Working with nature

Towards integrated approaches to disaster risk reduction

Millions of people around the world are vulnerable to natural and man-made hazards. Unsustainable management and use of ecosystems is often a root cause of such vulnerability. Wetlands International calls for better integration of approaches to disaster risk reduction, bringing together expertise from relevant sectors and making optimal use of the natural protection provided by ecosystems.

All around the world, people are increasingly exposed to disaster risk from natural hazards such as droughts, storms and floods. As disasters increase in frequency and intensity, there is a growing body of evidence suggesting that traditional approaches to disaster risk reduction (DRR) are often insufficient to make a lasting difference. Disaster response and relief, and community development and preparedness remain key pillars of DRR, but practitioners increasingly recognise the need to also address the root causes of risk and vulnerability.

Ecosystem degradation is often one such root cause. Deforestation, overexploitation of water resources, draining of wetlands and other practices that degrade ecosystems often stem from flawed spatial planning or inappropriate water management policies. As a result, ecosystem services - the benefits people derive from ecosystems, such as water purification, pest and disease control, as well as the provision of food and energy - are undermined.

Addressing the often complex underlying causes of risk requires integration of best practices from DRR, climate change adaptation and ecosystem-based approaches to land and resource management. This must be done at various levels, from the community to the landscape level, and across the risk reduction cycle, from immediate disaster relief to longer-term mitigation and prevention measures.

Our track record:
Wetlands International began working in DRR in the wake of the 2004 tsunami in the Indian Ocean. Between 2005 and 2011 we improved the livelihoods and resilience of more than 260,000 people through our coastal restoration work.

Since 2011, Wetlands International, CARE Netherlands, Cordaid, the Netherlands Red Cross, and the Red Cross/ Red Crescent Climate Centre form the *Partners for Resilience* alliance. Our joint programme, which spans nine countries across three continents, is one of the first large-scale efforts to bring together expertise from the humanitarian, development and environment sectors. It offers a holistic approach to risk reduction and climate change adaptation, focusing both on practical interventions and on influencing policy. Find out more about our work at www.wetlands.org/drr.

Rescue operation supported by Partners for Resilience in Odisha, India.

"By restoring wetlands as natural infrastructure, we have secured livelihoods of 200.000 fishers and 400.000 farmers in Lake Chilika basin."

Dr Ajit Kumar Pattnaik,Chilika Development Authority

Working with nature: living with floods

Floods have great destructive power, often forcing people to flee their homes, as well as costing lives and livelihoods. Floods are therefore generally perceived as hazardous events that must be controlled at all costs.

The regular rise and fall of river levels, however, sustains a wealth of economically valuable goods and services. Floods supply nutrients to riparian agricultural land, boosting crop yields, and play a crucial role in fisheries.

Restoring forests and wetlands may increase regulation of water flows and thereby prevent beneficial floods from turning into hazards. This will boost the resilience of river systems to climate change.

An ecosystem-based approach to flood risk reduction recognises the value of natural flows and floods and ensures that ecosystem management and restoration measures are employed alongside human-engineered risk reduction interventions. Integrating these landscape approaches with conventional early-warning, preparedness and response measures increases community resilience.

The evidence:

- Naturally flooded fields in the Mekong yield twice as much rice as irrigated fields.
- Worldwide 4 to 40 times as much fish is harvested from dynamic river-floodplain systems than from static reservoirs.
- Some European countries are removing dykes and restoring floodplains to restore water retention and reduce flood risk. The Dutch government has invested no less than €2.3 billion in river restoration measures.
- Models indicate that downstream water losses due to planned water infrastructure development upstream multiply risk, causing famine for 1 million inhabitants in the Inner Niger Delta in Mali every 2-3 years.

Wawang Pulo, Philippines

Restoring beneficial floods in the Mahanadi Delta

In recent years, hazardous floods have increased in frequency and severity in the Mahanadi Delta in north-eastern Orissa State, India: only three floods occurred between 1961 and 1970, compared with seven between 2001 and 2011. Three of the recent floods (2001, 2008 and 2011) were devastating, causing widespread loss of life and property.

Risks to the local population have been intensified by the silting up of the rivers and channels and the loss of 32% of the Delta's wetlands since 1975. Changes in water management in the Delta have increased the local population's vulnerability to floods. Structures built to control the flow of irrigation water impede flows to and from the rivers, leaving land water-logged and aggravating flood damage. Water-logging reduces agricultural productivity and increases the incidence of diseases related to stagnant water.
When the Naraj barrage on the Mahanadi River was planned, the state government commissioned a participatory assessment of its potential effect on nearby Chilika Lake. They found that communities living on the flood plain preferred to maintain water flows for their beneficial effects on agricultural productivity, which more than compensated for flood-induced damage. Fishers downstream also preferred to maintain flows to help keep the mouth of the river open and provide a constant stream of sediment and associated nutrients, which raises fishery productivity. Cost-benefit analyses confirmed the significant positive benefits of moderate floods to both agriculture and fisheries.

In response to these findings, the government has implemented innovations designed to improve flow regimes and restore the wetland ecosystem, including reforestation of hill slopes and nearby mangrove forests, dredging of silted lakes and removal of invasive plants.

Efforts to manage disaster risk now have an explicit focus on the ecosystem services provided by wetlands, and the government extended the scope of wetland management to the river-basin level.

Working with nature: coastal defences

Many coastlines have been stripped of their natural defences by human activity. Coastal wetlands have been drained for farmland and mangrove forests, salt marshes and other coastal habitats have been cleared for aquaculture ponds, coastal resorts and settlements.

Yet coastal wetlands are vital for protecting the land behind them from wind and wave erosion, and from storm surges and rising sea levels. Mangroves, for instance, also help people recover after coastal disasters by providing firewood, building materials and food, such as fish and shellfish.

Cyclones and storm surges may also impact mangroves themselves, stripping trees of their leaves and even uprooting them. It can take years or decades for mangrove forests to recover. Nature may need a helping hand, for example through *'hybrid engineering'*.

The evidence:

- Salt marshes in the USA have an estimated annual storm protection value of US$ 250 to US$ 51,000 per hectare.
- Many coastal wetlands can adapt to sea level rise; some mangrove forests can accommodate rises of up to 9 millimetres per year through sediment trapping and accumulation of organic matter.
- Mangrove forests reduce the effects of storm surges, reducing the height of storm surges by 5 to 50 centimetres per kilometre of mangroves and the height of surface waves by more than 75%.
- Mangrove degradation and subsequent unsustainable land use has caused massive erosion across the tropics, with the sea encroaching up to 2 kilometres along some stretches in one or two decades only.

"There will always be extreme weather, but the disasters it generates can be mitigated if we make sure ecosystems remain in healthy condition and are restored where possible."

Pieter van Eijk, Wetlands International

Hybrid engineering to increase coastal resilience

Around the world vast tracts of mangrove forest have been cleared, stripping coastlines of their protection against waves and leading to rapid erosion. Climate change and rising sea levels will only make matters worse.

Efforts to protect coastlines using engineered structures, such as dykes and sea walls, are expensive and the results are often disappointing. Along muddy coastlines hard structures cause the disturbance of sedimentary processes and as a result fail to protect people and their property. They may even exacerbate the problems they were designed to control.

'Hybrid engineering' - combining engineering with natural processes - may take longer to show results, but the end product is usually more self-sustaining because it is more in tune with nature, and adaptable to changing circumstances.

A practical example:
In tropical mud coasts, permeable *'fences'* made of brushwood, old fishing nets and other local materials can be used to break the passage of waves, mimicking the effects of mangrove roots. Sediment carried by waves and currents is dropped around the fences, building up the shoreline. As the shoreline stabilises, mangrove restoration can begin. The engineer's bulldozers and diggers may again be needed to dig a network of channels that mimic a natural tidal creek system through the new sand and mud banks to promote the natural spread of seedlings. If there are natural mangrove forests near the site to be reforested, there may be no need for artificial planting, but some human intervention may be needed to help the trees re-establish.

West Java, Indonesia

In practice: wetlands for disaster risk reduction

Managing wetlands for increased human resilience requires action to sustain or restore water regimes, so as to maintain wetland ecosystem health, productivity and functioning. These actions require the cooperation of different sectors and stakeholders at several spatial and temporal scales.

An ecosystem approach to DRR in five steps:

1. Assess risks and vulnerabilities, including the (environmental) root causes of risk.

Acknowledge the positive or negative impacts on the provision of ecosystem services related to the different scenarios.

2. Identify risk reduction scenarios and related costs and benefits.

Understand how areas within the wider landscape are spatially connected (upstream and downstream linkages etc.), and how interventions in one area may have (positive or negative) implications for an area elsewhere, sometimes hundreds of kilometres away.

3. Ensure that risk reduction measures are planned at multiple spatial scales - locally at the community level but also across wider areas (river basins, landscapes).

4. Design and implement ecosystem-inclusive risk reduction measures in partnership with multiple sectors.

i) Work with engineers and land-use planners to ensure integration of wetlands management and restoration in large-scale infrastructural/ development approaches for DRR.
ii) Work with development organisations and local communities to ensure integration of wetlands management and restoration in small-scale community-based risk reduction initiatives, linking environmental, humanitarian and development approaches.

5. Address the root causes of risk by ensuring sound land use and natural resource use policies, ensuring that ecosystem services are sustained.

This may require DRR professionals to move beyond their comfort zone and also address sensitive issues such as logging, mining and land conversion.

Further reading

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- Wetlands International, 201 3. Building with nature for coastal resilience. Wageningen, the Netherlands.
- Wetlands International, 2013. Criteria for Ecosystem-Smart Disaster Risk Reduction and Climate Change Adaptation. Wageningen, the Netherlands.

Community mapping in Gourao Bozo, Mali

Chilika Lake, India

Mission:

To sustain and restore wetlands, their resources and biodiversity

Join our efforts

Wetlands International is proud to work in collaboration with a wide variety of government, civil society and private sector partners. Together, we are integrating disaster risk reduction methods from the humanitarian, development and environmental sectors. However, there remains a **need for policies and investments that facilitate widespread adoption of this common sense, holistic approach**.

Initiatives aimed at disaster risk reduction must be aligned and combined with other policies in order to be effective. Key among these are policies on economic development, land use, water management and natural resource exploitation.

Join us and support our work on integrated approaches to disaster risk reduction.

For more information on our work and opportunities for collaboration, please contact:

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