Working Paper

Increasing the application of ecosystem-based approaches to disaster risk reduction

G20 – Presidency of India, 2023

With contributions from

UNDRR, UNEP, FAO, UNOPS

Contents

Acronyms and abbreviations

CBD	Convention on Biological Diversity
CCA	Climate change adaptation
DRR	Disaster risk reduction
EbA	Ecosystem-based adaptation
Eco-DRR	Ecosystem-based disaster risk reduction
ESG	Environmental, social and governance
FAO	Food and Agriculture Organization of the United Nations
GFANZ	Glasgow Financial Alliance for Net Zero
IPCC	Intergovernmental Panel on Climate Change
NAP	National Adaptation Plan
NbS	Nature-based solutions
NBSAP	National Biodiversity and Action Plan
NDC	Nationally Determined Contribution
UNCCD	United Nations Convention to Combat Desertification
UNDRR	United Nations Office for Disaster Risk Reduction
UNEA	United Nations Environment Assembly
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNOPS	United Nations Office for Project Services

Executive summary of recommendations

Ecosystem-based disaster risk reduction (Eco-DRR) has been practiced in numerous countries for the past decade. More recently the focus of the international discourse has shifted to questions around governance and how to scale-up such approaches. This is particularly the case in intergovernmental processes, where the role of nature-based solutions (NbS), including ecosystem-based adaptation (EbA) and Eco-DRR, has increasingly gained traction as one effective option to reduce disaster risks, build resilience to climate change and simultaneously provide human well-being, ecosystem services and biodiversity benefits.

The G20 Working Group on Disaster Risk Reduction has an opportunity to accelerate and promote the increased application and scale-up of NbS for disaster risk reduction and in particular Eco-DRR.

The following priorities are proposed and elaborated further in section 4 below:

1. ***Integrate Eco-DRR across sectors through comprehensive risk governance and increased advocacy and leadership engagement***
    a. Promote the integration of NbS into sectoral and disaster risk reduction planning through comprehensive risk governance, joint policy making and inter-ministerial/agency cooperation and updating of National Biodiversity Strategies and Action Plans (NBSAPs) to encourage alignment with national climate goals (NDCs and NAPs) and national/local disaster risk reduction strategies.
    b. Outreach to leaders and parliamentarians to highlight the role of Eco-DRR in building resilience, identifying entry points for updating legislation, policy and institutional governance frameworks and approaches. Ensure that such frameworks are just and equitable and promote inclusion, participation and partnership with local communities and other key actors and stakeholders to leave no one behind.
    c. Develop new and disseminate existing trainings and tools, such as leadership courses on DRR and Climate Change Adaptation, for decision- and policy-makers among all sectors and both public and private actors.
    d. Further promote the adoption and upscaling of NbS good practices.

2. ***Enhance private and public investment in NbS, including in high-impact sectors for resilience***
    a. Enhance funding and sustainable investments in nature-based solutions, including through bilateral and multilateral source of finance.
    b. Promote the adoption of laws and regulations for increased risk management and nature-disclosure frameworks for the private sector, building on ongoing efforts to report and act on climate and nature-related risks to support the implementation of Article 2(c) of the Paris Agreement, paragraph 36(c) of the Sendai Framework and targets 15 and 18 of the Kunming-Montreal Global Biodiversity Framework.
    c. Advocate for improved tracking of investments and financing in NbS/Eco-DRR to help identify areas where investments are insufficient.
    d. Contribute to the further development of financial structures for public and private investments in NbS/Eco-DRR, such as blended finance, resilience bonds, green bonds, impact investment, dedicated trust funds etc.

3. ***Consider NbS and hybrid approaches where possible to reduce stresses on infrastructure systems***
    a. Increase the financing and application of natural (green/blue) infrastructure through the development of standards and tracking mechanisms.

b. Promote and implement NbS and hybrid approaches where possible to reduce stresses on infrastructure systems.
c. Promote environmental economic accounting to measure the benefits of natural infrastructure, for instance through SEEA, conducting cost-benefit analyses or the payment for environmental services (also known as payments for ecosystem services or PES).
d. Encourage reporting of damages to and destruction of natural infrastructure and agriculture subsectors as part of Sendai Framework Targets C and D reporting.

4. Accelerate the application of Eco-DRR and NbS in build back better, including in humanitarian and emergency contexts

a. Ensure Eco-DRR/NbS is included in recovery contexts through build back better and greener approaches and the application of environmental standards.
b. Promote the utilisation of post-disaster environmental assessments to identify building back better measures based on ecosystem-based approaches and encourage the integration of these measures in post-recovery, rehabilitation and reconstruction efforts.
c. Call for case studies on successful examples of the application of ecosystem-based approaches for disaster risk reduction in humanitarian and fragile contexts, including with a focus on peacebuilding aspects.

5. Exchange good practices on the application of Eco-DRR approaches for resilience, focussing on high-impact sectors

a. Call for case studies on examples of the application of Eco-DRR in specific settings and contexts with a focus on high-impact sectors and emerging topics, and encourage exchange of good practices. Involve youth and other key actors/stakeholders in dialogue.
b. Gather evidence on non-economic loss and damage for consideration in relevant policy processes, highlighting links and entry points for resilience-building.
c. Consider opportunities for integrating Eco-DRR approaches in specific disaster risk reduction and environmental frameworks and mechanisms such as Blue Economy frameworks.
d. Promote the implementation of Eco-DRR approaches at local/community and landscape levels as well as design at scale.
e. Increase investments in NbS/Eco-DRR good practices including through the mainstreaming of NbS actions into government investment/flagship programmes.

1. Background

Over the last 20 years, the number of disasters has doubled, driven by climate change and increasing environmental degradation. Between 2000 and 2019, at least 1.4 billion people were affected by droughts and 1.6 billion by floods. At the same time the cascading and compounding effects of risk is gaining greater attention as the understanding of interconnected systems that underpin resilient societies, including food, agriculture, water, health, social justice, the economy and financial markets is increasing.

The Intergovernmental Panel on Climate Change (IPCC) finds that the frequency and intensity of extreme events is increasing. Their report on *Climate Change 2022: Impacts, Adaptation and Vulnerability* underlines the role of human activities and related decision-making. Further, the report draws a clear link between human vulnerability and the vulnerability of ecosystems, emphasising the need to transform current unsustainable development patterns to address the increasing exposure and vulnerability of people and ecosystems to climate-related hazards.[1]

The state of the natural environment creates risk by amplifying the exposure and vulnerability of people and assets to disasters.[2] The natural environment therefore plays an important role in minimising the extent and impact of disasters. Diverse and healthy ecosystems are better able to withstand the impacts of natural hazards, including climate related ones. At the same time, healthy ecosystems contribute to the protection of people and their livelihoods. Yet, population growth, land-use change and expansion of urban areas, unsustainable livelihood and market patterns as well as climate change impacts tend to degrade ecosystems and their services. This in turn drives a cycle of environmental degradation and biodiversity loss in increasingly tightly linked socio-ecological systems, with implications at a global scale and impacts at local scale.

The midterm review of the implementation of the Sendai Framework for Disaster Risk Reduction 2015–2030 highlighted shortcomings of limited application of ecosystem-based approaches to disaster risk reduction. The final report of the midterm review recommends that United Nations Member States to rethink risk governance, increase convergence between different policy processes and closely assess the relationship between society, economy and environment to identify areas for economic and financial reform in support of a long-term vision to building resilience.[3]

Nature-based solutions (NbS), including ecosystem-based approaches for disaster risk reduction and climate change adaptation, provide one key entry point to address current challenges of climate change and ecosystem and biodiversity loss. The facilitative role NbS has been recognised across most of the major intergovernmental processes and conventions, including the United Nations Framework Convention on Climate Change (UNFCCC), the Convention on Biological Diversity (CBD), the United Nations Convention to Combat Desertification (UNCCD), the Ramsar Convention on Wetlands as well as during High-level Political Forums on Sustainable Development, the United Nations 2023 Water Conference and in the context of the G7 and the G20, as well as in the political

[1] Hans-O. Pörtner and others, "Summary for policymakers", in Climate Change 2022: Impacts, Adaptation and Vulnerability – Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, Hans-O. Pörtner and others, eds. (Cambridge, United Kingdom of Great Britain and Northern Ireland, Cambridge University Press, 2022).

[2] See UNGA resolution 71/276; A/71/644

[3] UNGA (2023), Main findings and recommendations of the midterm review of the implementation of the Sendai Framework for Disaster Risk Reduction 2015–2030, A/77/640, 31 January 2023

declaration of the United Nations General Assembly high-level meeting on the midterm review for the Sendai Framework.

*G20 Members have committed in the **Bali Leaders' Declaration** to: "step up efforts to halt and reverse biodiversity loss, including through Nature-based Solutions and Ecosystem-based Approaches", including in addressing disaster risks and restoring ecosystems.*

*The **political declaration of the high-level meeting on the midterm review for the Sendai Framework for Disaster Risk Reduction 2015-2030** (A/RES/77/289) reads: "26. We call upon States to strengthen comprehensive disaster risk governance, taking into account their national circumstances, needs and priorities, including by: (…) (g) Promoting nature-based solutions, ecosystem-based approaches, among other approaches, for disaster risk reduction at all levels and across all phases of disaster risk reduction and management to restore, maintain and enhance ecosystem functions and services for protection from natural hazards, and to contribute towards increasing the resilience of biodiversity, supporting sustainable livelihoods and building community resilience"*

The following sections will provide an overview of the relevance of nature-based solutions for disaster risk management, highlight current trends, challenges and opportunities, and provide recommendations for consideration by the G20 working group on disaster risk reduction.

2. Disaster risk management and ecosystem-based approaches

The term nature-based solutions (NbS) was first used in the late 2000s in the context of climate change mitigation and adaptation. NbS operationalise the ecosystem approach that has its legal basis in the Convention on Biological Diversity (CBD) under one umbrella concept. Ecosystem-based disaster risk reduction (Eco-DRR) and Ecosystem-based Adaptation (EbA) emerged as terms at around the same time, in the context of international framework agreements such as the Sendai Framework predecessor, the Hyogo Framework for Action implementation, and the UNFCCC negotiations.

Eco-DRR and EbA are considered the two most relevant approaches under the NbS umbrella that address various hazards and thus contribute to disaster risk reduction. They are considered an effective combination of measures to addressing climate and disaster risks and facilitate comprehensive and integrated risk governance by enabling cooperation across sectors for multiple benefits. Today, there is political consensus that NbS and its operational parts of EbA and Eco-DRR are critical for the achievement of many of the goals of Agenda 2030 for Sustainable Development and other international policy commitments, such as the Sendai Framework, the CBD, the Ramsar Convention on Wetlands, the UNCCD and the UNFCCC, among others.[4]

In 2022, the United Nations Environment Assembly (UNEA) adopted the first universally agreed definition of nature-based solutions, through its resolution on 'Nature-based solutions for supporting sustainable development'. The definition stipulated in the resolution underscores the benefits of deploying NbS for resilience building and recognises the important role they play in

[4] United Nations Office for Disaster Risk Reduction, United Nations Environment Programme and Partnership for Environment and Disaster Risk Reduction, Nature-Based Solutions for Disaster Risk Reduction: Words into Action, 2021

achieving the Sustainable Development Goals (SDGs) and effectively and efficiently addressing major societal challenges, including disaster risks, biodiversity loss, land degradation, food security and climate change among others. [5]

UNEA agreed definition of nature-based solutions *(UNEP/EA.5/Res.5)*

"(…) nature-based solutions are actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services, resilience and biodiversity benefits (…)

nature-based solutions are among the actions that play an essential role in the overall global effort to achieve the Sustainable Development Goals, including by effectively and efficiently addressing major social, economic and environmental challenges, such as biodiversity loss, climate change, land degradation, desertification, food security, disaster risks, urban development, water availability, poverty eradication, inequality and unemployment, as well as social development, sustainable economic development, human health and a broad range of ecosystem services (….)"

Figure 1 illustrates the interconnections between the two approaches and the hazards they address. While EbA focusses specifically on climate-related risks to people and nature, Eco-DRR covers additional non-climate hazards, such as earthquakes, tsunamis and volcanic activities.

[5] UNEA Resolution Nature-based solutions for supporting sustainable development, UNEP/EA.5/Res.5, 7 March 2022

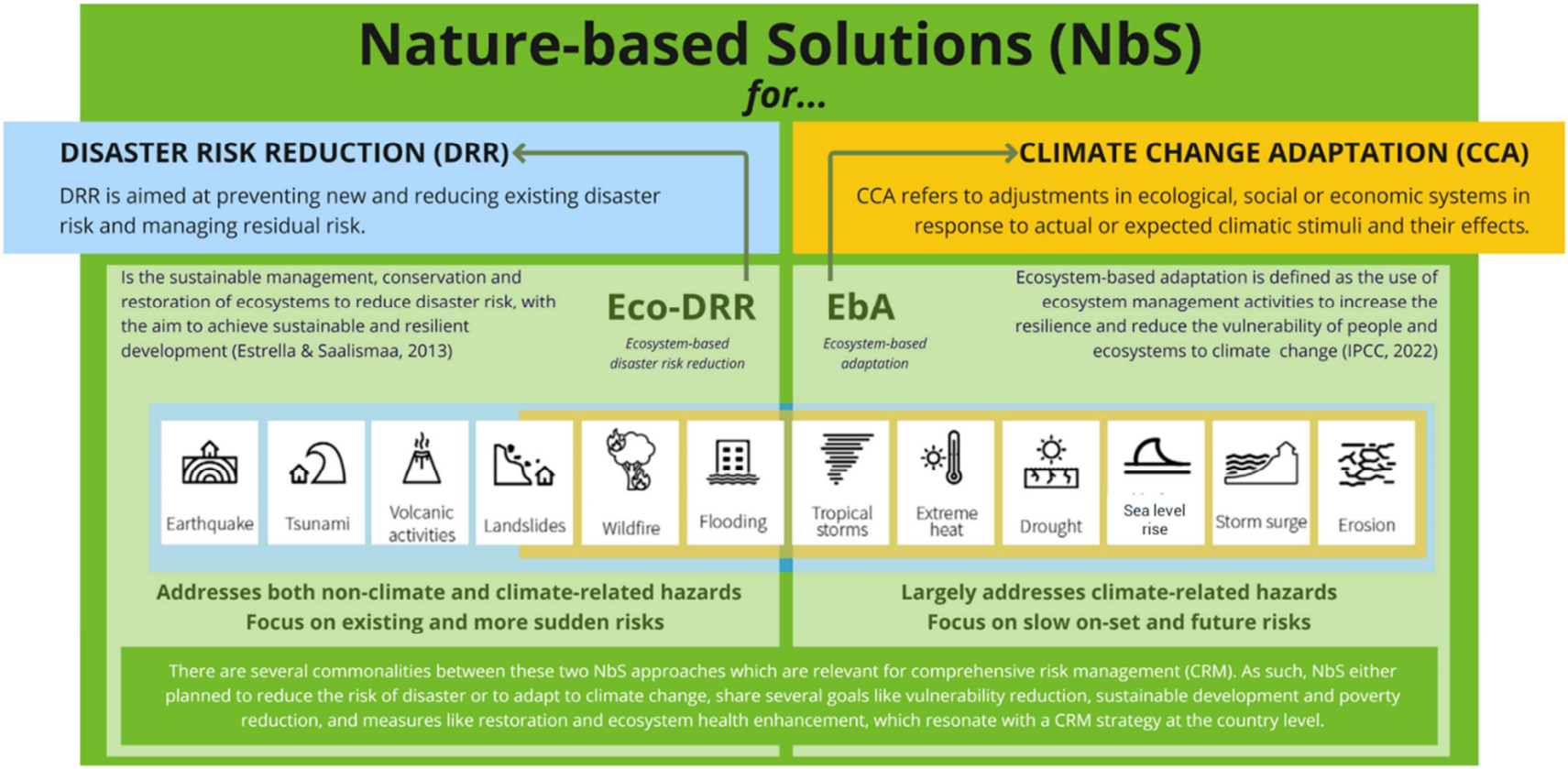

Figure 1: The role of Eco-DRR and EbA in addressing different non-climate and climate-related hazards, and their relevance in comprehensive risk management (Source: UNDRR/UNU-EHS)

2.1. The Sendai Framework on nature and disaster risk reduction

The Sendai Framework outlines the role of ecosystems in disaster risk assessments (Priority 1), strengthening risk governance (Priority 2), and investments in disaster resilience (Priority 3). While not mentioned in enhancing disaster preparedness for effective response, and to "build back better" in recovery, rehabilitation and reconstruction (Priority 4), there is increasing evidence that applying Eco-DRR/EbA can more effectively reduce future disaster risk.[6] Thus, understanding how NbS contribute to Priority 4 remains an area for further attention.

Highlighting poor land management, unsustainable use of natural resources and degraded ecosystems as underlying drivers of disaster risk, the Sendai Framework urges countries to strengthen the sustainable use and management of ecosystems for building resilience to disasters. The Sendai Framework also calls for greater collaboration between institutions and stakeholders from other sectors and for ecosystem-based approaches to be implemented in transboundary cooperation for shared resources, such as within river basins and shared coastlines.

The importance of linking sectoral perspectives more closely through systemic and comprehensive and integrated risk governance, the need for investments in resilience building to achieve multiple benefits, and, in particular, the urgency to consider the limits of planetary boundaries in risk governance, have been highlighted in the midterm review of the Sendai Framework as key areas that need to be addressed over the next seven years of Sendai Framework implementation and beyond.[7]

The following outlines specific opportunities and challenges for Eco-DRR in relation to the priorities of the Sendai Framework.

Priority 1: Understanding disaster risk

One of the identified challenges for disaster risk reduction is the availability of risk data and information at country level. Such data and information are required to understand the drivers that create risks and increase the vulnerability of people and ecosystems on which they depend. This includes the collection of risk information through conducting disaster and climate risk assessments as well as the establishment of risk and vulnerability profiles and maps.

Data collected during the midterm review of the Sendai Framework shows that 110 countries use DesInventar[8] to capture data on losses and damages of disaster events, with a focus primarily on natural hazards. Yet, countries struggle to produce relevant risk information that would help increase risk understanding and address interlinked systems. Moreover, while data on the type of hazard, impact on infrastructure and other built assets is frequently reported, governments have not yet reported the impacts on ecosystems or experienced ecosystem losses due to disasters, although Sendai Targets C and D allow for such reporting.

The deliberations of the Intergovernmental Panel on Climate Change (IPCC) and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)

[6] United Nations Office for Disaster Risk Reduction, United Nations Environment Programme and Partnership for Environment and Disaster Risk Reduction, Nature-Based Solutions for Disaster Risk Reduction: Words into Action, 2021

[7] UNGA, 2023. Main findings and recommendations of the midterm review of the implementation of the Sendai Framework for Disaster Risk Reduction 2015–2030, A/77/640, 31 January 2023; see also UNDRR (2022), Thematic Study: Planetary Boundaries. Geneva, Switzerland: https://sendaiframework-mtr.undrr.org/publication/thematic-study-planetary-boundaries

[8] https://www.desinventar.net/index.html

demonstrate that while the links between environmental degradation, biodiversity loss, climate change and disaster risk are broadly acknowledged, the data and knowledge to fully understand how they interact and should be addressed in practice remains weak.[9]

The Early Warnings for All initiative is a concreate step to disseminate risk information. Early warning systems and risk information should focus not only on hydro-meteorological and climatological hazards, but also produce information on short- and long-term stressors, as well as for different sectors. For instance, agriculture as a high impact sector, would benefit from timely alerts and agroclimatic risk information to reduce the adverse impacts of disasters on the sector and those whose livelihoods heavily depend upon it, such as smallholder farmers who are among the most at risk. Similarly, water-related disasters, which have caused nearly 95 percent of reported infrastructure losses and damages between 2010 and 2019[10], could be better addressed through increased risk knowledge and understanding related to hydrological cycles and ecosystem, climate and human interactions.

Early warning systems can support Eco-DRR efforts by providing risk data and information about impending hazards that may affect ecosystems and allowing for timely interventions to protect them. Eco-DRR can support the development and implementation of early warning systems by helping to identify and monitor indicators of ecosystem health that can be used as early warning signals for natural hazards.

Similarly, accounting for impacts on ecosystems in post disaster loss and damage assessments would foster a better understanding of how the natural environment is affected. Doing so would offer insights into how ecosystems could provide strategic entry points for building back better. In this manner it would also serve to assess the role of ecosystem-based approaches in recovery and rehabilitation and their contribution to long-term and nature-positive societal resilience.

Priority 2: Strengthening disaster risk governance to manage disaster risk

Mainstreaming NbS within and across sectors means addressing underlying systemic and cascading risks and vulnerabilities, through more comprehensive risk governance and management approaches. As highlighted in Figure 1 above, integrated disaster risk and climate change policy making and planning that also takes into account conservation and biodiversity goals and objectives (especially those included in the Kunming-Montreal Global Biodiversity Framework), could address a number of societal challenges. The concept of NbS thereby serves as a tool to facilitate such connections.

The findings of the midterm review of the Sendai Framework show that more needs to be done to support local level implementation, with least developed countries, small island developing States and landlocked developing countries struggling the most to engage local governments and communities in disaster risk reduction planning. For NbS measures to be effective in addressing disaster risks, while protecting biodiversity and supporting human wellbeing, they need to be designed and implemented at scale (both spatial and temporal), consider synergies and trade-offs across relevant sectors, policy and planning processes, and guarantee the implementation of

[9] See for instance Pörtner, H.O., et al., 2021. Scientific outcome of the IPBES-IPCC co-sponsored workshop on biodiversity and climate change; IPBES secretariat, Bonn, Germany

[10] Sendai Monitor database, available at https://sendaimonitor.undrr.org/; see also UN, 2023. Interactive dialogue 3: Water for climate, resilience and environment – source to sea, biodiversity, climate, resilience and disaster risk reduction: Concept paper prepared by the Secretariat. A/CONF.240/2023 /6

environmental and social safeguard. This includes ensuring inclusive and participatory governance approaches that involve actors at the appropriate level, promote coordination and local participation, especially of those most at risk. Considering NbS in DRR planning, thus, promotes a more comprehensive risk governance approach due to their definitional commitment to achieving multiple goals and benefits for the environment, society and economy.

> *"Greater integration of risk-informed decision-making and investment across sectors and scales is required if the Sendai Framework is to be realized by 2030."* (UNGA (2023) A/77/640)

It may be practical to identify high-impact sectors. Those sectors that experience high disaster and climate risks while also offering opportunities for risk reduction/adaptation and resilience building. In this regard strengthening the risk governance systems to ensure the integration of NbS and especially Eco-DRR is highly important. This can be achieved by mainstreaming Eco-DRR into relevant disaster risk reduction and sectoral development plans and by ensuring that well-functioning institutional structures with coordination mechanisms within and across sectors are in place at various levels. National level disaster risk reduction platforms, where they exist, could play a key role to help coordinate Eco-DRR interventions.

High-impact sectors include water, agriculture and food, land-use, infrastructure (including hybrid models), health, and urban development (see section 3 below for a more detailed account). A focus on exposure and vulnerability reduction remains key; this includes addressing biodiversity loss and ecosystem degradation, as a key driver of disaster risk, which impacts on livelihoods and human well-being. In addition, engaging and empowering the most at risk communities, including women, Indigenous Peoples and people with disabilities, and leaving no one behind should remain essential principles in risk governance.

Priority 3: Investing in disaster risk reduction for resilience

The findings of the midterm review of the Sendai Framework underscore that there is still insufficient investment in disaster risk reduction. Investing in Eco-DRR can provide benefits in multiple sectors and domains, which provides opportunities to pool resources, avoid duplication and promote pathways towards a greater focus on prevention. However, such solutions are often not connected to national budgets allocated towards disaster risk reduction. Tagging and tracking of risk-related financing in Eco-DRR could provide a better picture of the gaps and challenges related to financing prevention that supports multiple national goals. Most notably these goals include reducing disaster risks, mitigating and adapting to climate change, halting biodiversity loss and environmental degradation, and protecting local livelihoods. Thus, tagging and tracking financing for Eco-DRR would help determine the most cost-effective disaster risk reduction options, encourage coordination and cooperation between authorities with respective mandates and support allocation of resources to high-impact sectors most in need. This would enable long-term sustainability and resilience building that applies a deliberate approach to accounting for the interactions of interlinked systems.

Besides financial constraints, many countries, especially least developed countries and small island developing States, report a lack of technical and human capacity to implement Eco-DRR approaches. To scale up Eco-DRR and to ensure adequate financing to provide the full range of benefits derived from Eco-DRR, capacity building and greater access to public and private sources of financing are needed.

According to UNEP's State of Finance for Nature report, there is a USD11 trillion gap in NbS finance by 2050 – by targeting the USD130 trillion being committed towards Net Zero by the private sector, and channelling these climate commitments towards greater investments in NbS, it would be possible to effectively finance the USD11 trillion NbS finance gap.[11]

Nevertheless, some progress can be noted regarding investments in NbS in G20 countries. For instance, the Government of Australia reported on their Climate Resilient Built Environment initiative, which considers NbS for flood mitigation, delivering both climate and biodiversity co-benefits, while reducing the impacts of climate-related disasters. The United States have integrated NbS in their critical infrastructure toolkit.[12] Relatedly, the UNDRR Principles for Resilient Infrastructure[13] and corresponding handbook, promote the implementation of NbS for disaster risk reduction, including Eco-DRR and EbA.

Box 1: Kunming-Montreal Global Biodiversity Framework

TARGET 8: Minimize the impact of climate change and ocean acidification on biodiversity and increase its **resilience** through mitigation, adaptation, and **disaster risk reduction actions**, including through **nature-based solution and/or ecosystem-based approaches**, while minimizing negative and fostering positive impacts of climate action on biodiversity.

TARGET 11: Restore, maintain and enhance nature's contributions to people, including ecosystem functions and services, such as regulation of air, water, and climate, soil health, pollination and **reduction of disease risk**, as well as **protection from natural hazards and disasters**, through **nature-based solutions and/or ecosystem-based approaches** for the benefit of all people and nature.

TARGET 15: Take legal, administrative or policy measures to encourage and enable business, and in particular to ensure that large and transnational companies and financial institutions:

a) Regularly monitor, assess, and transparently **disclose their risks**, dependencies and impacts on biodiversity, including with requirements for all large as well as transnational companies and financial institutions along their operations, supply and value chains and portfolios;
b) Provide information needed to consumers to promote sustainable consumption patterns;
c) Report on compliance with access and benefit-sharing regulations and measures, as applicable;

in order to progressively reduce negative impacts on biodiversity, increase positive impacts, **reduce biodiversity-related risks to business and financial institutions**, and promote actions to ensure sustainable patterns of production.

TARGET 18: Identify by 2025, and eliminate, **phase out or reform incentives, including subsidies, harmful for biodiversity**, in a proportionate, just, fair, effective and equitable way, while substantially and progressively reducing them by at least 500 billion United States dollars per year by 2030, starting with the most harmful incentives, and scale up positive incentives for the conservation and sustainable use of biodiversity.

[11] United Nations Environment Programme (2022). State of Finance for Nature. Time to act: Doubling investment by 2025 and eliminating nature-negative finance flows. UNEP, Nairobi, Kenya
[12] See the voluntary national reports to the midterm review of the Sendai Framework by Canada and the United States: https://sendaiframework-mtr.undrr.org/2023/mtr-sf-submissions-and-reports#voluntary
[13] https://www.undrr.org/publication/principles-resilient-infrastructure

In addition to investments in and financing of prevention through ODA and national budgets, private sector investments have an increasing role to play with regards to ensuring a catalytic impact of small-scale Eco-DRR interventions. Yet, the midterm review of the Sendai Framework finds that private sector investments tend to aggravate risk creation, thereby contributing to increased exposure and vulnerability of people, societies and ecosystems.

Some momentum has been created with regards to increased consideration of environmental, social and governance (ESG) factors. However, these relate mostly to climate change and do not consider the broader spectrum of risks. Momentum was seen in December 2022 with the adoption of the Kunming-Montreal Global Biodiversity Framework. Targets 15 and 18, in particular, are in line with the spirit of Article 2(c) of the Paris Agreement and paragraph 36(c) of the Sendai Framework. The two targets address the need to ensure that private sector decisions and investments are based on risk information and do not increase existing risks or create new ones that may have negative impacts on biodiversity. In this manner, they encourage a proactive approach to putting in place appropriate policy and regulatory frameworks that promote de-risking and risk disclosure. Due to their integrative nature, financing of Eco-DRR offers an opportunity for a more comprehensive perspective on financing disaster risk reduction that ensures the sustainability of investments by ensuring equity and inclusion, effective coordination and a long-term vision to maintaining sustainability and resilience beyond short-term economic gains. Yet, prevention, including Eco-DRR as a key opportunity, remains largely in the realm of responsibility of governments. A shift is necessary to incentivise private investors to channel finance and technical assistance for greater resilience.[14] The work of the Task Force on Climate-related Financial Disclosures, the Taskforce on Nature-related Financial Disclosures and the International Sustainability Standards Board should be considered in this regard.

It is also important to note that private sector investment in NbS needs to move beyond tree-planting initiatives (that too often do not constitute NbS) and include protection and restoration of ecosystems and ecosystem services, implemented in consultation with local communities and indigenous people while taking into account socio-ecological systems. Thus, financing for NbS should clearly contribute towards positive dividends for vulnerability reduction, resilience building, and climate mitigation and adaptation.[15]

Priority 4: Enhancing disaster preparedness for effective response and to build back better in recovery, rehabilitation and reconstruction

Disasters can result in significant environmental impacts and environmental emergencies. For instance, in the recent 2022 Pakistan floods, initial estimates of the assessed damages and losses in the environment sector amount to USD48 million, linked to the forestry sector, protected areas, as well as chemical spills and contaminated sites. NbS and specifically EbA are highlighted in the post-disaster needs assessment as key approaches in recovery and reconstruction.[16]

[14] See ECOSOC (2022). Follow-up and review of the financing for development outcomes and the means of implementation of the 2030 Agenda for Sustainable Development. E/FFDF/2022/L.1, 25 April 2022

[15] Seddon, N. et al. (2021) *Getting the message right on nature-based solutions to climate change*. Global Change Biology, 27: 1518

[16] Government of Pakistan (2022). Pakistan Floods 2022: Post-disaster needs assessment - https://www.undp.org/pakistan/publications/pakistan-floods-2022-post-disaster-needs-assessment-pdna

The midterm review of the Sendai Framework finds that opportunities to build back better, for instance by drawing on green recovery approaches, are often missed. Preparedness for effective response and anticipatory action are critical to move quicker from response to recovery, rehabilitation and reconstruction as well as build back better in a manner that supports long-term resilience and sustainable, nature-positive development.

The COVID-19 pandemic and subsequent recovery planning, has demonstrated the need for more integrated, green and nature-positive approaches to prevent exacerbating climate change impacts and biodiversity loss further.[17] Eco-DRR could provide a useful entry point for recovery, rehabilitation and reconstruction, providing opportunities to build back better by overcoming previous risks (e.g. with regards to increasing the resilience of infrastructure). Because environmental and social safeguards are key for the effective implementation of Eco-DRR, they can support a more inclusive approach to build back better. Such an approach should include taking into account different sources of knowledge and engaging those most at risk, including women and girls, Indigenous Peoples and local communities, people with disabilities, as well as youth. In addition, post-disaster risk assessments, that include environmental information, could provide data and support the identification of opportunities, where Eco-DRR could be applied.

Box 2: 2022 Floods in Pakistan

NbS are already being considered in recovery and reconstruction to build back better after the devastating floods in Pakistan in 2022. Not only did the floods cause significant losses and damages to people and property, they also caused damages to forests, biodiversity and land, including pollution that have not been fully accounted yet.

Nevertheless, in preparing estimations for recovery and reconstruction needs, the report prepared by the Government of Pakistan considers nature-based solutions, including ecosystem-based adaptation, as an important approach to addressing both floods and droughts, also considering increasing risks due to climate change.

The Government of Pakistan further recognised that "an expanded environmental recovery strategy is required to achieve an appreciable level of resilience to climate change induced disasters and check the pace of environmental degradation and pollution."

This offers a good example of how a broader resilience strategy, including the environment, can feed into the recovery and reconstruction plan. In the case of Pakistan, it is suggested to focus on three areas in particular that would require an estimated investment of USD1.8 billion:

i. ecosystem-based restoration and adaptation in vulnerable landscapes and watersheds
ii. pollution reduction and waste management
iii. strengthening environmental governance

Source: Government of Pakistan (2022). Pakistan Floods 2022: Post-disaster needs assessment - https://www.undp.org/pakistan/publications/pakistan-floods-2022-post-disaster-needs-assessment-pdna

[17] See for instance IUCN's Nature-based Recovery initiative: https://www.iucn.org/resources/issues-brief/nature-based-recovery; UNEP Perspectives, Building Back Greener in the post-Covid-19 Era, Issue 42, January 2023, available at: https://wedocs.unep.org/bitstream/handle/20.500.11822/41641/Perspective-Issue42.pdf?sequence=3&isAllowed=y

Similarly, an assessment of losses and damages that accounts for ecosystem losses, could provide additional benchmark data to support the implementation and scale up of Eco-DRR with a view to long-term resilience building and institutional strengthening (see also Priority 1 above).

While there is now a well-established evidence base for promoting Eco-DRR and EbA, this is not yet the case for promoting NbS in a humanitarian context. Eco-DRR and resilience building can provide a bridge between humanitarian, development and peacebuilding activities. The need for integrating NbS in post-disaster and humanitarian response is an emerging area. Hence, there is a need to find ways to ensure that climate and environmental considerations, including NbS, are considered in response and recovery frameworks. Mechanisms, such as Cash for Work programmes that incorporate NbS, as for instance with mangrove reforestation/rehabilitation, can be an effective livelihood intervention built into recovery and rehabilitation frameworks to restore ecosystems and reduce vulnerability and exposure to future hazards.

2.2. NbS/Eco-DRR as a promoter of disaster risk reduction and prevention

The midterm review of the Sendai Framework has demonstrated that more needs to be done to move from a continues and repetitive disaster spiral (disaster event → response → recovery → repeat) towards prevention, mitigation and preparedness. The prevailing model to address disaster risks, remains largely focusses on the disaster event itself. This promulgates risk management that prioritises reactive measures rather than ongoing disaster risk reduction through prevention, mitigation and preparedness for effective response. Eco-DRR and other NbS approaches, can help to break out of this vicious cycle, as they focus on long-term resilience and build connection between interrelated and interdependent environmental, societal and economic forces. By promoting greater emphasis on comprehensive and integrated governance, through for instance considering the benefits for a range of sectors and stakeholders, while managing trade-offs, they can help better reduce existing risks and anticipate new risks across systems. Thereby, NbS also promote proactive action and risk-informed planning and investments in support of a more equitable future.

Figure 2 illustrates the needed shift towards more regenerative approaches. In the figure, NbS should be included as one key approach to achieve regeneration. Thus, risk and vulnerability assessments, comprehensive policymaking and planning for disaster risk reduction and preparedness should consider the role and benefits derived from the application of NbS. As mentioned above, if a disaster does occur, considering Eco-DRR in recovery, rehabilitation and reconstruction could also support a shift towards prevention.

Examples of relevant measures, include ecosystem and sustainable land and water resource management or availing the provisional ecosystem services for food, fodder, water, wood, shelter, to sourcing of sustainable building construction material.[18] More specifically, wetlands and other water-related ecosystem-based measures can help mitigate flood impacts and reduce hazards, the creation of green jobs, nature-supported livelihoods insurance and resilient infrastructure can help reduce vulnerability, and risk-informed governance and spatial and land-use planning as well as early warning systems can reduce exposure and vulnerability and enhance coping capacity when people

[18] United Nations Office for Disaster Risk Reduction, United Nations Environment Programme and Partnership for Environment and Disaster Risk Reduction, Nature-Based Solutions for Disaster Risk Reduction: Words into Action, 2021

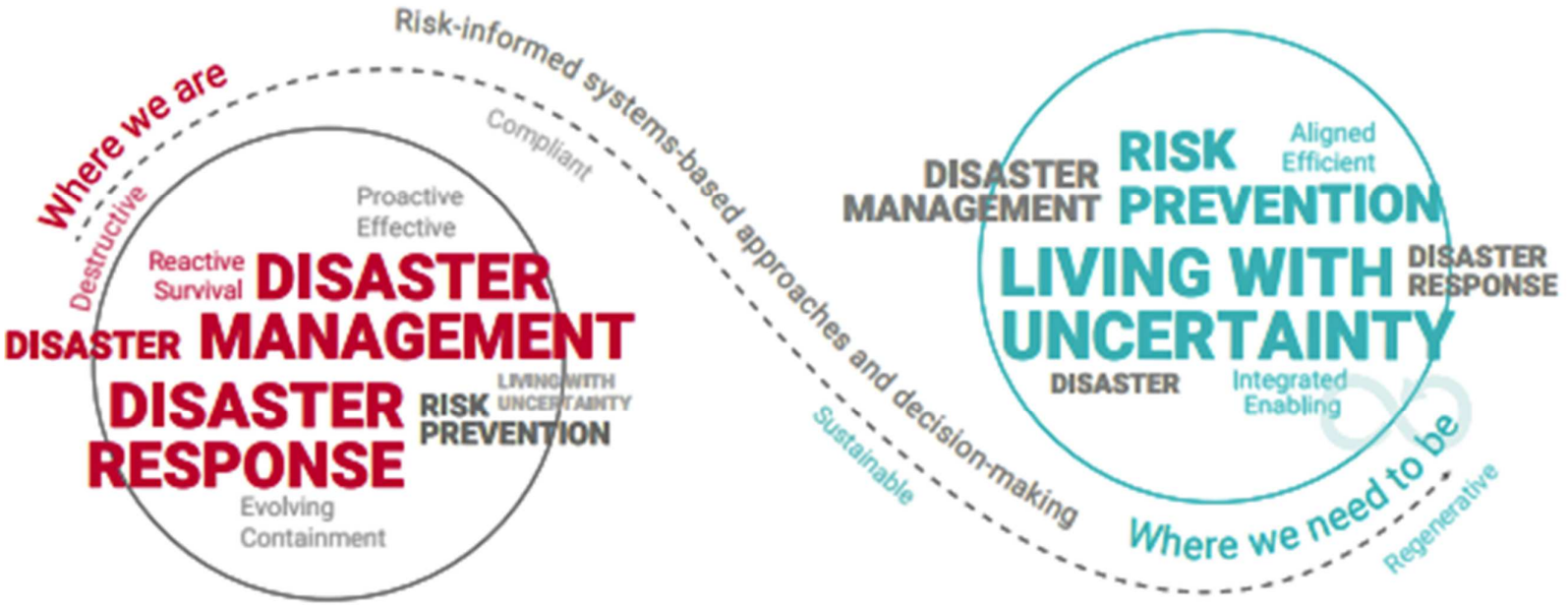

Figure 2: Breaking the disaster management cycle and moving towards more regenerative approaches (Source: UNDRR (2019), Global Assessment Report on Disaster Risk Reduction. UNDRR. Geneva, Switzerland)

are timely alerted and know which actions to undertake to reduce the adverse impacts of the hazards.[19]

Error! Reference source not found. illustrates how a focus on long-term resilience building that considers three challenges that undermine sustainable development, namely climate change, biodiversity loss and social justice, not only provides a more complete picture of system interactions, but also ensures a focus on building the necessary capacities of social, economic and financial systems that are more adept to anticipating and coping with existing and new risks.

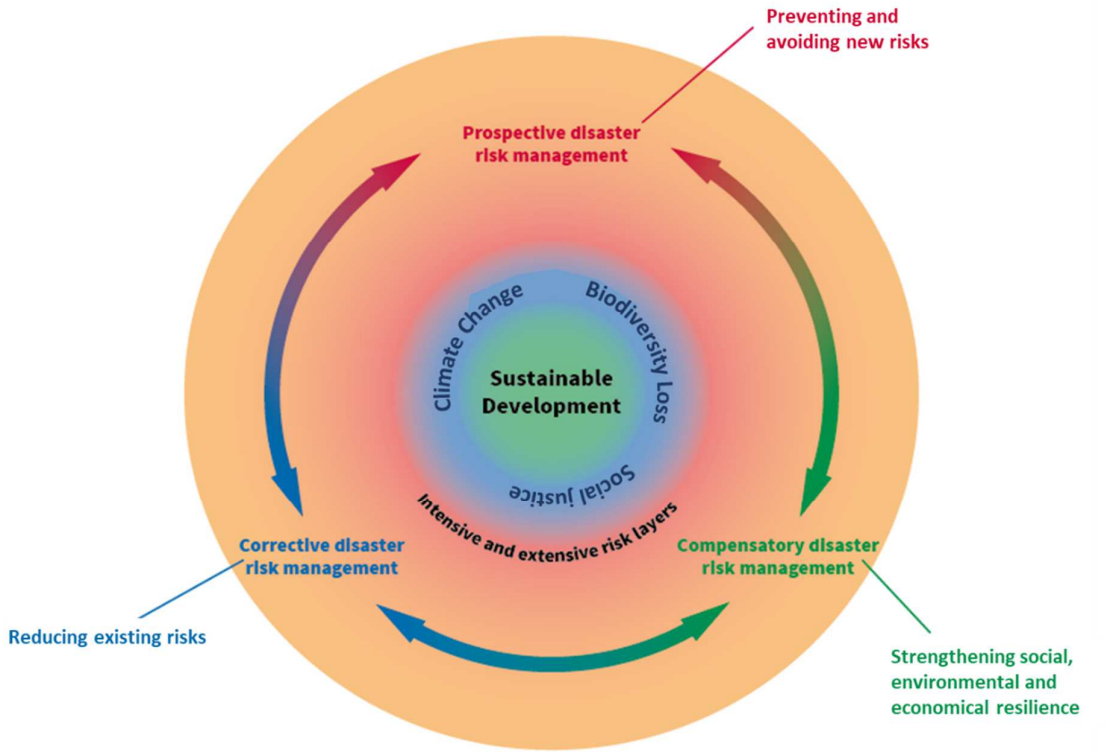

Figure 3: Breaking the disaster spiral (Source: based on UNISDR (2015). Making Development Sustainable: The Future of Disaster Risk Management. Global Assessment Report on Disaster Risk Reduction. Geneva, Switzerland: United Nations Office for Disaster Risk Reduction (UNISDR))

Moreover, Eco-DRR and EbA, in comparison to grey infrastructure approaches, provide a more comprehensive solution to disaster prevention, mitigation and recovery. Through their increased focus on environmental and social considerations, they can also provide a number of enhanced benefits for climate change adaptation, sustainable and nature-positive livelihoods, protection of heritage and culture, preservation of water and soil resources, biodiversity conservation, and carbon sequestration.[20] **Error! Not a valid bookmark self-reference.** considers the application of NbS throughout the different stages of disaster risk reduction and proposes how ecosystem considerations could be integrated.

[19] Based on CB2.1 in Abram, N., et al., 2019: Framing and Context of the Report. In: IPCC Special Report on the Ocean and Cryosphere in a Changing Climate [H.-O. Pörtner, et al. (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 73–129.

[20] Sudmeier-Rieux, K., Nehren, U., Sandholz, S. and Doswald, N. (2019) Disasters and Ecosystems, Resilience in a Changing Climate - Source Book. Geneva: UNEP and Cologne: TH Köln - University of Applied Sciences.

Table 1: Overview of application of nature-based solutions in disaster risk reduction (Source: United Nations Office for Disaster Risk Reduction, United Nations Environment Programme and Partnership for Environment and Disaster Risk Reduction, Nature-Based Solutions for Disaster Risk Reduction: Words into Action, 2021)

Phase		Time frame after hazard event	Objectives	Main actions	Ecosystem services privileged	Ecosystem-management component
Response		Hours to days after	Save lives	Search & rescue, emergency skills	Provisioning services	Avoiding dumping of hazardous materials in environmentally sensitive areas or habitats; possible use of provisioning services from ecosystems (food, wood, shelter, etc.)
Rehabilitation / Recovery		Days to months after	Secure livelihoods	Temporary shelters, provision of basic services, e.g. water, food	Provisioning, regulatory services	Rapid environmental assessments, sourcing of sustainable materials for recovery, waste management
Reconstruction		Months to years after	Reconstruct livelihoods	Reconstruction/ provision of housing and infrastructure, job creation	Provisioning, regulatory, supporting and cultural services	Environmentally sensitive reconstruction, sustainable materials sourcing, improved waste management, ecosystem restoration, green infrastructure and improved ecosystem management for DRR
Prevention	**a) Risk and vulnerability assessments**	Continuously updated	Analyses and assess risk	Hazard and exposure mapping, vulnerability assessments, risk	Regulatory and provisioning services	Integrating ecosystems in risk assessments (see Priority for action 1)
	b) Development planning and risk reduction	Continuous process, on regular intervals	Hazard, vulnerability and exposure reduction	Risk-sensitive land use planning, based on assessments	Provisioning, regulatory, supporting and cultural services	Ecosystem and land management plans, ecosystem protection and restoration included in planning and zoning (see Priority for action 3)
	c) Preparedness	Continuously updated	Increase readiness for future hazard events	Creation and maintenance of early warning systems, evacuation plans	Regulatory and provisioning services	Including ecosystems in environmental emergency preparedness programmes

3. Current trends, challenges and opportunities

Eco-DRR has been practiced in numerous countries for the past decade. More recently the focus of the international discourse has shifted to questions around governance, safeguards and how to scale-up such approaches. This is particularly the case in intergovernmental processes, where the role of NbS, including EbA and Eco-DRR, has increasingly gained traction as one effective option to reduce disaster risks, build resilience to climate change and simultaneously provide human well-being, ecosystem services and biodiversity benefits.

3.1. Increasing knowledge, data and capacity on Eco-DRR

Strengthening natural resource management as part of the disaster risk reduction, management and response strategy does not only support the implementation of the Sendai Framework (see section 2.1 above), it is also congruent with meeting the objectives of other global agendas like the Sustainable Development Goals (including SDGs 6, 9, 11, 13, 14, 15), the Paris Agreement (especially Articles 7 and 8), the Kunming-Montreal Global Biodiversity Framework (targets 8, 11 and 15), and the New Urban Agenda (particularly Commitments 14, 101, 157). Hence, investing, strengthening, and coordinating actions to promote Eco-DRR can have cascading positive impacts.

While the significance of NbS, including Eco-DRR and EbA, is well acknowledged in all key global frameworks, translating those into practice remains in its infancy. Some of the key barriers to policy incoherence identified are: lack of coordination among staff, siloes among sectors and horizontal and vertical administrative levels, within and across sectors, as well as path dependency and regulatory lock-ins in grey infrastructure that hinder the upscaling of NbS.[21] Thus, knowledge and experience sharing, developing national capacities, and providing the necessary data to support the effective implementation of Eco-DRR and EbA in particular contexts, is key.

The need for greater knowledge, data and capacity on NbS was highlighted especially in the UNEA resolution on “Nature-based solutions for supporting sustainable development”. In the resolution, UN Member States request: (i) a compilation of best practices; (ii) guidance on proposals, criteria, standards and guidelines that can foster a common understanding as well as help design, implement and evaluate NbS interventions; and (iii) identification of investment in NbS.[22]

3.2. Scaling up of Eco-DRR implementation and impact

The midterm review of the Sendai Framework finds that the implementation of solutions, such as Eco-DRR, currently does not match the rate of biodiversity loss and increases in ecosystem vulnerability. Instead, human activities that do not account for systemic risks tend to increase existential threats by pushing planetary boundaries.[23] Hence, key ecosystems, such as forests, grasslands, wetlands, mangroves, coral reefs and seagrass meadows continue to shrink and degrade; species populations are declining; extinctions continue; production systems are becoming more homogenous, and genetic diversity is lost.

[21] UNDRR (2021). Words into Action: Nature-based solutions for disaster risk reduction. UNDRR, Geneva, Switzerland.
[22] UNEA Resolution Nature-based solutions for supporting sustainable development, UNEP/EA.5/Res.5, 7 March 2022
[23] UNDRR (2023). The Report of the Midterm Review of the Implementation of the Sendai Framework for Disaster Risk Reduction 2015–2030. UNDRR: Geneva, Switzerland.

Mainstreaming NbS in national and sub-national policies to meet the commitments for global frameworks, such as Nationally Determined Contributions (NDCs), National Adaptation Plans (NAPs), Voluntary national and local reviews and action plans for Urban Agenda, can offer an opportunity for the alignment of Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA) strategies. It also helps create the enabling environment for increasing the application of Eco-DRR, EbA and other relevant NbS approaches. Integrating NbS in sectoral and sustainable developmental planning policies can further increase investments in NbS and help in its upscaling.[24]

The first recommended step for decision makers is to map what exists and assess the comprehensiveness of existing policy, legal and regulatory frameworks. Doing so provides an overview of already existing experiences, efforts and co-benefits and helps identify bottlenecks while keeping initial resource investments low.[25]

From a policy perspective, Sendai Framework Target E provides an important opportunity to integrate NbS in disaster risk reduction strategies. Target E supports the creation of an enabling policy environment for scaling up NbS and increasing the systematic integration and prioritisation of sustainable environmental management into DRR and resilience building measures. This will become particularly important in the context of investments in infrastructure and critical services as NbS or hybrid solutions tend to be more cost-effective in the long term.[26]

Box 2: Integrating NbS in national policies

The **Climate Change Policy 2018-2028 of Cook Islands** includes green investments as one priority area for the development of standards and procedures. One policy measure seeks to draw on traditional methods and knowledge to tackle climate change, including through an increase of activities deploying nature-based approaches.

UNDRR (2023), Status Report on Target E 2023, United Nations Office for Disaster Risk Reduction (UNDRR).

Bangladesh in their national report to the midterm review of the Sendai Framework promotes a comprehensive risk management approach that includes NbS as one adaptation measure in an integrated system of climate change and disaster risk reduction policies and plans in **national preparedness in cities**. Related to this Bangladesh proposes to strengthen partnerships for technical assistance, research and techno environment projects.

See the voluntary national report to the midterm review of the Sendai Framework by Bangladesh: https://sendaiframework-mtr.undrr.org/2023/mtr-sf-submissions-and-reports#voluntary

Apart from increasing Eco-DRR implementation through policy instruments, there is also a need for larger scale programmes that apply landscape approaches and move beyond small-scale pilot applications. To achieve this, interventions need to be designed with scale (space and time) in mind, which requires adequate financial resources to be made available. For example, the Global Environment Facility's eighth replenishment (GEF-8) considers NbS and resilience as a cross-cutting

[24] See also Criterion 8 of the IUCN (2020). Global Standard for Nature-based Solutions. A user-friendly framework for the verification, design and scaling up of NbS. First edition. Gland, Switzerland: IUCN.
[25] UNDRR (2021). Words into Action: Nature-based solutions for disaster risk reduction. UNDRR, Geneva, Switzerland, chapter 4.1
[26] UNDRR (2023), Status Report on Target E 2023, United Nations Office for Disaster Risk Reduction (UNDRR).

and integral part and aims to facilitate more integrated programming to tackle several environmental challenges at once.[27] The design and implementation of such integrated programming could be a blueprint for others to follow and learn from.

Scaling up pf Eco-DRR implementation also requires a concerted effort by a number of actors, engaging in particular those most at risk. The findings of the midterm review of the Sendai Framework reiterate the need for collective action called for in the UN Secretary-General's "Our Common Agenda". Such collective action across sectors, across government and across society is particularly relevant as risks are increasingly interconnected.

3.3. Eco-DRR in high-impact sectors

3.3.1. Infrastructure

Infrastructure is frequently highlighted as a number one concern with regards to disaster risk reduction. Generally, the focus is on making critical infrastructure more resilient, which often means a focus on grey infrastructure. However, there are many benefits to taking a wider view on infrastructure resilience, including on how infrastructure contributes to societal resilience and the resilience of environmental systems through the inclusion of natural (including green and blue) infrastructure. A recently adopted United Nations General Assembly resolution acknowledges the role of natural infrastructure as well as the protection of the environment and thus contributes to such a wider perspective on building infrastructure resilience.[28]

Nature-based solutions need scaling up as an integral part of infrastructure development. This can only be achieved through integrated, systems approaches to infrastructure that recognize the built, natural, and enabling environments as interlinked components of infrastructure systems, and invest in them accordingly.

Targets C (reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030) and 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) of the Sendai Framework consider green infrastructure and allow countries to report on economic losses and the destruction of such infrastructure. Although, there are examples of ecosystem inventories that are used to make decisions on the deployment of natural infrastructure, as noted above, countries have not yet taken advantage of reporting on these through the Sendai Framework Monitor. This constitutes a missed opportunity, as data could be generated through earth observation and satellite data and may already be available in the ministries for environment.[29]

[27] GEF (2022). GEF-8: Moving toward an equitable, nature-positive, carbon neutral and pollution-free world: https://www.thegef.org/sites/default/files/documents/2023-02/GEF8_Integrated_Programs_Briefs_2023_02.pdf

[28] UNGA (2023). Building global resilience and promoting sustainable development through regional and interregional infrastructure connectivity. A/RES/77/282, 3 May 2023

[29] See also chapter 3.2 in the UNDRR (2021). Words into Action: Nature-based solutions for disaster risk reduction. UNDRR, Geneva, Switzerland

Integrating NbS in resilient infrastructure planning provides opportunities for design innovations and long-term resilient and sustainable development alternatives.[30] The UNDRR Principles for Resilient Infrastructure, including a handbook for implementing the principles provide guidance, including on Principle 3 – Environmentally Integrated.[31]

3.3.2. Water

Water-related disaster deaths have more than doubled in the last 10 years and nearly 95% of infrastructure loss and damage reported between 2010 to 2019 were due to water-related disasters.[32] In the last 50 years, floods led to economic losses of USD115 billion, while droughts led to the largest human losses causing 650 000 deaths.[33] These figures illustrate that it is indispensable to engage with the water sector to promote risk-informed regenerative development while sustainably managing water resources and associated ecosystems.

Nature-based solutions in the water sector remain under-utilised, although they have immense potential to enhance water availability, improve water quality, and reduce risks associated with water-related disasters and climate change. More needs to be done to highlight and promote the value of investing in NbS in the water sector to prevent, mitigate and reduce water-related hazards and risks.

NbS were repeatedly mentioned during the UN 2023 Water Conference that took place in March 2023. NbS for water were proposed as an existing promising solution and as an important connector between protecting water resources, achieving national adaptation goals and building resilience and societal well-being. NbS, and in particular EbA and Eco-DRR, are deemed to be particularly helpful in regulating water flows, maintaining groundwater tables and improving water quality through natural filtration. In addition, NbS store carbon and provide a natural defence system, thus reducing water-related risks.[34]

3.3.3. Food and agriculture

In the context of agriculture, NbS encompasses a broad range of practices that can be deployed directly to the production of food and fiber, either by agricultural practitioners or on lands or waters used for production.[35] Biodiversity and ecosystems are essential for agriculture as they provide multiple services and benefits, including pollination, nutrient cycling, water purification and regulation of water floods, control of pests and diseases, carbon sequestration, protection from

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[30] UNDRR (2020), *Ecosystem-Based Disaster Risk Reduction: Implementing Nature-based Solutions for Resilience*, United Nations Office for Disaster Risk Reduction – Regional Office for Asia and the Pacific, Bangkok, Thailand

[31] UNDRR (2022). Principles for resilient infrastructure. UNDRR, Geneva, Switzerland: https://www.undrr.org/quick/70250; UNDRR (2023), How to make infrastructure resilient: The Handbook for Implementing the Principles for Resilient Infrastructure, United Nations Office for Disaster Risk Reduction (UNDRR), Geneva, Switzerland: https://www.undrr.org/quick/77508

[32] Sendai Framework Monitor

[33] WMO, 2021. WMO Atlas of Mortality and Economic Losses from Weather, Climate and Water Extremes (1970–2019)

[34] United Nations Office for Disaster Risk Reduction (2021), Words into Action; and Secretariat of the Convention on Biological Diversity, Voluntary Guidelines for the Design and Effective Implementation.; see also UN, 2023. Interactive dialogue 3: Water for climate, resilience and environment – source to sea, biodiversity, climate, resilience and disaster risk reduction: Concept paper prepared by the Secretariat, A/CONF.240/2023/6

[35] Miralles-Wilhelm, F. 2021. *Nature-based solutions in agriculture – Sustainable management and conservation of land, water, and biodiversity*. Virginia. FAO and The Nature Conservancy. https://doi.org/10.4060/cb3140en

floods and storms, removal of pollutants from the air, creation and maintenance of soils, provision of habitats for fish among others. Hence, biodiversity and ecosystems provide food, forage, water, bioenergy as well as buffering capacities against extreme weather events. In this regard, sustainably managing, conserving, and restoring natural resources in an effort to strengthen the resilience of agricultural dependent livelihoods is crucial.

Eco-DRR in the agriculture sector has the potential to deliver food and nutrition for people worldwide while restoring nature and the climate—contributing to multiple imperatives of the 2030 Agenda. Working with nature to reduce the vulnerability and exposure of people and livelihood assets can release resilience dividends in the agriculture sector. A study undertaken by FAO showed that under hazard conditions, regenerative food systems based on ecosystem-based approaches can perform as high as 6.8 percent better than previously used practices.[36]

Yet, there is a need to further promote and systematically upscale nature-based solutions in the agriculture sector. They must be integrated into disaster risk reduction and sectoral strategies and plans, and complemented by integration into disaster risk reduction financing strategies. It also requires that governments are involved to do more to incentivize these good practices, including reorienting agricultural subsidies that are driving risk creation. It requires not only the commitment of governments, but also other relevant stakeholders and actors. There is a need to strengthen the coordination within and across sectors and at all levels through national platforms for disaster risk reduction where they exist.

3.3.4. Urban development

Eco-DRR and EbA also play an important role in reducing disaster and climate risk at the local level. One of the ten essentials of the Making Cities Resilience (MCR2030) initiative[37] calls for 'Safeguard Natural Buffers to Enhance the Protective Functions Offered by Natural Ecosystems'. It aims to 'Identify, protect and monitor natural ecosystems within and outside the city geography to sustain and safeguard their protective functions as natural buffers and enhance their use for risk reduction'.

Applying NbS in urban spaces, as cities are likely to continue growing, is an effective way to reduce heat island effects, protect cities from potential disaster impacts and contribute to the wellbeing and health of urban dwellers, among other benefits. An abundance of experiences, knowledge, science and policy analysis and assessments already exist, including in many G20 countries.

The European Union through its Horizon Europe programme, has championed NbS approaches in urban contexts to address modern challenges faced by cities, including prolonged heatwaves, droughts and floods. Through projects, such as NetworkNature[38] or MCR2030, local authorities and other actors can share knowledge and experiences, learn from good practices and build coalitions and networks across cities. For instance, in the context of MCR2030, local authorities that have a track record in disaster risk reduction and resilience, with a commitment to support and mentor other participating municipalities, can be recognised as a Resilience Hub.

3.3.5. Humanitarian contexts

The need to strengthen the links between development, humanitarian and peacebuilding work, including links to climate action and commitments, has been highlighted as an emerging issue by

[36] FAO. 2019. Disaster risk reduction at farm level. Multiple benefits, no regrets. http://www.fao.org/3/ca4429en/ca4429en.pdf
[37] https://mcr2030.undrr.org/
[38] https://networknature.eu/more-about-project

participants of the recent ECOSOC Humanitarian Affairs Segment.[39] Some examples of successful work on Eco-DRR in conflict settings exist, for example in Afghanistan where the Afghan Resilience Consortium implemented a project on Eco-DRR, involving natural resource management strategies and reforestation as well as conflict-sensitive approaches.[40]

In humanitarian response, several rapid decisions are made without necessarily assessing the long-term environmental impact of such decisions. The environmental consideration in humanitarian response or the green humanitarian response can improve the lives of the communities affected by disasters and conflicts while minimising the negative environmental impact and can help to build back better. Along with an overarching commitment for green recovery, the environmental impact needs to be assessed and prioritised across food, nutritional security, WASH, public health, housing/site management, protection, human rights and justice, and access to energy. Increased focus on environmental approaches can help bridge the gap between response and recovery and support preparedness and proactive disaster risk reduction.

A recently published "Sphere Unpacked Guide" on NbS for climate resilience in humanitarian action[41] highlights the flexible application and scalability of NbS in humanitarian response ranging from trees that can offer shadow to refugees to more dedicated humanitarian green corridors that offer socio-political buffers in conflict-affected areas. In addition, tools like the Green Recovery and Reconstruction Toolkit (GRRT) and Nexus Environmental Assessment Tool (NEAT+) provide guidance across multiple stages of recovery and response project cycles and have been applied to both developed and developing countries. Challenges in mainstreaming green humanitarian response remain due to a lack of awareness of the availability of tools and resources among the national government officials, who are at the forefront of disaster response.

Box 3: NEAT+ Green Response Tool in Mantapala, Zambia

The Mantapala refugee settlement in Zambia is home to around 13,000 refugees. Many of them are from the Democratic Republic of Congo. The settlement is surrounded by the biodiversity-rich Mantapala Forest Reserve, which includes protected woodlands.

Due to frequent flash floods and high electricity prices, access to electricity is both abrupt and unaffordable to most residents of the Mantapala refugee settlement. They rely on firewood and charcoal as their primary cooking fuels.

The close proximity to woodlands and high reliance on firewood and charcoal can have a negative environmental and livelihoods impacts on the Forest Reserve.

NEAT+ supported decision-makers to assess the sensitivity of the environment in displacement settings by enabling the overlay of environmental realities in identifying environmental and climate risks and measures to mitigate those. It identified the risk of deforestation and opportunities for alternative livelihoods, and agroforestry programmes could be supported.

NEAT+ tool has shown the added value and synergies for green humanitarian response that can be cost effective, contribute to a healthy environment, and support livelihoods and health of affected communities.

[40] Sphere (2023). Sphere Unpacked Guide: Nature-based solutions for climate resilience in humanitarian action: https://spherestandards.org/wp-content/uploads/Sphere-NbS-23-04-2023-english.pdf
[41] Nature-based Solutions for Climate Resilience in Humanitarian Action, https://spherestandards.org/resources/nbs-guide/

4. Proposed priorities for the G20

4.1. Integrating Eco-DRR across sectors through comprehensive risk governance and increased advocacy and leadership engagement

Our governance and infrastructure systems are not equipped to manage the complexities of current global and cascading risks and the irreversible impacts of breaching planetary boundaries. There is a need to further develop better risk governance structures, supported by legal and regulatory frameworks, policies, and plans at all levels and for hazards of all kinds, in a way that reduces existing risks and avoids the creation of new risks and to risk-inform decision-making and investments.

Nature-based solutions (NbS) offer an opportunity for linking policymaking and governance approaches in the areas of disaster risk reduction, biodiversity, climate change, and other policy areas related to the SDGs, providing multiple environmental, social and economic benefits as well as supporting comprehensive and integrated risk governance. This makes NbS and more specifically ecosystem-based disaster risk reduction (Eco-DRR) an attractive contributor to addressing the systemic risk challenges of our time.

To build resilience, the integration of disaster risk reduction, and Eco-DRR more specifically, into sectoral development plans, will be critical. Ministries of Planning and Finance as well as other sectoral ministries are in a key position, where integrating climate and disaster risk reduction into key development sectors offers opportunities for substantive risk reduction, adaptation, and resilience building, including through the large scale-up of the application of NbS.

Suggested actions for G20 include:

- Promote the integration of NbS into sectoral and disaster risk reduction planning through comprehensive risk governance, joint policy making and inter-ministerial/agency cooperation and updating of National Biodiversity Strategies and Action Plans (NBSAPs) to encourage alignment with national climate goals (NDCs and NAPs) and national/local disaster risk reduction strategies.
- Outreach to leaders and parliamentarians to highlight the role of Eco-DRR in building resilience, identifying entry points for updating legislation, policy and institutional governance frameworks and approaches. Ensure that such frameworks are just and equitable and promote inclusion, participation and partnership with local communities and other key actors and stakeholders to leave no one behind.
- Develop new and disseminate existing trainings and tools, such as leadership courses on DRR and Climate Change Adaptation, for decision- and policy-makers among all sectors and both public and private actors.
- Further promote the adoption and upscaling of NbS good practices.

4.2. Private and public investment through NbS in high-impact sectors for resilience

Leveraging the private sector is key to accelerating progress on disaster risk reduction and increase investments in long-term resilience. The question of how to finance Eco-DRR is not only about finding additional resources and integrating NbS into existing budgets. It is also about reforming ad redirecting incentives and subsidies that undermine resilience and may be harmful for biodiversity and ecosystems, including towards the implementation of programmes and initiatives that apply

Eco-DRR and EbA. It also requires consideration of integrated financial and budget planning whereby one investment supports multiple benefits.

For instance, within the Glasgow Financial Alliance for Net Zero (GFANZ), more than 450 private financial institutions representing USD 130 trillion committed to align their entire portfolios to accelerating the decarbonization of the economy to net zero – at the very latest by 2050. It is important to ensure that the USD 130 trillion being committed towards net zero by the private sector is increasingly also addressing resilience and delivering through NbS. Additionally, it may involve payment for environmental services (also known as payments for ecosystem services or PES), which involve payments to farmers or landowners who agreed to take certain actions to manage their land or watersheds to provide an ecological service.

Public-private sector partnerships and investments are also key, where natural resources are state-owned and the private sector is allowed to manage and derive profit from some of these resources; e.g. forests. These partnerships should ensure the participatory and inclusive engagement of the communities whose food, income and livelihoods are dependent on these resources. It should also ensure mechanisms are in place that recognise global common goods and ensure equitable and fair access and benefit-sharing.

While the private sector's engagement in environmental, social and governance factors, sustainability reporting and disclosure standards have improved, particularly in the context of the climate agenda, more needs to be done to consider interlinked risks and identify related disaster risk reduction actions.[42] The financial sector needs to better account for and accurately price disaster risk and to be more transparent on its exposure of risks. Efforts to enable or require private sector and financial institutions to be more transparent on its exposure of risks should link to ongoing global efforts on private sector financial disclosures, including for instance the work of the Task Force on Climate Related Disclosures and the Task Force on Nature related Financial Disclosures. NbS provide an entry point for transforming business models and investments to prevent, mitigate and reduce climate- and nature-related risks.[43]

<u>Suggested actions for G20 include:</u>

- Enhance funding and sustainable investments in nature-based solutions, including through bilateral and multilateral source of finance.
- Promote the adoption of laws and regulations for increased risk management and nature-disclosure frameworks for the private sector, building on ongoing efforts to report and act on climate and nature-related risks to support the implementation of Article 2(c) of the Paris Agreement, paragraph 36(c) of the Sendai Framework and targets 15 and 18 of the Kunming-Montreal Global Biodiversity Framework.
- Advocate for improved tracking of investments and financing in NbS/Eco-DRR to help identify areas where investments are insufficient.
- Contribute to the further development of financial structures for public and private investments in NbS/Eco-DRR, such as blended finance, resilience bonds, green bonds, impact investment, dedicated trust funds etc.

[42] UNGA, 2023. Main findings and recommendations of the midterm review of the implementation of the Sendai Framework for Disaster Risk Reduction 2015–2030, A/77/640, 31 January 2023

[43] See for instance https://framework.tnfd.global/concepts-and-definitions/definitions-of-opportunities/

4.3. Consider NbS and hybrid approaches where possible to reduce stresses on infrastructure systems

Between 2015 and 2021, reported damages to infrastructure is estimated to have doubled.[44] Natural infrastructure or hybrid approaches (a combination of NbS and grey infrastructure) could provide a needed buffer to increase resilience of traditional infrastructure, while contributing to wider societal resilience by providing additional co-benefits, such as ecosystem services, recreational or other health related benefits.

The United Nations Environment Assembly resolution on "sustainable and resilient infrastructure", as well as the United Nations General Assembly resolution on "building global resilience and promoting sustainable development through regional and interregional infrastructure connectivity" encourage investment in natural infrastructure and nature-based solutions for delivering essential services and improving ecosystem services.[45]

In line with the recommendations made under 5.2., regulatory and policy frameworks should be put in place to promote natural infrastructure as a way to build long-term resilience, increase the resilience of grey infrastructure, as well as to redirecting investments from grey solution to green and hybrid infrastructure.

In addition, reporting on Sendai Framework targets C and D provides an opportunity to take stock of the role of natural infrastructure and agriculture (including crops, livestock, forestry, fisheries and aquaculture) in disaster risk reduction, while also providing information on the impacts of disasters on ecosystems – damages and losses. The System of Environmental-Economic Accounting-Ecosystem Accounting (SEEA) linked to national accounting could be one means to support an analysis of both the benefits and losses. However, more needs to be done to develop methodologies and data protocols to account for non-economic losses.

<u>Suggested actions for G20 include:</u>

- Increase the financing and application of natural (green/blue) infrastructure through the development of standards and tracking mechanisms.
- Promote and implement NbS and hybrid approaches where possible to reduce stresses on infrastructure systems.
- Promote environmental economic accounting to measure the benefits of natural infrastructure, for instance through SEEA, conducting cost-benefit analyses or the payment for environmental services (also known as payments for ecosystem services or PES).
- Encourage reporting of damages to and destruction of natural infrastructure and agriculture subsectors as part of Sendai Framework Targets C and D reporting.

[44] UNDRR (2023). The Report of the Midterm Review of the Implementation of the Sendai Framework for Disaster Risk Reduction 2015–2030. UNDRR: Geneva, Switzerland.
[45] UNEA (2022). Sustainable and resilient infrastructure. UNEP/EA.5/Res.9, 7 March 2022; UNGA (2023). Building global resilience and promoting sustainable development through regional and interregional infrastructure connectivity. A/RES/77/282, 3 May 2023

4.4. Accelerate the application of Eco-DRR and NbS in build back better, including in humanitarian and emergency contexts

The climate crisis is now a humanitarian crisis, with visible impacts globally and locally. Disaster risk is increasing and is together with the effects of climate change already compromising the humanitarian sector's capacity to respond. In addition, disaster risk can drive conflicts and conflicts can worsen when disasters are adversely impacting people's lives and livelihoods. Increasingly, the humanitarian community is recognising the need to find new and sustainable approaches to deal with more severe and frequent disasters and conflicts. In this regard, there is a need to find ways to link humanitarian assistance to development work along the humanitarian-development-peace Nexus.

While environmental degradation is acknowledged as a factor increasing the risk of humanitarian crises, and while the natural environment is critical for people's health, well-being and livelihoods, it is often overlooked in humanitarian crises. Despite this, efforts to promote climate and environmental risk analysis and mainstreaming in humanitarian programmes are relatively recent and in nascent stages. The inclusion of environmental and DRR aspects in peacebuilding activities is even more limited.[46]

Many of the countries that are most vulnerable to climate-related risks are fragile and conflict affected countries, with weak institutions, and limited cross-governmental coordination. Civil protection and post-disaster response – including international responses – are often dominated by specialists in traditional "grey" infrastructure. More needs to be done to find ways to ensure that climate and environmental considerations, including NbS, are considered in response and recovery frameworks as well as sectoral development plans.[47]

Suggested actions for G20 include:

- Ensure Eco-DRR/NbS is included in recovery contexts through build back better and greener approaches and the application of environmental standards.
- Promote the utilisation of post-disaster environmental assessments to identify building back better measures based on ecosystem-based approaches and encourage the integration of these measures in post-recovery, rehabilitation and reconstruction efforts.
- Call for case studies on successful examples of the application of ecosystem-based approaches for disaster risk reduction in humanitarian and fragile contexts, including with a focus on peacebuilding aspects.

4.5. Exchange good practices on the application of Eco-DRR approaches for resilience, focussing on high-impact sectors

An exchange of detailed good practices highlighting Eco-DRR applications for various hazards as well as in the context of different sectors can help increase risk understanding and institutional and individual capacities. Such good practices should cover an array of issues, including policy and governance, data and knowledge, engagement of stakeholders, financing, design, implementation and monitoring of Eco-DRR, cost-benefits, etc. They should further cover different types of

[46] UNDRR, Evidence of positive progress on disaster risk reduction in the humanitarian-development-peace nexus: Thematic report to inform the Midterm Review of the Sendai Framework, 2023

[47] UNEP Perspectives, Building Back Greener in the post-Covid-19 Era, Issue 42, January 2023, available at: https://wedocs.unep.org/bitstream/handle/20.500.11822/41641/Perspective-Issue42.pdf?sequence=3&isAllowed=y

ecosystems, including terrestrial, inland water, coastal and marine ecosystems, as well as link to internationally agreed goals, frameworks and standards.

NbS have been shown to offer new solutions in areas where grey infrastructure measures alone are no longer feasible, such as in coastal zones. Mangroves have, for instance been shown to regulate and mitigate the impact of hazards such as flooding, storm surges and erosion, while at the same time providing nurseries for fish, shrimp, crabs and other shellfish. In this regard, mangroves provide food and income to communities whose food security, income and livelihoods depend on these ecosystems. With sea levels on the rise and expected increase in salt water intrusion in coastal lands, these solutions will only gain in importance to reduce disaster and climate risks, while at the same time contributing to food security and sustainable livelihoods. Integrated coastal zone management provides a framework for the sustainable management and development of coastal zones and resources in a way that supports ecosystem functions and services.[48] Forest landscape restoration or the protection of wetlands have similar benefits for enhancing the resilience of ecosystems and societies.

It is also important to highlight emerging issues, such as the implications of climate change for displacement and migration, especially for small island and developing States. Moreover, the momentum of the UNFCCC's process to address loss and damage (L&D) associated with climate change impacts, including extreme events, in developing countries presents an opportunity to mainstream multi-hazard disaster risk reduction as part of disaster response, recovery and reconstruction and advocate for the application of a comprehensive risk governance approach.

Suggested actions for G20 include:

- Call for case studies on examples of the application of Eco-DRR in specific settings and contexts with a focus on high-impact sectors and emerging topics, and encourage exchange of good practices. Involve youth and other key actors/stakeholders in dialogue.
- Gather evidence on non-economic loss and damage for consideration in relevant policy processes, highlighting links and entry points for resilience-building.
- Consider opportunities for integrating Eco-DRR approaches in specific disaster risk reduction and environmental frameworks and mechanisms such as Blue Economy frameworks.
- Promote the implementation of Eco-DRR approaches at local/community and landscape levels as well as design at scale.
- Increase investments in NbS/Eco-DRR good practices including through the mainstreaming of NbS actions into government investment/flagship programmes.

Annexes

1. Youth Input Paper
2. The Report of the Main findings and recommendations of the Midterm Review of the implementation of the Sendai Framework for Disaster Risk Reduction 2015-2030: https://sendaiframework-mtr.undrr.org/publication/report-main-findings-and-recommendations-midterm-review-implementation-sendai-framework

[48] Nature-based Solutions for Climate Resilience in Humanitarian Action, https://spherestandards.org/resources/nbs-guide/