported classic signs of desertification. They were also aware that ecosystem management in the delta remains a remote place where the tarmac roads turn into rutted tracks and ways through the savanna, where herds of cattle and camels roam. The inner Niger Delta is a region of extremes. In May, the lakes are dry and their beds turned to scrubby woodland, dry grass, and parched earth. The villages are silent. Travel is by four-wheel drive across dried up lake beds.

The programme in Mali targets those most in need. The government has listed 11 municipalities as vulnerable. The highest concentration is the Inner Niger Delta, where all 20 of the programme’s project villages are situated. Within these municipalities, mayors and other local officials choose which communities might benefit the most by participating.

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**Nowadays many of these natural water storage structures are dry. They are cut off from the main river by siltation, in turn driven by deforestation and erosion and the reduced self-cleaning capacity and the erosion of the delta due to upstream water abstraction.**

Digging channels to collect water is becoming a way of life for many communities on the delta. Water is abundant for a few months of the year, but its abrupt disappearance is a huge constraint on agriculture the rest of the time. In the past water would have been stored after the floods in ponds and lakes. Nowadays many of these natural water storage structures are dry. They are cut off from the main river by siltation, in turn driven by deforestation and erosion and the reduced self-cleaning capacity of the delta due to upstream water abstractions.

**Take Nogga, in the municipality of Dialloube. Reaching the village takes hours of driving across what is, for much of the year, the top of its bank. It no longer flows onto the village’s farms and grazing land, which it once watered and covered with rich pasture.**

The villagers, like most in the area, are poor and marginalised. Like many villages in the delta, Nogga has no school. Only one villager at a meeting back in the shade. “We will be full of fish, as well as birds like egrets and herons, and grazes that the Rain. They will overflow into the lake as we will have more pasture.” Local villagers stand benefited from the scheme. “The ponds will be a big opportunity, both against poverty and climate change.” In Sobé, villagers are working hard to catch fish and water. The villages, like most in the area, are poor and marginalised. Like many villages in the delta, Nogga has no school. Only one villager at a meeting back in the shade. “We will be full of fish, as well as birds like egrets and herons, and grazes that the Rain. They will overflow into the lake as we will have more pasture.” Local villagers stand benefited from the scheme. “The ponds will be a big opportunity, both against poverty and climate change.” In Sobé, villagers are working hard to catch fish and water. The villages, like most in the area, are poor and marginalised. Like many villages in the delta, Nogga has no school. Only one villager at a meeting back in the shade. “We will be full of fish, as well as birds like egrets and herons, and grazes that the Rain. They will overflow into the lake as we will have more pasture.” Local villagers stand benefited from the scheme. “The ponds will be a big opportunity, both against poverty and climate change.” In Sobé, villagers are working hard to catch fish and water.
Vegetable gardens are one of the most successful interventions under the Mali programme. The gardens are especially important for women, who cannot traditionally own land in Mali but can assume “ownership” of their gardens. Almost every village involved in the project either has one or wants one. In Kakagna, they have two – since the village women have lately fallen into two camps. Now they vie for vegetable supremacy, competing to display their produce to visitors.

The frenzy of vegetable growing in Kakagna came about partly by accident, explained the president of the first women’s group, Diko Bilakoro. The original proposal from Wetlands International and its local partner was to fence off an area of land to grow trees such as Acacia kirkii. But five years on, the trees were not doing well, because of termite attacks, while the women had filled the gaps by planting onions, lettuce, tomatoes, cabbage, okra and much else.

The key, Bilakoro explained, was the fence. It kept out livestock that would otherwise have eaten the vegetables. Behind the fence, the women were manuring and watering their tiny personal plots for all they were worth.

Not to be outdone, the second group banged their buckets loudly to greet our arrival. They showed off sorghum and cotton as well as mangoes and vegetables. Back at a village meeting, both camps agreed that the vegetables were feeding families, while providing women with a valuable new source of income in local markets, and raising their status within the village. “The men are happy too, because women now contribute two-thirds of the family income,” Bilakoro said.

In Noga, 93 women produced around five tonnes of onions, okra, tomatoes, maize, rice and beans, from their one-hectare garden. Onions sell for about 500 CFA a kilogramme (about a dollar) in local markets. One woman said she had earned 10,000 CFA – enough to buy two sheep. There was only one downside: the men lost the orchard. The garden had taken land they once played soccer on.

A couple of hours drive north across the dried Lake Diebe in Guidio, another desperately poor delta village that is innovating to survive. At the end of the village they are extending the land raised above the lake floodplain with a constant supply of household trash. In front of almost every house sat a cheap bank of Chinese solar panels, bought in the Mopti market. By day the panels charged car batteries, which by night delivered power for TVs and household lighting.

Here the women were tending both a tree plantation and vegetable garden. Fatoumata Cisse, president of the women’s group, showed me aubergines and onions, carrots and cotton, beetroot and cowpeas, guava and chilli peppers – and henna, which is used here as in Europe as a skin and hair dye. Then she grabbed some foliage from another bush. “This is our pharmacy,” she said. “We give it to sick children.”

“This isn’t our project anymore,” said the man from ODI-Sahel contentedly. “It’s theirs. That’s how it should be. It started with trees, but it’s mostly vegetables now. We just came to check things were okay.”

Both camps agreed that the vegetables were feeding families, while providing women with a valuable new source of income in local markets, and raising their status within the village.
The bourgou grasses are in trouble. As the delta lakes diminish, so are the bourgou pastures and with them the fisheries. Bourgou beds are the nurseries for the delta's fisheries. More bourgou means more fish. And as the waters retreat, the aquatic pastures of bourgou also sustain cattle and goats brought by nomadic Fulani herders from as far away as Mauritania and Burkina Faso. Villagers eat it too, when their millet crops fail. They call it “starvation food”. It tastes rather like couscous. It also ferments to make a popular sweet beer.

But the bourgou grasses are in trouble. As the delta lakes diminish, so are the bourgou pastures and with them the fisheries. So, a number of villages have begun planting and cultivating bourgou. Outside Akka on the shores of Lake Debo, I saw a 30-hectare stand nurtured by villagers. It attracted so many fish that thousands of cormorants and pelicans gathered round. The villagers were content that the birds were feasting on their fish, however. They said that bird droppings fertilised the waters, encouraging the growth of bourgou, which brought more fish. “The more birds there are, the more fish we get”, said Alpha Fofana, who was in charge of the planting project.

Nearby in Gouraou-Bozo, Wetlands International and its partners are encouraging locals to plant bourgou grasses in return for micro-credit for other small village projects. Villagers had planted 15 hectares of bourgou cuttings over two years. The second crop was just poking above the water as our boat passed. The planting took place during a quiet period for fishing. “We used to migrate to find work when we didn’t much to do here”, said Reza Fofana, a member of the village committee. “If they do more, they will get more micro-credit cash”, said Kobe. But they don’t need much incentive. The gains are clear to see. “Since we started to restore the bourgou fields, fishing has been good,” said Reza Fofana. One of the older women, Ramata Moussa Kampo, agreed. “We used to eat little because at our age, she said, whether fresh from the lake between December and February, or dried or smoked at other times.

As soon as the water levels start to fall, Fulani cattle move in. But the fishers, who are from the Bozo clan, say they want to protect the grasses because the water is cleaner. They know the bigger fish will stay if we prevent livestock going into the grasses till April”, said Reza Fofana. “We are bothered, but they only go up to the water. We have been taught, which is in April, but they don’t want to exclude the cormorants. They don’t like the Bourgou grasses by stamping broken stems into the mud. Timing is everything.

Such disputes can cause conflict. But so far things have been unruly, said Ramata, “Bozo and Fulani have lived together around Gouraou for centuries,” she said. “The land rights are well-established and nobody has broken ranks. And there is another incentive. Wetlands International and its partners will not fund projects where there are disputes over land, said Kobe.”
Many villages involved in the project have been offered micro-credit in return for doing ecological restoration projects that will help sustain their livelihoods in the long run as well as guard against natural hazards and protect biodiversity in the delta. Overall, the micro-credit scheme operated by Wetlands International to finance conservation, known as Bio-rights has allocated 60 million CFA in loans to women’s groups in Mali villages.

The micro-credit schemes – run by specialist institutions like the Bamako-based CAMEC – differ in their rules, but the beneficiaries are mostly village women’s groups. This is a deliberate policy, partly because women need support in traditionally patriarchal societies, partly because they are generally better at organising themselves and paying back loans, and partly because, as the members of the community who sell produce in the markets, they are more used to handling money.

Typically, the initial supply of cash credit is augmented by the women themselves, who top up the pot with a small subscription each week. Typically, the credit funds things like buying rice huskers, establishing grain banks, restoring and stocking fish ponds, and buying seeds for vegetable gardens. Typically, too, the women hold the cash in padlocked boxes, which they displayed proudly at the village meetings I attended.

In Kakagna, the village got credit in return for digging a channel that supplied water to a fish pond. The villagers used the cash to set up a grain bank to tide them over the “starvation time” at the start of the rainy season before new crops have grown. At Gouraou-Bozo, women put in 125 CFA (about 25 cents) each week. Typically, too, the women hold the cash in padlocked boxes, which they displayed proudly at the village meetings I attended.

In those boxes was the village’s social security. This was becoming a substantial community piggy bank benefitting the social resilience of the community as much as the environmental projects benefitting its ecological resilience.
The River Senegal is West Africa’s second largest river, exceeded only by the River Niger. It flows out of Guinea, through western Mali and along the border between Senegal and Mauritania to the Atlantic Ocean. Its flow is now controlled by the Manantali hydroelectric dam in Mali, which supplies power to both the Malian capital of Bamako and the Senegalese capital of Dakar. At its mouth, the Diama dam prevents the incursion of salt water into the large delta region.

With water from both upstream and the ocean managed by dams, the extensive coastal delta of the River Senegal is largely under human control. And natural ecosystems such as mangrove swamps at the river mouth and wetlands across the delta have suffered from man-made hydrological regimes. They have suffered from flood protection systems that work for urban areas but increase the threat to others, and land and water grabs for large-scale irrigated agriculture that deprive them of the wetlands, fisheries and pastures on which their livelihoods depend.

Wetlands International has for some years been working with these communities, often in collaboration with environment and human rights advocates and humanitarian agencies, to protect wetland ecosystems and improve the livelihoods, resilience and disaster preparedness of the communities that depend on them. This has sometimes involved taking sides in politically charged conflicts over water and land.

Chapter 4: Restoring wetlands to increase resilience in Senegal
The sea has destroyed it.”

She seemed happy, almost coquettish, at the chance to show off her rustic hermitage. But the story of what happened to her village is shocking. In 2003, the nearby Senegalese town of Saint-Louis was submerged one night in some panic as the Atlantic Ocean surged in. The sea overtopped a barrage behind the sand dunes, creating a permanent exit for the swollen river. The flood water was ponding up behind an extensive natural barrage of sand dunes that diverted the river south before it could enter the Atlantic Ocean. One night, in some parts as Saint-Louis was inundated, the authorities hurriedly excavated a channel through the dunes to let the swollen river flow out. It worked. Saint-Louis was saved. But the rush of water began to widen the four-metre emergency channel. Within a few weeks, the southernmost part of the sand dune barrier had been breached. Today, the breach is more than two kilometres across. The southern half of the sand dune barrier is now an island, and some day may disappear altogether.

Meanwhile, the widening breach has exposed the once tranquil lagoon behind the dunes to the full force of Atlantic breakers. The waves lapped at the dunes, which had eroded away elsewhere. The breach is now 400 metres wide. Today, the breach is more than two kilometres across. The southern half of the sand dune barrier is now an island, and some day may disappear altogether.

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Wetlands International and the Senegalese branch of the International Union for the Conservation of Nature, the world’s largest organization of conservation scientists, backed the association, accusing the company of threatening to take the reserve’s last supplies of water for its irrigation.

Mane Laye Fall of Forum Civil, the local branch of the International Human Rights NGO Transparency International, told me: “We are here to highlight goals and help the communities who oppose them. They see strangers coming into their villages, coming to take their land. The company is involving a lot and says it wants to work with the communities, but the communities do not know what it is doing. It says one thing and then a few months later does another.” Months after promising it would be growing sunflowers as a biofuel, he said, Senhuile switched to planting rice.

How much water that heads west will actually go to the reserve and its inhabitants, and how much will end up feeding irrigation canals on the Senhuile farm? Some years there may be enough water for all. But, in a dry year, who will get priority? And who will be in charge of the sluices?

The activities of the Senhuiile company deprive us of access to the majority of pastures and sources of food, water and firewood. The company has made us prisoners in our own land.”
To the charge of land grabbing, the company says it is providing jobs and assisting communities with infrastructure such as digging wells. To the charge of water grabbing, it says, it is providing more water to the reserve. To secure its water supplies for irrigation, the company has increased the capacity of the water channel from Lake Guiers. The cleaned-out channel now runs the 18 kilometres all the way to the farm. But it says it is willing to let local authorities take much of the water on a spur to the wetland. This could happen. The Senhuile project now forms part of a wider government scheme to revive this part of the River Senegal delta, for both nature and agriculture. In 2013, it secured funding from the African Development Bank to spend $24 million on increasing the amount of water taken from the River Senegal to Lake Guiers from 1.2 to 2.1 billion cubic metres by 2017. There are many demands on this water. But the bank says its aim is to “restore and develop natural ecosystem resources in order to sustainably boost the resilience and productivity of farming systems for the benefit of poor rural communities.”

This is good news and Wetlands International and their local partners have supported the plan, though it will not resolve the land grab. And questions remain. How much water that heads west will actually go to the reserve and its inhabitants, and how much will end up feeding irrigation canals on the Senhuile farm? Some years there may be enough water for all. But, in a dry year, who will get priority? And who will be in charge of the sluices?

When I visited in May 2014, Senhuile had completed the upgrading of the channel from Lac Guiers to its farm. Water was passing flowing to its fields. Some cattle herders were pleased. One, Adama Ba, who had bought two cows with micro-credit arranged by Wetlands International, brought them to the Senhuile channel for water. “With the channel, everything is going well now,” he said. And we watched local women bathed in the canal and a large unmarked road tanker abstracted water.

“We are working to improve the water resource for everyone. We want to make sure the reserve also has water at the right time. Not all year, but at the right time.”

But there was as yet no sign of the Office du Lac Guiers, a government agency, fulfilling its promise to dig the spur that would take water to the wetland reserve. Nobody seemed sure when, or if, this would happen. Wetlands International supported the construction of a lookout tower in the wetland so visitors will be able to watch the abundant bird life that should return, once the spur is built and the water starts flowing. But the channel to the reserve remained clogged and the depression where there should be a lake was bone dry. “There were pelicans here briefly in January,” Wetlands International’s Pape Diomaye Thiare told me. “But right now there is no water because the company is diverting it to its fields.”

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The promises had yet to be fulfilled. It explained the tension at the meeting between NGOs and Senhuile. During a two-hour confrontation in searing heat outside shipping containers that functioned as company field offices, Senhuile’s head of security and its conservation officer, Colonel Ibrahima Diop, insisted: “We are working to improve the water resource for everyone. We have done a lot for the community. We want to draw water for ourselves without creating problems. We want to make sure the reserve also has water at the right time. Not all year, but at the right time.”

The impasse continued until the arrival of the company social director Maura Pazzi, who is in charge of liaisons with communities. The mood – and the company line – changed.

“Yes, we have some problems,” Pazzi admitted. “We will do our best to fix them. We want to fix the past, and sit down together.” The company, it emerged, had been troubled by the outbreak of protests in recent weeks. There would be an effort to mend fences.

Sitting quietly at the back of the hot-tempered meeting, keeping his cool, had been the man at the government water and forestry department who is in formal charge of the reserve. Moussa Diop [no relation] has kept his counsel as voices were raised. But he told me later: “We are very happy to see a new behaviour from the new team at Senhuile. They are very different from the former team. More open to collaboration.”

He agreed that, in his view, “the crisis with communities in recent months is the reason they have changed their behaviour. But if everybody does what they say now, if the company allows water to come to the reserve, and works with the communities, there will be a positive outcome.”
FRED PEARCE
author of “The Land Grabbers: The New Fight over Who Owns the Earth” published by Beacon Press (US) and Eden Project Books (UK) in 2012, is a veteran news editor at New Scientist. Currently he is an environmental and development consultant, he also writes regularly for The Guardian, the Yale e360 environment web site, the Washington Post and others. He has been honored as UK environmental journalist of the year, among other awards. His many other books include When the Rivers Run Dry, With Speed and Violence, Confessions of an Eco-Sinner, and Peoplequake.

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