

Wetlands for disaster risk reduction: Effective choices for resilient communities

Degradation of wetlands reduces resilience against water-related hazards such as floods, droughts and storm surges. Integrating wetlands as natural infrastructure for disaster risk reduction (DRR), alone or in conjunction with traditional “hard” infrastructure, can mitigate hazards and increase the resilience of local communities and those living across entire river basins or coastal zones.

Policy recommendations

Policy-makers should:

- Recognize the roles of wetlands in DRR, emphasizing the value of their wise use as a significant and cost-effective component of DRR strategies.
- Embed wetland wise use within ecosystem-based DRR (eco-DRR) policies and programmes, and broader development plans, developed in the context of international processes such as the Sendai Framework for Disaster Risk Reduction, the Paris Agreement on climate change and the Sustainable Development Goals.
- Promote collaboration between the development, humanitarian and environmental sectors to design and implement wetland-related solutions to increase resilience to disasters.
- Emphasize within sectoral policies and programmes, particularly those related to DRR, that degradation of wetlands can cause disasters and amplify their impacts on water, food and energy security, and human health.
- Recognize that ecosystem-based solutions alone may not address all forms and scales of disaster risks, and that they can be applied together with other risk management measures such as early warning, evacuation and contingency planning, and traditional infrastructure such as dams, dykes and seawalls.



The issue

Across the world, natural disasters continue to have a severe impact on people, their livelihoods and their environment. Over 90% of natural disasters are caused by water-related hazards such as floods, droughts and storm surges. Climate change is increasing the frequency of the extreme weather which causes these hazards. From 2006 to 2015, the percentage of lives lost due to weather- and climate-related disasters increased to nearly 49% of all lives lost to natural hazards in that period, up from around 40% in the previous decade.

Disasters and the associated fatalities, losses and damage often result from poor decisions and actions that make hazards more severe and communities more vulnerable to their impacts. There is a need for better integration between environmental, development and humanitarian actors, to enable effective prevention, response and recovery.

Wetlands are natural water infrastructure, which can help to mitigate the physical impacts of hazards. The services which healthy wetlands provide, including food and clean water, can mitigate the humanitarian impacts of disasters, enhancing the immediate coping capacities of communities and their sustainable long-term recovery.

Wetlands provide multiple benefits and services. For example:

- Inland wetlands collect and hold water during floods, and release it gradually, regulating water flows and ensuring consistent supply. Many wetland types, such as fishponds and rice paddies, also contribute to food production.
- Coastal wetlands such as mangroves provide spawning and feeding grounds for fish, providing food and livelihoods; they also act as buffers against storm surges.
- Healthy peatlands store carbon and thereby mitigate the impacts of climate change.

However, the value of wetlands in countering disasters is seldom understood, and they are too rarely considered in DRR policies and programmes. Despite the many benefits which wetlands provide, more than 64% of the world's wetlands have been lost since 1900, and wetland loss and degradation continue at alarming rates around the world, contributing to lower resilience to disasters.



Why wetlands are important for DRR

The sustainable management of wetlands, and the restoration of those which have been degraded, can help reduce the impact of hazards and help communities recover from disasters. Wetlands can also work effectively alongside traditional “hard infrastructure” to enable such resilience.

Studies have shown that it is often more cost-effective to invest in the conservation of these ecosystems than in constructing hard infrastructure. A recent review of nature-based DRR projects, including 12 mangrove projects, found that mangrove management costs from two to six times less than submerged breakwaters, the most commonly used alternative. This figure does not take into account the added benefits which mangroves provide, such as food, timber, medicines, habitat and nurseries for fish and other wildlife.

- The storm protection value of coastal wetlands lost in the State of Louisiana (United States of America) before and during Hurricane Katrina in 2005 has been estimated at USD 850 million per year. Following Katrina, the State and the City of New Orleans have adopted a multi-pronged approach to increase the city's resilience to sea level rise, hurricanes and river flooding. Wetlands such as marshes have been restored to act as buffers between the sea and the city.
- The Netherlands, as part of the “Room for the River” initiative, has restored the natural floodplains of the Rivers IJssel, Rhine, Lek and Waal, to reduce the impact of floods and improve overall water and land management.
- The storm protection benefits of mangroves in southern Thailand have been valued at USD 10,821 per hectare. At the Krabi River Estuary Ramsar Site, mangroves are being restored to protect vulnerable coastal communities against tropical storms, as well as to mitigate the effects of sea-level rise.
- In Hubei Province (China), lakes and marshes have been reconnected to the Yangtze River to reduce flood impacts. The restored wetlands have led to an increase in fish stocks and improved water quality for local communities.
- The degradation and draining of peatlands, coupled with El Niño Southern Oscillation drought conditions, resulted in devastating fires which swept through Indonesia and South-east Asia in 2015 and 2016. In response, Indonesia created the Peatland Restoration Agency to restore five million acres (two million hectares) of peatlands.

Ecosystem-based DRR approaches within global agreements

Conservation and wise use of wetlands is increasingly recognized as a part of the “eco-DRR” approach. Eco-DRR entails the sustainable management, conservation and restoration of ecosystems to reduce disaster risk, with the aim of achieving sustainable and resilient development.

The Ramsar Convention, the Convention on Biological Diversity and the Paris Agreement, as well as global policy frameworks such as the Sendai Framework on Disaster Risk Reduction and the Sustainable Development Goals, clearly recognize that nature-based solutions for reducing disaster risk are vital for a sustainable and secure world. The Sendai Framework explicitly recommends taking into account the role of ecosystems, including wetlands, within disaster planning. There is an urgent need to apply these instruments through concrete actions, to increase global efforts and scale up investments in wetland conservation and restoration.

Integrating wetlands within national DRR strategies

Assessment and communication of the potential contributions of wetlands to reducing the impacts of hazards can strengthen the case for the integration of wetland management into DRR planning. By combining “natural” and “hard” engineering techniques, the needs of different sectors and stakeholders regarding water, energy, food security and human health can be addressed.

A growing number of national governments are integrating wetlands within national policies and plans for DRR, such as the Philippines’ disaster prevention and recovery programme, and India’s National Disaster Management Plan.

For wetland solutions to contribute effectively to DRR the following should be considered:

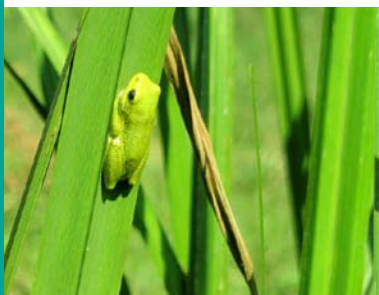
- Development, humanitarian and environmental agencies should collaborate to ensure that their management frameworks and actions are coherent.
- Wetlands and the benefits they provide should be taken into account within disaster risk assessments. Their impacts should be considered across entire river basins or coastal zones, rather than within administrative and political boundaries.
- Relevant links between development planning and land use changes, wetland degradation and disaster risk patterns should also be taken into account, building on or promoting transboundary cooperation.
- Wetland managers should recognize that wetlands and the ecosystem services they provide are themselves vulnerable to disasters as well as the impacts of climate change. Analysis of these vulnerabilities should be incorporated into wetland site management plans and response options. This would support adaptive management and help minimize adverse impacts that may undermine the contributions of wetlands to disaster resilience, response, recovery and reconstruction.
- Rapid environmental assessments conducted after a disaster should consider options for wetland restoration as a contribution to environmental recovery, reconstruction and future resilience.
- Assessment of immediate and longer-term costs, benefits and trade-offs for different risk management scenarios should fully capture gains or losses in wetland service provision that impact on disaster risk and resilience. Mapping the full range of ecosystem services and values of wetlands, including their role in DRR, can inform this process.

Policy considerations for effective integration of wetlands in DRR strategies

Put in place enabling policies and legislation. Integrating wetland considerations and other ecosystem-based approaches in long-term visions and national development plans can provide an enabling environment. Combining top-down and bottom-up approaches, and including traditional, indigenous and local knowledge, can make policy-making more effective. Gender mainstreaming should form a significant aspect of integration of wetlands in DRR.

Include wetland indicators within monitoring systems for global processes. Wetlands and DRR should be integrated in national policies and measures to implement them in the context of the Sendai Framework, Sustainable Development Goals and the Paris Agreement. The inclusion of wetland-related indicators can link implementation of the Ramsar Convention and its Strategic Plan for 2016-2024 to track progress on these mechanisms.





Promote use of environmental and social risk reduction safeguards by different sectors. Incorporating environmental and social risk reduction safeguards into environmental impact assessments and strategic environmental assessments can help reduce risks from unintended impacts of development projects.

Raise awareness and capacity in development planning. Engaging universities and training institutions, and including wetland management courses in learning programmes, can help cultivate policy makers, researchers and practitioners who promote nature-based approaches. Enhancing awareness within the private sector will help make the business case for natural infrastructure solutions; high-profile “ambassadors” who are able to explain and promote wetlands can provide strategic support.

Restoring and sustainably managing wetlands should complement other risk management measures. The capacity of wetlands to help mitigate hazards and reduce disaster risk can depend on local geographical conditions and socio-political contexts. Policy-makers and decision-makers should consider an array of solutions including those which combine natural and hard engineered infrastructure. Ecosystem-based solutions should complement other risk management measures such as early warning, evacuation and contingency planning.

New investment may not be required. A sizeable proportion of DRR investment is allocated to hard infrastructure solutions. Investment in wetlands as stand-alone or hybrid infrastructure, in most circumstances, will not require new resources and financing, rather reallocation of existing funds. The expertise, resources and networks of private sector partners may be harnessed to encourage and scale up investments in wetland solutions.

Limitations and further research

To make informed choices on the use of ecosystem-based approaches for DRR, it is important to continue investing in research into ecosystem resilience thresholds. Collaborative research with humanitarian and development partners can greatly assist in integrating wetland solutions for enhancing resilience, from a socio-ecological systems perspective. Further quantification of performance of ecosystem-based solutions, in varied geophysical and socio-economic contexts, using metrics to assess infrastructure efficiency, is required to enable planners to make informed decisions on combining natural and traditional infrastructure solutions for DRR.

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Further reading

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The Ramsar Convention



The Convention on Wetlands, also known as the Ramsar Convention, is a global inter-governmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. It is the only global treaty to focus on one single ecosystem.