

# POLICY BRIEF NO.11



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## A way forward to monitor disaster-related losses of ecosystems and ecosystem services in the Sendai Framework Monitor

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*Scientific evidence for this policy brief is documented by Walz and others (2021).*

### CONTEXT

Climate-related disasters have accounted for 91 per cent of the recorded disaster events over the past 20 years (UNDRR, 2018). Thereof, droughts, floods and storms alone have affected 3.8 billion people, or 94 per cent of all people affected by disasters (UNODA, 2020). According to the latest Global Assessment Report (UNDRR, 2019), climate change is considered to be a major driver of disaster-related losses as it amplifies disaster risk and hampers development.

Disasters affect all three dimensions of sustainable development, namely society, the economy and the environment. Since the recording of disaster-related losses, impacts of disasters on society and the economy have been captured and monitored by leading global disaster loss databases, such as DesInventar Sendai (UNDRR, n.d.) and the international disaster database EM-DAT (CRED, 2009), and reinsurance databases, such as Sigma Explorer (Swiss

Re, n.d.) and NatCatService (Munich RE, n.d.). With regard to the environmental dimension, only the loss of provisioning ecosystem services, such as loss of crops or livestock, has been reported on despite the fact that ecosystems have been well recognized by researchers and policymakers globally for their contribution to development, disaster risk reduction (DRR) and climate change adaptation (CCA) (Campbell and others, 2009; Estrella and Saalismaa, 2013; Renaud and others, 2016).

The Sendai Framework for Disaster Risk Reduction (SFDRR) was adopted in 2015 by 187 countries with the aim to foster DRR efforts globally by substantially reducing disaster-related losses (UNISDR, 2015). The implementation of the targets of the SFDRR is facilitated through a web-based monitoring framework of 38 indicators, the Sendai Framework Monitor (SFM) (UNISDR, 2017).

# KEY MESSAGES AND RECOMMENDATIONS for a way forward to monitor disaster-related losses of ecosystems and ecosystem services in the Sendai Framework Monitor

The SFM facilitates the monitoring of disaster-related losses in order to measure progress on global targets for DRR. However, the SFM has a limited number of options to capture disaster-related losses of ecosystems and their services. Yet, the potential of the SFM to integrate disaster-related losses of ecosystems and ecosystem services has not been leveraged, most likely due to a lack of understanding and consideration of ecosystems and their services in the context of disaster-related impacts and what this means in terms of advancing DRR efforts.

To achieve progress in DRR as envisioned by the SFDRR, we argue that currently neglected ecosystems and their services need the same attention as social and economic disaster-related losses are given in terms of monitoring. As a result of our research, we provide the following specific recommendations as a way forward for integrating ecosystems and their services in the existing framework of the SFM (see Box 1 for information about specific indicators):

**1** Ecosystems and ecosystem services make an important contribution to disaster risk reduction and are often impacted by climate-related hazards, such as droughts, floods and storms. Disaster-related losses of ecosystems and ecosystem services need to be reported in the SFM.

**2** The reporting of livelihoods lost due to disasters should go beyond crop and livestock and consider other relevant ecosystems and ecosystem services that provide a basis for livelihoods (subindicators of Target B, indicator B-5).

**3** Ecosystems which are recognized for their DRR benefits should be considered as critical infrastructure. The reporting of an area of damaged or destroyed green (and blue) infrastructure would be more meaningful than the sole number of items affected (Target D, indicator D-4).

**4** Green infrastructure needs a more clear and applicable definition in the SFM and to be complemented with blue infrastructure.

**5** The majority of ecosystem services can be considered as basic services that are needed for society to function, such as fresh water supply, waste water treatment and services that are relevant for human health and well-being. Against this background, ecosystem services should be integrated into indicator D-8 (disrupted services) and reported in reference to ecosystem losses under green (and blue) infrastructure as monitored by indicator D-4 (Target D, indicator D-8).

Given the direct link between ecosystems and DRR, the comprehensive monitoring of disaster-related losses of ecosystems and their services is essential for planning sustainable DRR strategies and measures.

## Box 1: Indicators of the SFM that provide the opportunity to improve monitoring of and reporting on disaster-related losses of ecosystems and ecosystem services (UNDRR, 2015; UNISDR, 2017).

Global target B: Substantially reduce the number of affected people globally by 2030, aiming to lower the average global figure per 100,000 between 2020-2030 compared with 2005-2015.

Indicator B-5: Number of people whose livelihoods were disrupted or destroyed attributed to disasters (based on hectares of crops affected / number of livestock lost in relation to average number of workers)

Global target D: Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030

Indicator D-4: Number of other destroyed or damaged critical infrastructure units and facilities attributed to disasters.

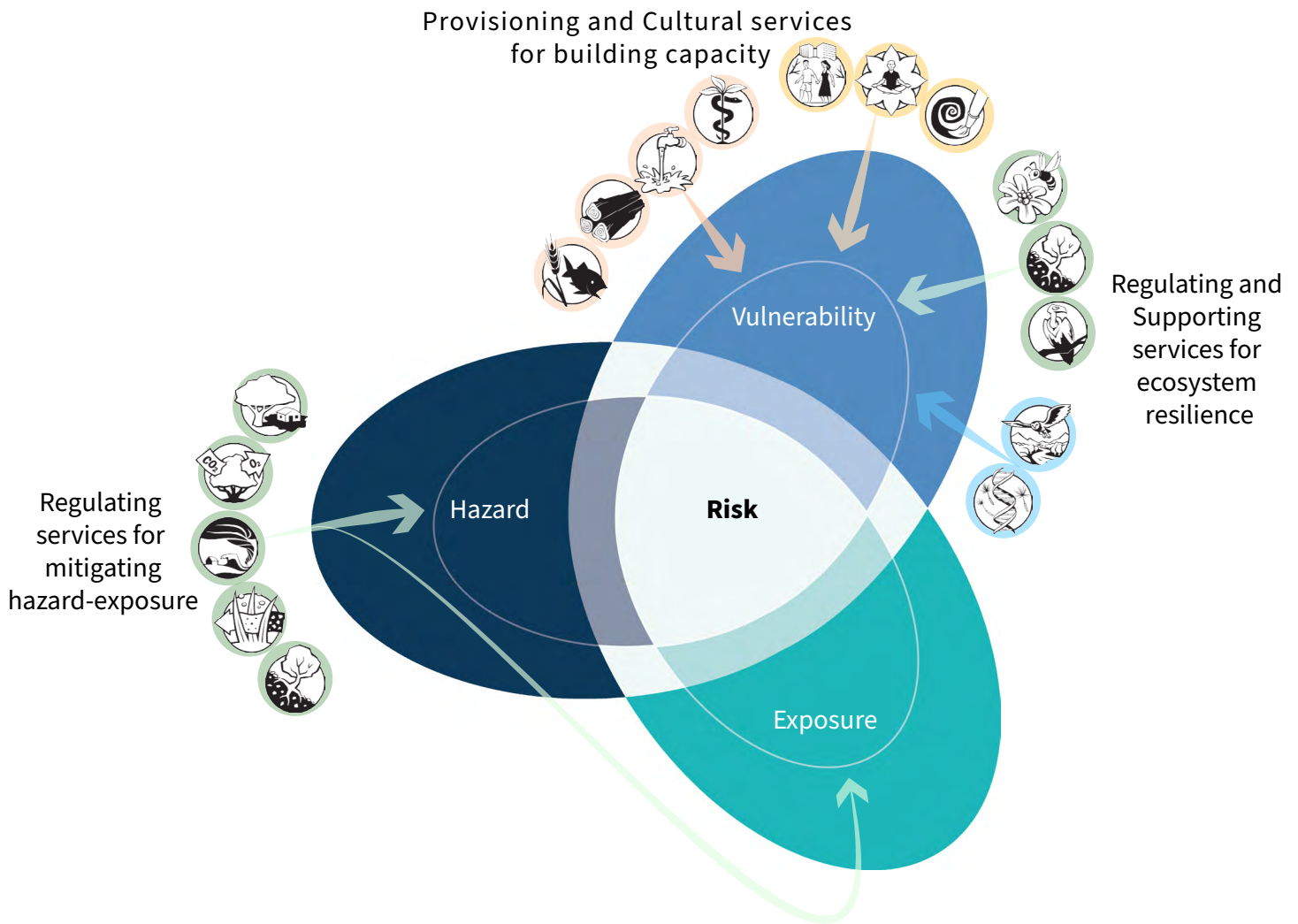
Indicator D-8: Number of disruptions to other basic services attributed to disasters.

# RATIONALE FOR INTEGRATING ecosystems and ecosystem services in monitoring disaster-related losses

Ecosystems provide provisioning, regulating, habitat-supporting and cultural services for human well-being (MEA, 2005; TEEB, 2012). Ecosystem services, particularly regulating and supporting services, are relevant to help people adapt to the adverse effects of climate change and reduce disaster risk. For example, coral reefs can dissipate wave energy (Ferrario and others, 2014), mangroves can protect shorelines (Marois and Mitsch, 2015), wetlands can regulate flood events (Kadykalo and Findlay, 2016) and forested slopes can protect people from avalanches (Dorren and others, 2004). There is comprehensive scientific evidence on the potential of ecosystems and their services to attenuate hazards, reduce exposure and vulnerability, and with this reduce overall disaster risk (Ruangpan and others, 2020; Sudmeier-Rieux and others, 2021). However, ecosystems themselves are also impacted by natural hazards, leading to losses of ecosystems and their services. For example, due to Hurricane Sandy, major losses to a large area of a coastal wetland in New Jersey, United States of America, have been documented (Hauser, Meixler and Laba, 2015). A comparison of ecosystem assessments before and after the disaster event has revealed that erosion, deposition of sediments and marsh salinization have caused severe degradation of 40 per cent of the wetland area and long-term degradation of 50 per cent of the area. This event caused major losses of flood regulating services, water filtration and water supply amounting to losses of ecosystem services up to \$4.4 billion of the total \$9.4 billion provided by this wetland area.

Scientific evidence, on which this policy brief is based, in fact shows that a broad range of ecosystem services can be directly related to manifested disaster-related losses of ecosystems with consequences on the different dimensions of disaster risk (Walz and others, 2021). The figure below provides a synthesis of all ecosystem services in relation to the classification of TEEB (2012) that contribute to reduce risk of climate-related disasters. It can clearly be recognized that there is one set of regulating services that mainly contributes to the mitigation of hazards, which in turn results in the reduction of exposure. Additionally, there are numerous ecosystem services that contribute to the reduction of vulnerability. The provisioning and cultural services mainly reduce vulnerability of people through increasing their coping capacities, health and well-being. The regulating and habitat-supporting services mainly reduce vulnerability through keeping ecosystems intact and healthy, thereby enabling ecosystems to provide their services.

This research on disaster-related losses of ecosystems and their services demonstrates on the one hand that ecosystems and their services play a major role for DRR in all its dimensions while justifying the need to monitor disaster-related losses of ecosystems and their services for a comprehensive understanding of progress in DRR efforts.



**Provisioning services**



Food



Raw materials



Fresh water



Medicinal resources

**Regulating services**



Local climate and air quality



Carbon sequestration and storage



Moderation of extreme events



Erosion prevention/  
Maintenance of soil fertility



Waste-water treatment



Pollination



Biological control

**Habitat-Supporting services**



Habitat for species



Maintenance of genetic diversity

**Cultural services**



Recreation and mental and physical health



Aesthetic appreciation and inspiration for culture, art and design



Spiritual experience and sense of place

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