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WORKING WITH NATURE IN DISASTER RISK REDUCTION

This document is part of the "Working with Nature" Quick Tips series, comprising 7 sectoral Quick Tips on Agriculture and Livestock, Cities, Forestry, Renewable Energy, Transport, and Water.

Nature and disasters

The role of nature in disaster risk reduction (DRR) is of overwhelming importance. It is humanity's first line of defence against natural hazards such as floods, droughts, heat waves, tropical cyclones (hurricanes, typhoons), and the mounting impacts of climate change. By removing carbon from the atmosphere nature also mitigates against climate change. Nature provides protection of human life and assets for free.

> **Degradation of ecosystems limits their ability to serve as protective barriers** against natural hazards and to provide other services such as food, medicine, water, shelter and livelihood opportunities. In other words, ecosystem degradation increases exposure to hazard risks as well as the vulnerability of communities living in hazard prone areas. (Disaster risk = Hazard x Exposure x Vulnerability)

Climate change is having profound influence on disaster risk by increasing the frequency, intensity and magnitude of weather-related events (storms, floods, drought, heatwaves, etc.), but also by having an impact on the capacity of ecosystems to regulate and buffer the impacts of disasters (think of water buffers, temperature regulation, wind breaks, or erosion control).

It often is after the degradation of nature that disaster risks become apparent. Reversely, **nature provides potential solutions to reduce disaster risks and adapt to climate change**. Therefore, the 2022 *Global Biodiversity Framework* requires us to increase resilience against climate change, while minimizing negative and fostering positive impacts of climate action on biodiversity (target 8) and restore, maintain and enhance ecosystem services for the protection from natural hazards and disasters (target 11), both through *nature-based solutions (NbS)* and/or ecosystem-based approaches for the benefit of all people and nature.

Nature provides potential solutions

NbS for DRR have a number of clear advantages:

- Natural hazards can damage ecosystems, but healthy ecosystems also are resilient and have the ability to **recover from disturbance**. Healthier ecosystem will experience less damage and will recover faster. Ecosystems may even keep pace with a growing risk (e.g., sea-level rise[1]).

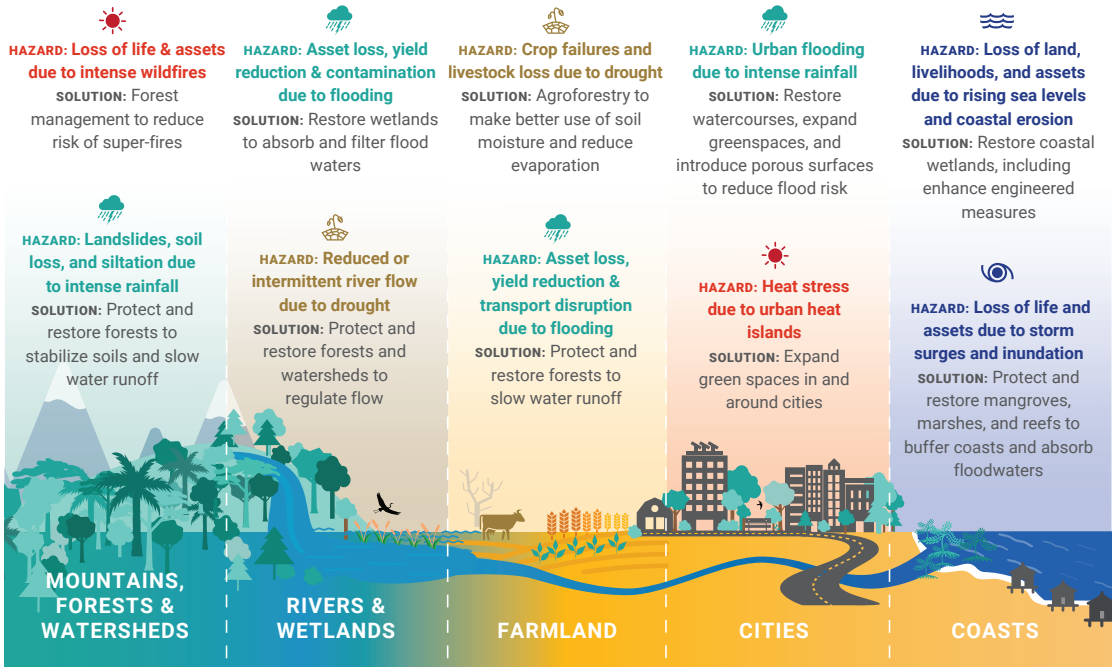

Figure 1: Examples (non-exhaustive) of nature-based solutions to address disaster risks in various landscapes (Source: Global Commission on Adaptation – 2019: Adapt Now report). Please note that description of hazard in this figure includes both impact (e.g. loss of life& assets) and hazard (e.g. intense wildfires).

- Protection and restoration of ecosystems can be **more cost-effective** than man-made engineered options for DRR.
- NbS for DRR provide **co-benefits for society**, supporting local livelihoods and biodiversity. The co-benefits are produced continuously, while protection may only be needed at rare moments.
- NbS for DRR contribute to conservation and protection of nature; while with proper planning and design, activities focusing on **biodiversity conservation can also contribute to disaster risk reduction**.
- Nature is a **no-regret solution** to reducing risks from disasters, complementing conventional engineering measures such as sea walls and storm channels.
- NbS generate **local employment and economic opportunities**, reducing the need to import technical expertise and labour (see this *coastal protection case* from Indonesia).

Priorities for action

Incorporate nature-based solutions for disaster risk reduction where relevant, at all levels.

- **Incorporate nature throughout the disaster risk management cycle**, i.e. prevention, mitigation, preparedness, response and recovery and continuous risk assessments. Participatory vulnerability assessments provide understanding on how communities depend on ecosystem services and what protection ecosystems provide. Preparedness plans should include protection and management of these ecosystems to avoid damage during the response and recovery phase. Also aim for greener reconstruction and recovery in post disaster activity (i.e. Build back greener and better).
- In all **spatial planning instruments** (e.g. land use plans, regional development plans, river basin and coastal zone management plans), identify risk-prone areas; avoid land use change in ecosystems which are essential in reducing risks; identify areas suitable for the restoration of protective ecosystems. The periodical revision process of such plans provides a good opportunity for mainstreaming NbS for DRR.
- **Align** national policy, planning and legal frameworks **with international policy frameworks**, notably *UNFCCC Paris Agreement*, *Global Biodiversity Framework* and the *Sendai Framework for Disaster Risk Reduction 2015-2030*.
- Integrate DRR measures in **National Biodiversity Strategies and Action Plans** targeting both risk reduction and biodiversity conservation. Enhance the use of protected areas as a way to reduce disaster risks and minimise the effects of hazards.

[1] In the past, mangroves have adjusted to sea-level rise through tree root growth and the accumulation of sediments from rivers and oceans, processes which allow them to maintain their forest floor elevation relative to sea level. However, it should be noted that in light of the projected acceleration of the rate of sea-level rise, as well as modifications made to coastal environments that impede their ability to respond, it is unclear how mangrove forests will respond to future conditions.

- Introduce NbS and disaster risk management in relevant **sector plans** (e.g. transport, energy, forestry, urban, agriculture, etc.)
- **Use strategic environmental assessment** (SEA) to apply climate risk and vulnerability assessment to policies plans and programmes and assess alternative options for DRR, including the role of ecosystems and nature-based solutions.
- **Seek complementarities between green and grey infrastructure** to ensure effective risk reduction. Hybrid solutions may provide a greater level of confidence than natural approaches alone.
- Increase investment in **monitoring and evaluation** of the performance of NbS for DRR, including the quantification and qualitative assessment of potential co-benefits of NbS, to make the business case.
- Scale up investment in existing forms of **private sector finance mechanisms** for NbS. Invest in exploring innovative new finance mechanisms (such as insurance mechanisms; see case below) for NbS for climate adaptation and disaster risk reduction, establishing their scale-up potential and feasibility in different geographies.
- As a precautionary measure, ensure strong **environmental and social safeguards**, including Environmental and Social Impact Assessment, are in place when supporting DRR activities. This to inform planners, decision makers and the general public on potential (unexpected) impacts of proposed measures.
- **Promote the involvement of communities** in the protection/conservation of important protective ecosystems, through mechanisms such as Payment for Ecosystem Services (PES) resulting in a triple win for nature conservation, risk reduction, local income generation.

The Case of the Coastal Zone Management Trust in Quintana Roo, Mexico

Case highlights

A series of hurricanes hitting a stretch of the Mesoamerican coral reef and beaches triggered the world's first coral reef insurance policy, based on its protective service. It will pay out to repair and restore the reef in the event of a major storm.

The combination of an insurance policy for the coral reef and a well-organised post-storm response capacity proved a highly successful approach to help the reef recover, thus protecting both nature, people and an important tourism business. This insurance mechanism for the restoration of protective ecosystems could also be envisaged for other types of unpredictable disasters such as those caused by wildfires or upland flash floods.

What happened

In 2005, Mexico's Caribbean coast was struck by two hurricanes, Emily and Wilma, causing US$8 billion in damages and closing hotels and other businesses in Cancún. But some hotels and beaches in Puerto Morelos were protected by a stretch of coral reefs and suffered less damage. A healthy coral reef can reduce up to 97 percent of a wave's energy before it hits the shore. However, coral reefs are damaged by severe storms[2], greatly reducing the protection they offer for coastal communities. Local authorities often lack the financial resources to repair the damages caused by such fierce weather events. To confront this threat various stakeholders from government, business and NGOs piloted an innovative conservation strategy to build post storm response capacity by:

[2] Apart from damage by natural phenomena such as hurricanes, or El Niño Southern Oscillation (ENSO), and diseases, it should be noted that reefs are already under severe pressure by impacts of human activities such as destructive fishing, coastal development/urbanization, pollution, sedimentation, tourism, declining water quality, and, of course, the indirect and direct effects of climate change.

- Training and equipping Reef Brigades, community members (tour guides, diving instructors, park rangers, fishermen, researchers) to repair the reef after a storm. Fast repair of corals is critical for regrowth.
- Setting up a Coastal Zone Management Trust, a collaboration of tourism industry, The Nature Conservancy (an international NGO), civil society organisations, the local science community, and the international insurance industry.

The trust purchased the first ever coral reef and beach insurance policy to ensure funding for repairs after extreme storms hit. Hotel and tourism operators with beach front properties contribute for a trust fund which purchases an annual insurance. The insurance is a parametric policy which is triggered not by financial losses, but when a specified set of conditions are met.

The parametric insurance has three elements: (i) **wind speed**, the parameter that triggers the insurance if a threshold is passed (100 knots in this case); (ii) a **geographic area (polygon)** where the wind speed must pass the threshold to trigger a payout, and (iii) the **amount of payout** to the policy holder. The payout increases according to the maximum sustained wind speed since stronger winds result in greater damage and expenses.

Lessons from practice

On October 7, 2020, Hurricane Delta entered the polygon and registered windspeeds of over 100 knots. The insurance policy was triggered and paid close to $800,000 to the Trust Fund, allowing swift damage assessment, debris removal and initial repairs to be carried out by the Reef Brigades, followed by a longer period of restoration to restore the reef's value as a coastal barrier. The funds have substantially expanded the post-storm response and repair efforts on the reef. The pay-out is the first time ever that funding from an insurance policy is available to help reef recover.

Apart from coastal protection, the obvious co-benefits in this case are the services provided to the tourism and fisheries industries, and the biodiversity conservation on which these industries are based. Transferring the cost of restoration to the market via an insurance policy reduces the burden for local authorities. The insurance policy is a cost-effective financial investment to guarantee the availability of funding to implement a post-storm response.

Further information and support

- QuickTips: *Integrating Disaster Risk Reduction, Environmental and Climate Change Action at Sector Level*
- Case Quintana Roo: *A Post-Storm Response and Reef Insurance Primer*
- *PEDRR* (Partnership for Environment and Disaster Risk Reduction) is a clearinghouse for knowledge, training, advocacy and practice on Ecosystem-based DRR. (*EcoDRR project* supported by INTPA)
- European Union (2022): *Guidance on the operationalization of the minimum environmental requirements and recommendations for EU-funded humanitarian aid operations*
- WWF (2022). *Working With Nature To Protect People. How Nature-Based Solutions Reduce Climate Change And Weather-Related Disasters*
- IFRC (2021). *Intro to nature-based solutions.*
- UNDRR (2021). *Nature-based Solutions for Disaster Risk Reduction*
- World Bank (2021). *A Catalogue of Nature-based Solutions for Urban Resilience*
- World Bank (2019). *Nature-based Solutions for Disaster Risk Management: Booklet*
- IUCN (2016) *Helping nature help us. Transforming disaster risk reduction through ecosystem management.*
- UN University Press (2013) *The role of ecosystems in disaster risk reduction*

Other References:

- *World Bank Nature-based Solutions Program*
- *IFRC: How can we work with nature to protect people?*
- *World Bank (2022). Nature-based solutions for resilient cities and restoring local biodiversity*
- *World Bank (2022). Climate Explainer Series - What You Need to Know About Nature-Based Solutions to Climate Change*

All documents are available on capacity4dev (public group: *Environment, Climate Change and Green Economy*)

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