NON-ECONOMIC LOSSES

Featuring loss of territory and habitability, ecosystem services and biodiversity, and cultural heritage

United Nations
Climate Change

The Warsaw International Mechanism for
LOSS AND DAMAGE
Executive Committee

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Executive summary

Historical understandings of loss have focused on those losses that can be easily identified, quantified and monetized.

From sea level rise and storm surges inundating people's ancestral homes and important cultural sites, to unpredictable rains and saltwater intrusion making it difficult for people to sustain their livelihoods, loss from climate change is already with us. It will continue to occur and accelerate in many places across the globe.

Article 8 of the Paris Agreement refers to loss and damage associated with the adverse effects of climate change, including extreme weather events and slow onset events, and the role of sustainable development in reducing the risk of such loss and damage (FCCC/CP/2015/10/Add.1). Historical understandings of loss have focused on those losses that can be easily identified, quantified and monetized, while our understandings of non-economic losses (NELs) – that is, those that may not constitute a direct loss of revenues or those that are irreducible to economic terms – are nevertheless significant and deserve greater attention.

The focus of this technical paper is to better understand a series of NELs (biodiversity and ecosystem services, territory and habitability, and cultural heritage), their interlinkages, and the often overlapping and cascading impacts they have within socio-ecological systems, and how these can be addressed. This will help inform and guide future policy and practice, including the operationalization of the Fund for responding to Loss and Damage established under the Convention and the Paris Agreement.

Loss of biodiversity and ecosystem services

As climate change and other stressors change and transform ecosystems, losses to biodiversity and ecosystem services arise. These losses cascade beyond the ecosystem itself into the entire socio-ecological system, with impacts on livelihoods, security, health and well-being, habitability, opportunities, dignity and identity. A climate change related event or process can impact, for example, a coastal forest in such a way that it loses important species and livelihood opportunities, and the socio-ecological system's capacity to regulate extreme events is degraded.

The focus of this technical paper is to better understand a series of NELs, their interlinkages, and the often overlapping and cascading impacts they have within socio-ecological systems, and how these can be addressed.

Actions to address non-economic losses to biodiversity and ecosystem services (NELs-BES) and their cascading impacts should include targeted measures that avert and mitigate NELs-BES in the interacting social and ecological systems. Such actions cover comprehensive risk management approaches, including emergency preparedness and building back better. Monitoring and reporting are key to understanding NELs-BES and thus to designing actions to address them, yet this requires data and monitoring frameworks which are largely lacking. Communities dependent on ecosystems and the services they provide can cope with and address NELs-BES by adapting and diversifying their livelihoods, and should be empowered to do so through training programmes on community-led resource protection. Implementing nature-based solutions (NbS) and/or ecosystem-based approaches is considered the most powerful action, because

The key lesson learned is that the multiple dimensions of NELs-BES are not yet sufficiently visible and are still considered in isolation, hindering efforts to conserve and restore ecosystems.

it addresses NELs-BES while simultaneously minimizing or even averting them in the face of future climate change impacts.

The key lesson learned is that the multiple dimensions of NELs-BES are not yet sufficiently visible and are still considered in isolation, hindering efforts to conserve and restore ecosystems. It is essential to raise awareness on NELs-BES, with particular engagement of affected communities and consideration for their perspectives. Relatedly, monitoring and reporting efforts must be improved, institutional data collection capacities enhanced and ecosystem inventories established, allowing for the storage of baseline data against which changes in ecosystem services (ES) and biodiversity can be tracked.

Loss of territory and habitability

Sea level rise, desertification, glacial retreat and storm surge, among other climatic changes, are causing the loss of land, which constitutes a total or partial loss of territory (i.e. physical land under the jurisdiction of an agent) and the (perceived) loss of habitability (i.e. habitable land to support human life, with thresholds of uninhabitability determined by material and non-material factors). This loss of physical and/or habitable land has cascading impacts on people's well-being, identity, cultural practices, social cohesion, and ecosystem services, and ultimately disrupts people's feelings of control and their ability to sustain their lives and derive a level of political self-determination in their space. As areas gradually become less habitable and land is lost, increased human mobility can also be expected as an impact and response, which in turn results in a series of cascading impacts.

In the face of land loss and its cascading impacts, various responses have been implemented, three of which are explored in this paper. The first is the immediate humanitarian relief provided to meet basic human needs and to minimize suffering and help save lives. This includes food and water access, temporary settlements and shelter, safety and security, and education and health services. Funding for localized and community-level humanitarian relief in ways that build on existing local capacity, do not entrench existing inequalities, offer a continuity of support for longer-term impacts, and are operationally efficient and scalable, is critical. The second response relates to protecting and rehabilitating landscapes to minimize continued loss of land. This includes hard structures, NbS and/or ecosystem-based approaches, or a combination of both. The efficacy of these approaches is affected by many factors, such as cost, governance and social acceptability. Hard protection measures have proved ineffective in the long term in several contexts, and NbS have proved to be more culturally and environmentally appropriate in rural areas, but require the development of comprehensive scientific and broadly accepted standards. There is a growing need for options that combine traditional practices with modern solutions enabled by advances in environmental science and engineering. Lastly, although largely a last resort option, planned relocations, meaning the coordinated permanent movement of people from places that are affected by acute land loss, are increasingly considered as a response. There are various facilitators and inhibitors to the relocation process, as well as both beneficial and harmful outcomes which are important to consider for future relocation efforts. The development of government frameworks that can incorporate the strength and decision-making authority of community-led approaches, is imperative.

As areas gradually become less habitable and land is lost, increased human mobility can also be expected as an impact and response, which in turn results in a series of cascading impacts.

Key lessons emerged for responding to loss of land and other NELs, including the need for 1) equitable, effective and sustainable delivery of finance for humanitarian relief; 2)

Impacts of climate change are causing loss and damage to cultural heritage, from archaeological sites to historic cities, artefacts, living heritage elements and underwater heritage.

protection and restoration of landscapes and people-ecology interactions (the loss of which is often the first link in the chain of cascading impacts of NELs), especially through NbS and/or ecosystem-based approaches; 3) inclusive, participatory and rights-based mechanisms to address loss of land; 4) multi-stakeholder partnerships to ensure financial, technical and institutional support for those affected; 5) proactive approaches to create awareness and outreach to equip people in tackling loss of land; and, 6) improvements to the security of land tenure to ensure efforts to address various NELs are sustainable.

Loss of cultural heritage

Cultural heritage includes tangible, movable and immovable heritage, intangible cultural heritage, and natural heritage. Other cultural resources to consider include languages as well as Indigenous and local knowledge systems. Rising sea levels, floods, droughts and extreme weather events, among others, are impacts of climate change that are causing loss and damage to cultural heritage, from archaeological sites to historic cities, artefacts, living heritage elements and underwater heritage. This paper identifies a number of different losses resulting from the loss of cultural heritage and the value it holds. Thus, the losses may include the loss of distinctive forms and expressions of identity, accumulated cultural and environmental knowledge, skills related to local resources and livelihoods, traditional forms of governance systems, and inspiration and innovation, as well as diminished food and water security and loss of the adaptive capacity and resilience of communities, including their resilience to disasters. These losses are frequently experienced as multiple and overlapping losses. The loss of cultural heritage may disproportionately impact the most vulnerable communities, including marginalized groups and certain Indigenous Peoples.

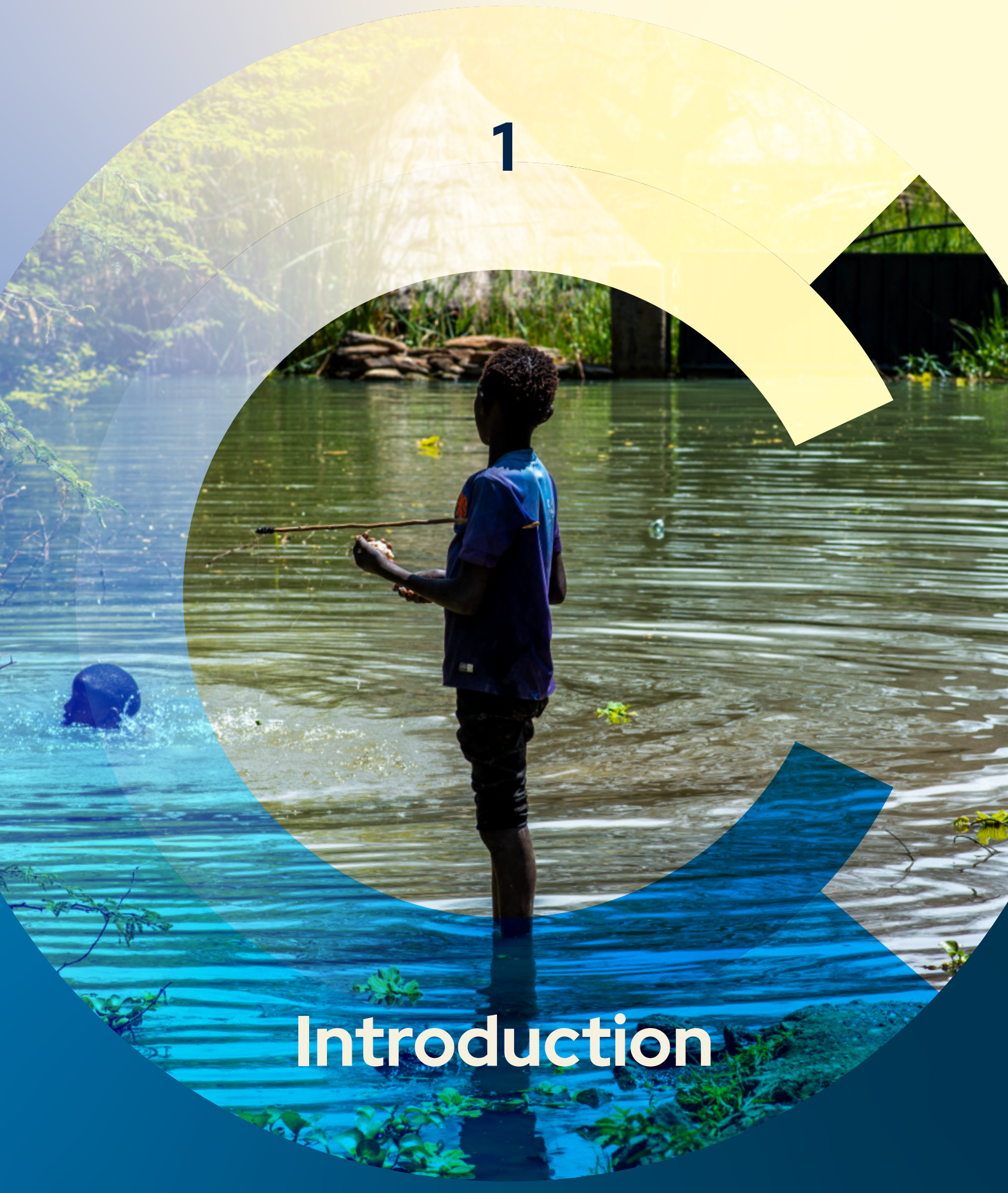
While the loss of cultural heritage most immediately impacts the local communities of which it is a part, that heritage may hold different values at different scales. Hence, depending on the value of the cultural heritage, as well as the extent and significance of its loss, local, national and global communities may also be impacted – or even all of humanity. Furthermore, the losses resulting from the loss of cultural heritage are interlinked with loss of territory, biodiversity and ecosystem losses, along with other NELs, such as the loss of sociocultural identity and Indigenous knowledge. Loss of cultural heritage also narrows cultural diversity, impairing inclusive sustainable development.

Reinforcing cultural resilience is urgent, including inventorying and strengthening governance systems and legislation and ensuring the full engagement of local communities and Indigenous Peoples, as well as other stakeholders, in the processes.

International processes and initiatives, including those falling under the UNFCCC and the Paris Agreement, urgently need to recognize the loss of cultural heritage, as well as the importance of cultural heritage as a resource for climate resilience and adaptation solutions. Actions are also urgently needed to assess and monitor climate change impacts on cultural heritage, enhance cultural resilience and the resilience of communities, strengthen governance systems for the protection and safeguarding of cultural heritage, value the knowledge and skills of local communities and Indigenous Peoples and harness cultural heritage and associated knowledge as an asset in both adaptation and mitigation solutions and climate communication. Protection and safeguarding of cultural heritage is itself a significant climate action. Integrating cultural heritage into comprehensive risk management as well as climate plans and policies at all levels, from the national to the local, is essential. Reinforcing cultural resilience is urgent, including inventorying and strengthening governance systems and legislation and ensuring the full engagement of local communities and Indigenous Peoples, as well as other stakeholders, in the processes.

1

Introduction



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1.A Background

The WIM Executive Committee, which comprises 20 representatives from Parties, guides the implementation of the Mechanism through a rolling workplan across five thematic workstreams.

The Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts (WIM) was established at COP19 in 2013 to address loss and damage associated with the impacts of climate change, including extreme events and slow onset events, in developing countries that are particularly vulnerable to the adverse effects of climate change.[1] The WIM fulfils this role by undertaking the following functions:[2]

(a) Enhancing knowledge and understanding of comprehensive risk management approaches to address loss and damage associated with the adverse effects of climate change;

(b) Strengthening dialogue, coordination, coherence and synergies among relevant stakeholders;

(c) Enhancing action and support, including finance, technology and capacity-building, to address loss and damage associated with the adverse effects of climate change, so as to enable countries to undertake actions.[3]

The WIM Executive Committee, which comprises 20 representatives from Parties, guides the implementation of the Mechanism through a rolling workplan across five thematic workstreams. The Committee is assisted by five thematic expert groups that co-create knowledge products, such as this one, and undertake activities jointly with the Committee to promote integrated and coherent approaches to loss and damage associated with climate change impacts.

The 2013 technical paper on NELs provided a typology and an overview of eight main types of NELs and their conceptual background, describing them in the context of the total cost of climate change, and elaborating on the methods for assessing and managing the risks of NELs, and what they imply for the design of practical actions.

The expert group on NELs became operational in 2021. The group's plan of action contributes to the implementation of the Committee's strategic workstream, which aims to enhance cooperation and facilitation in relation to NELs, by strengthening technical guidance and the capacity to address associated loss and damage, particularly at regional and national levels.

Activity 1 of the plan of action focuses on stocktaking relevant data, tools and knowledge for anticipating the risks of, and responding to, NELs. One of the outputs of this activity is to update a technical paper published in 2013 (FCCC/TP/2013/2).[4] The 2013 technical paper on NELs[5] provided a typology and an overview of eight main types of NELs and their conceptual background, describing them in the context of the total cost of climate change, and elaborating on the methods for assessing and managing the risks of NELs, and what they imply for the design of practical actions.

1 Decision 2/CP.19, paragraph 1.

2 Decision 2/CP.19, paragraph 5.

3 Pursuant to decision 3/CP.18, paragraph 6.

4 The rolling plan of action of the expert group on non-economic losses of the Executive Committee of the Warsaw International Mechanism for Loss and Damage can be found here: https://unfccc.int/sites/default/files/resource/NELs_Plan%20of%20Action%20_final_01052021.pdf

5 See the 2013 technical paper on non-economic losses at https://unfccc.int/resource/docs/2013/tp/02.pdf

This technical paper seeks to provide examples of how countries and communities are responding to the following key types of NELs: 1) loss of biodiversity and ecosystem services; 2) loss of territory and habitability; and, 3) loss of cultural heritage (tangible and intangible).

The Executive Committee hopes that the present updated technical paper provides the most relevant information based on the latest science, as well as select good practices from featured case studies and other literature, to assist developing countries in designing and implementing practical actions, including planning and policymaking processes to respond to key types of NELs.

1.B Scope of the technical paper

The interplay and scale of climate hazards and processes result in various forms of loss and damage, which are often categorized as economic losses and NELs in the work of the WIM. NELs refer to a broad range of losses that are not easily quantifiable in financial terms or commonly traded in markets. These losses are additional to the loss of property, infrastructure, or agricultural production and revenue that can result from the adverse effects of climate change. NELs may affect individuals (e.g. loss of life, health or mobility), society (e.g. loss of territory, cultural heritage, Indigenous or local knowledge, societal or cultural identity) or the environment (e.g. loss of biodiversity or ecosystem services).

This technical paper seeks to provide examples of how countries and communities are responding to the following key types of NELs: 1) loss of biodiversity and ecosystem services; 2) loss of territory and habitability; and, 3) loss of cultural heritage (tangible and intangible). While these types of losses are the focus of this paper, they are not meant to be exhaustive and do not cover all primary losses, such as the loss of health. Similarly, the coverage of cascading or secondary losses arising from these key types of losses is limited. This paper endeavours to showcase a wide range of examples, being cognizant of regional representation and representation at all levels of action, but does not exhaustively describe actions to address NELs. The case studies referred to throughout the paper, along with literature, are selected examples to illustrate the above selected types of NELs and actions taken to address such losses.

The case studies highlight the diverse aspects of integrating key NELs considerations into policies and planning, immediate or early response efforts, long-term resilience efforts for irreversible NELs, and engaging those at the forefront of climate change.

The Executive Committee called for submissions of case studies in February 2024 to inform the development of this paper.[6] Twenty-two submissions were received by April 2024 containing information on approaches concerning loss of biodiversity and ecosystem services, loss of territory and habitability, and loss of cultural heritage (tangible and intangible). In addition, 38 case studies submitted to the Transitional Committee in 2023[7] were analysed. The set of case studies collectively covers the American, African, Asian, European and Pacific regions. Numerous cases were also drawn from UNESCO's work on cultural heritage specifically for the analysis of cultural heritage in this paper. Together they highlight the diverse aspects of integrating key NELs considerations into policies and planning, immediate or early response efforts, long-term resilience efforts for irreversible NELs, and engaging those at the forefront of climate change. To inform this paper, the case studies were supplemented by complementary desktop research.

6 The list of case studies collected from this call for submissions can be found here: https://unfccc.int/WIM-ExCom/NELs/2024_case_studies

7 The list of case studies submitted to the Transitional Committee can be found here: Case studies | UNFCCC

1.C Aim and structure of the paper

This knowledge product seeks to explore recent understandings of NELs and highlights the multiple interlinkages between the selected types of losses.

This knowledge product seeks to explore recent understandings of NELs and highlights the multiple interlinkages between the selected types of losses. It also seeks to discuss case studies from diverse contexts to share concrete examples and good practices for policymaking and practical actions to address losses. Through the emerging good practices, the paper aims to extract success factors:

(a) For the integration of key NELs considerations in policies and planning;
(b) For immediate or early response efforts to address these NELs;
(c) For long-term rehabilitation, recovery, building back better and resilience efforts to address these NELs;
(d) For the facilitation of robust measures to mitigate key types of NELs;
(e) For the engagement of those at the forefront of climate change.

This technical paper is structured as follows:

(a) Section 2 focuses on the loss of biodiversity and ecosystem services;
(b) Section 3 focuses on the loss of territory and habitability;
(c) Section 4 focuses on the loss of cultural heritage;
(d) Section 5 focuses on the way forward.

Each of these chapters provides:

(a) An overview of each type of NEL in the context of climate change and their interlinkages with other NELs;
(b) A spectrum of actions to respond to each type of NEL, drawing on the case studies and desktop research;
(c) Lessons learned from each type of NEL.

2

Loss of biodiversity and ecosystem services

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2.A Non-economic losses of biodiversity and ecosystem services in the context of climate change, and their interlinkages with other non-economic losses

Climate change, together with other stressors, is driving changes that transform ecosystems. These changes are caused by physical factors such as storms, biological responses such as changing ranges, or both, interacting with stressors caused by human activities.

Climate change, together with other stressors, is driving changes that transform ecosystems. These changes are caused by physical factors such as storms, biological responses such as changing ranges, or both, interacting with stressors caused by human activities (Intergovernmental Panel on Climate Change [IPCC], 2022a). Multiple stressors, whether gradual or sudden, can have complex interacting or amplifying impacts on ecosystems (Harris et al., 2018; Zhou et al., 2023). Changes that transform the composition, structure, function and 'intactness' of ecosystems can mean that ecosystem tipping points are reached, and transformation to a new state occurs, often resulting in the loss of biodiversity and ecosystem services (Selkoe et al., 2015; Pecl et al., 2017; Heinze et al., 2021). Ecosystem change can be gradual or abrupt depending on ecosystem characteristics and key species, and the stressors at play (Ratajczak et al., 2018; Malhi et al., 2022). When the threshold is crossed and the ecosystem has transformed entirely, restoration can be difficult or even impossible (Hillebrand et al., 2020). These risks are expected to grow with accelerating climate change (Parmesan et al., 2022).

Biodiversity changes and losses can emerge because of short-term extreme events such as heatwaves or wildfires, or longer-term habitat changes related to rising temperatures or precipitation change, for example. Biodiversity loss can refer to decreasing numbers (and thus genetic diversity) of certain species, the decrease in the variety of species (species richness) in an ecosystem, or the decrease in ecosystem types (ecosystem diversity) in an area. Impacts on biodiversity can present themselves as changes in phenology (e.g. shifting timing of seasonal and life-cycle events), range shifts (i.e. shrinking habitats of high-elevation species), increased mortality and localized extinctions, and the spread of invasive species (e.g. spread into new ranges due to warming, or better adapting to changing conditions than native species) and diseases (e.g. through population growth of disease-spreading species, increased host susceptibility due to stress and enhanced pathogen transmission) (Panetta et al., 2018; Roman-Pacaios and Wiens, 2020; IPCC, 2022a). The loss of species richness and diversity is likely to affect the ecosystem's overall resilience to climate change (Hutchisun et al., 2018).

NELs of biodiversity and ecosystem services associated with climate change can affect ecosystem functions, structure and resilience.

NELs of biodiversity and ecosystem services associated with climate change can affect ecosystem functions, structure and resilience. This results in impacts on ecosystem services, which are the benefits that humans receive or derive from ecosystems. Intact ecosystems provide so-called "provisioning services", such as food, fresh water and raw materials; "regulating services" like moderation of extreme events and air regulation; "supporting services", which include genetic diversity and habitats for species; as well as "cultural services", such as places that serve as inspiration, places with aesthetic value and recreational benefits (The Economics of Ecosystems & Biodiversity, 2010).

Being essential for the well-being of people, the loss of ecosystem services has direct impacts on society. The cascading effects that NELs-BES associated with climate change have on people and livelihoods is well documented, highlighting how losses to the ecological system cannot be separated from the interlinked social system.

For example, a mangrove ecosystem provides food (fish) and timber. It is estimated that a hectare of mangrove contributes an annual USD 33,000–58,000 to the national economies of developing countries, the majority of which comes from fisheries and wood (Earth.org, 2022). Additionally, mangroves provide regulating services, for instance by storing carbon, but also by serving as buffers against extreme events: mangroves are known to reduce wave energy, erosion and storm surge water levels (Spalding et al., 2014). Furthermore, being biodiversity hotspots, mangroves provide habitat services, maintaining genetic diversity and hosting numerous niches for species habitats. Finally, mangroves provide cultural services including sites for recreation, aesthetic experiences and eco-tourism, as well as forming cultural identity and cultural heritage – all of which are important for the well-being of communities.

Being essential for the well-being of people, the loss of ecosystem services has direct impacts on society. The cascading effects that NELs-BES associated with climate change have on people and livelihoods is well documented, highlighting how losses to the ecological system cannot be separated from the interlinked social system. When exploring NELs-BES, it is important to remember that loss does not occur to ecosystems and people separately, but to an interlinked socio-ecological system with embedded cultural, social and ecological structures that form the foundation of identity, well-being, way of life, worldviews and self-esteem (Movono et al., 2017; Yazzie et al., 2019; McNamara et al., 2021).

For example, the loss of provisioning services due to flood impacts a community's food supply, with especially negative effects on subsistence farmers and those whose livelihoods depend on selling food. In Saint Vincent and the Grenadines, arable lands were flooded, which resulted in the loss of food products for the cultivators' own consumption and loss of income generated from sales on the local market (Government of Saint Vincent and the Grenadines, 2016). The loss of regulating services, such as the moderation of extreme events, can reduce people's protection against such events. In Kerala, floods and landslides caused the removal of a hill's vegetation cover and topsoil, which in turn reduced the hill's capacity to absorb rainwater and to mitigate landslides (Government of Kerala, 2018). The loss of cultural services, too, has direct consequences on humans. In the Lao People's Democratic Republic, for instance, sacred forests were lost due to heavy summer rains and flooding. This disrupted the social well-being and cohesion of some ethnic groups (Government of Lao People's Democratic Republic, 2018).

NELs-BES constitute losses to the socio-ecological system, which are shown in Figure 1. NELs-BES directly translate to losses to security, livelihoods, and health and well-being, which further cascade into losses of habitability and opportunity. Ultimately, these losses all affect dignity and identity (Tschakert, 2019; Eberle, 2020; Eberle et al., 2023). In these categories, the subjects of the loss are humans, ecosystems and species. The below explains how NELs-BES result in losses in the following categories:

NELs-BES directly translate to losses to security, livelihoods, and health and well-being, which further cascade into losses of habitability and opportunity. Ultimately, these losses all affect dignity and identity.

- **Security**, or the feeling of being secure, can decrease as a result of food and water insecurity, degraded social cohesion, the absence of safety nets, the ongoing presence of risk and financial instability – all of which can result from ecosystem services loss (Eberle, 2020). Loss of security in the presence of risk can worsen when protective measures or infrastructure are missing or damaged. A case study from the Coral Restoration Consortium illustrated how climate-induced adverse impacts on coral reefs, such as bleaching, reduce the capacity of the reefs to provide important protective functions, implying a loss of security from hazards as a result of environmental NELs (Coral Restoration Consortium, 2023).

As climate change induces NELs-BES, livelihoods relying on these ecosystems can no longer be sustained.

- **Livelihoods** are the physical goods and the sense of purpose humans can obtain from ecosystems, which allow them to sustain their lives (Eberle, 2020). As climate change induces NELs-BES, livelihoods relying on these ecosystems can no longer be sustained. The deprivation of these essential resources and the erosion of meaningful connections to nature translates to the loss of livelihoods. A case study from the Solomon Islands demonstrates how heat waves associated with climate change increasingly damage coral reefs, promote eutrophication and consequently lead to declining fish stocks. Since the food supply, income and cultural identity of fishing communities directly depend on fish as goods provided by ecosystems, dwindling fish stocks directly bring about loss of human livelihoods (Unitarian Universalist Service Committee, 2024).

- **Health and well-being** comprise a comfortable state at the physical, mental and social level. NELs-BES can have impacts on health and well-being, such as the deterioration of physical and mental well-being, the increase of disease and the overall deterioration in quality of life (Eberle, 2020). Climate-driven ecosystem degradation can threaten physical health through food insecurity, poor nutrition and water insecurity, and mental health through changing ecosystems, inability to meet basic needs, and loss of sense of place (Sattler et al., 2018; Benjamin et al., 2019; IPCC, 2022a). NELs-BES also disrupt people's well-being by damaging their livelihoods and sources of income. In Bangladesh, for example, loss of financial stability resulting from climate change induced crop loss reportedly affected mental health and people's ability to pay for healthcare (van Shie and Ranon, 2014).

- **Habitability** refers to the physical goods and services humans receive from the environment, as well as the aesthetic and cultural appeal that creates an environment people can and want to live in (Eberle, 2020). In Vanuatu, many coastal and mountainous regions have become uninhabitable as a consequence of climate-induced degradation of environmental resources, such as food, fresh water, or materials such as timber, and ecosystems not being able to sustain human lives. The loss of livelihoods has often forced Indigenous communities to leave ancestral land. The loss of habitability, which can result from the loss of security (e.g. as food supply may become insecure), as well as the loss of livelihoods or health and well-being, may induce displacement, contribute to migration decisions or necessitate planned relocation. In Bangladesh, for instance, loss of ecosystem services from sea level rise and salinity intrusion results in the considerable displacement of people every year.

- **Opportunities** refer to the possibilities afforded by the environment for the future advancement of society, including knowledge, learning, inspiration, pride and genetic diversity (Movono et al., 2017; Eberle et al., 2023). By losing livelihood prospects – such as those in Vanuatu who lost fishing livelihoods due to outmigration from submerging islands, or pastoralism in Kenya which became unviable due to droughts – future generations lose opportunities linked to their heritage and eco-literacy. Further, the Nature's Contribution to People (NCP) approach of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) specifically refers to the "maintenance of options" (NCP18) through the ability of ecosystems, habitats, species, or genotypes to maintain human options for ensuring a high quality of life in the future (IPBES, 2019). The latest global NCP assessment by the platform highlights declining genetic diversity, which limits future opportunities such as the discovery of new medical resources.

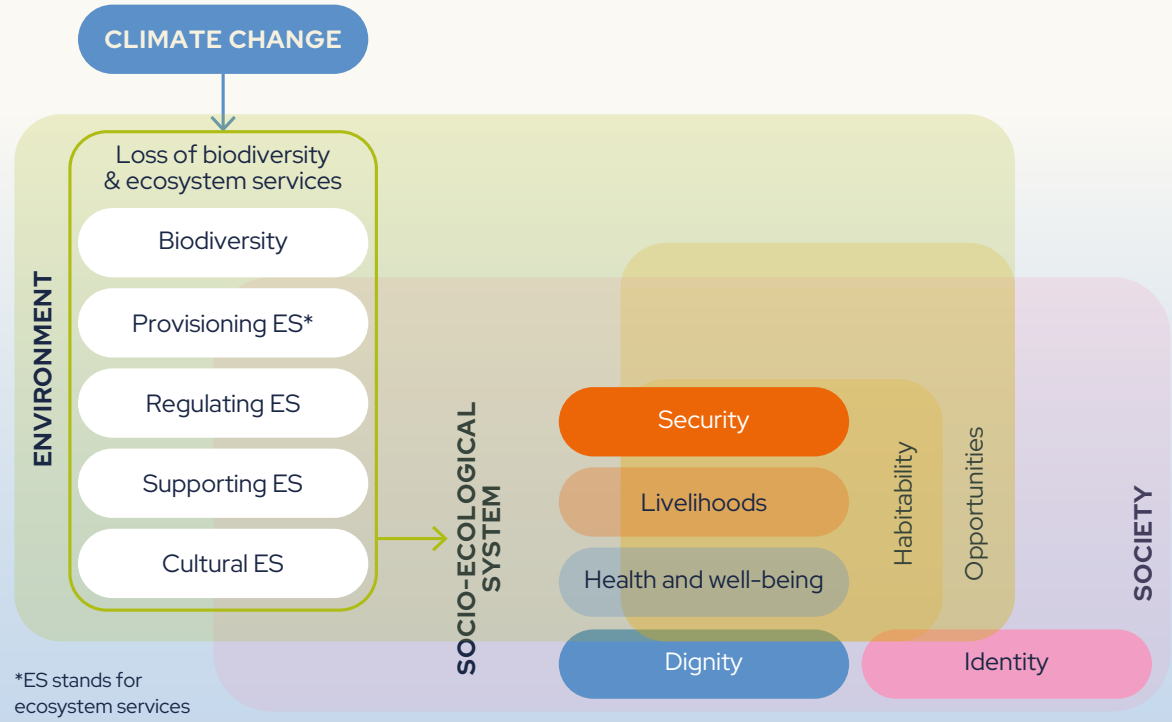
By losing livelihood prospects future generations lose opportunities linked to their heritage and eco-literacy.

- **Dignity** is the state or quality of being worthy of honour or respect, and covers agency, mobility, sovereignty, identity etc. (Eberle, 2020). NELs-BES and their resulting impacts on any of the categories listed above can ultimately damage people's dignity. For example, loss of livelihoods as a result of NELs-BES may induce migration and force migrants to live in informal settlements, far from the circumstances they were accustomed to. Similarly, loss of natural heritage such as sacred groves can deeply affect people's dignity, stripping away their cultural identity, spiritual connection, economic resources and social cohesion, and exacerbating issues of environmental justice.

- **Identity**, or the feeling of being someone (Eberle, 2020), can be affected, for example, when livelihoods, territory, homes or sacred places are lost and a person's sense of place is damaged, when heritage such as place-based traditions or customs are lost, or when culture such as gathering places or sources of inspiration are lost. In the Gambia, for example, the loss of traditional crops rendered non-viable by changed weather patterns, and the loss of ancient shade-providing trees in village centres and markets, resulted in the loss of cultural heritage, communal identity and historical knowledge (United Nations Capital Development Fund [UNCDF], 2024). Cámara-Leret et al. (2019) refers to the impact of climate change on 'biocultural heritage', illustrating how climate change diminishes the well-being and cultural integrity of Indigenous Peoples by causing local extinctions of wild foods, medicines and ritual foods. Other studies have also documented extensive losses to Indigenous and traditional knowledge related to weather forecasting, agriculture, medicine and culturally significant species as a result of NELs-BES (Nankaya et al., 2020).

Other studies have also documented extensive losses to Indigenous and traditional knowledge related to weather forecasting, agriculture, medicine and culturally significant species as a result of NELs-BES.

Figure 1: Illustration of NELs-BES and their associated impacts on the socio-ecological system



NELs-BES may have a disproportionate impact on certain groups, such as women, by exacerbating existing social inequalities and norms.

NELs-BES may have a disproportionate impact on certain groups, such as women, by exacerbating existing social inequalities and norms. In Vanuatu, for example, women rely on the coral, sea grass and mangrove ecosystems for their livelihoods, and for spiritual, customary and social protection purposes. The loss of these ecosystems and the subsequent reduction in family income disproportionately affects Vanuatuan girls, who can no longer go to school as families with limited income will only pay school fees for eldest sons (Waiwai et al., 2023).

Making it even more critical to address NELs-BES is the fact that the losses often have overlapping, cascading, or multiplying effects: one loss often increases the risk of further losses, and a strategy to respond to one loss can trigger another (Westoby et al., 2021). Furthermore, the loss of ecosystem services aggravates the risk of climate-related disasters, since the loss of provisioning, cultural and supporting services increases vulnerability to climate-related hazards and the loss of regulating services degrades capacities to mitigate climate-related risks (Walz et al., 2021; IPCC, 2022a).

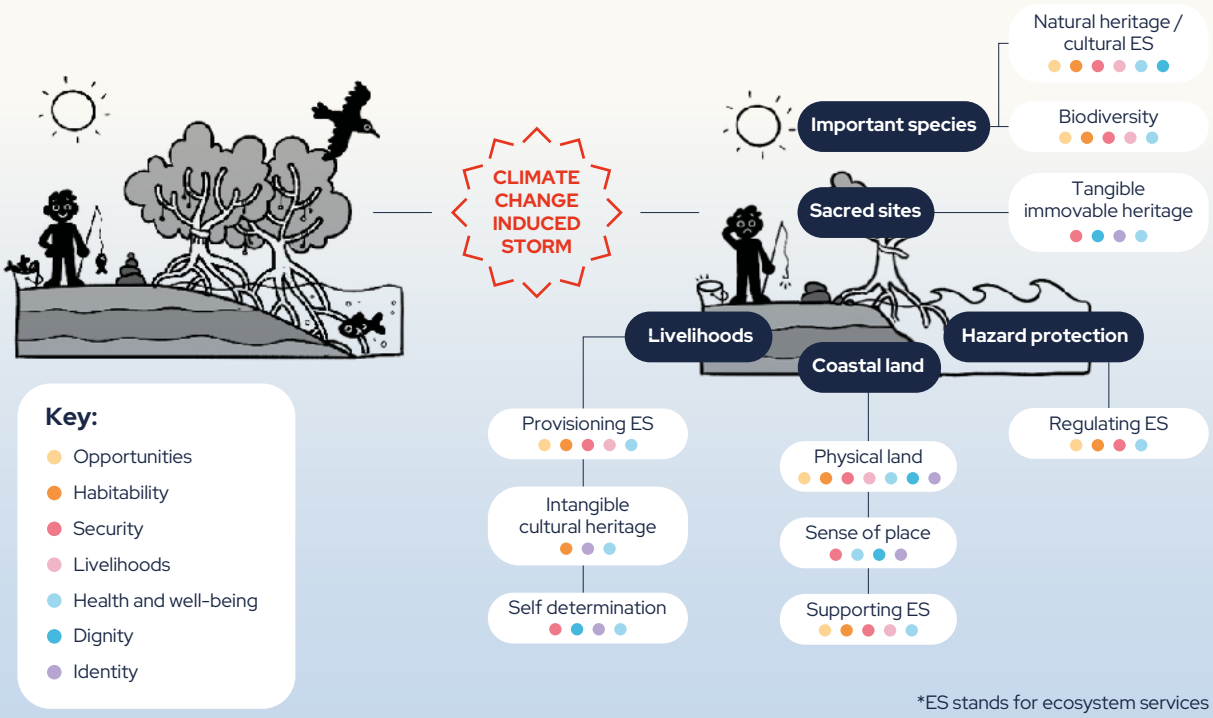
Experience of loss is unlikely to be neatly described by only one of the above categories at a time, independently from the others. For example, drought in the Gambia has rendered traditional crops non-viable, destroying the livelihoods of rural communities. This has fuelled irregular migration, which, together with the loss of the crop, has led to loss of cultural heritage. At the same time, the drought has threatened traditional ways of life, with the loss of ancient shade-providing trees having social and cultural impacts.

A 'single' loss, such as that of a coastal forest, is likely to affect an entire socio-ecological system, resulting in a multitude of diverse NELs which will be different for each community and person.

As such, it is perhaps more useful to presume that each loss has different and multiple values for each person or group of people (McShane, 2017) and that such loss rarely has an isolated impact. Figure 2 illustrates the cascading and interacting impacts of a climate change induced storm on a coastal forest. The coastal land may be lost from storm surge and erosion, representing a loss of physical land, sense of place and supporting ecosystem services. Losing the mangrove forest may also mean losing hazard protection in the form of wave energy dispersal and erosion control as types of regulating ecosystem services. The coastal forest could also have been an important sacred site, meaning that people would have lost tangible, immovable heritage. Ecologically, many species would lose their habitat in the event, resulting in a loss of biodiversity and perhaps natural heritage/cultural ecosystem services in the form of culturally important species or an aesthetic landscape. The cultural knowledge of the environment, as well as the cultural practices and beliefs surrounding specific species and their natural rhythms, would also be lost. These species may also have provided fundamental livelihood opportunities for people, such as through fishing or foraging, and such species loss would equate to a loss of provisioning ecosystem services and tangible cultural heritage in the form of traditional livelihood practices, as well as a loss of self-determination as livelihood opportunities would be undermined. This example highlights the ways that a 'single' loss, such as that of a coastal forest, is likely to affect an entire socio-ecological system, resulting in a multitude of diverse NELs which will be different for each community and person.

Both Figure 1 and 2 show the complexity, interlinkages and cascade of losses resulting from NELs-BES, highlighting the importance of understanding and addressing NELs systematically.

Figure 2: Examples of how a single loss can represent many other losses at the same time



*ES stands for ecosystem services

2.B Spectrum of actions to avert, minimize and address loss of biodiversity and ecosystem services

There is an urgent need to advance actions that help avert, minimize and address NELs, including NELs-BES, with an emphasis on avoiding reaching the limits of climate change adaptation and on addressing its impacts.

The IPCC finds that NELs are not yet sufficiently addressed by governmental, institutional and financial arrangements, putting developing countries in particular at a disadvantage (IPCC, 2022b). Consequently, there is an urgent need to advance actions that help avert, minimize and address NELs, including NELs-BES, with an emphasis on avoiding reaching the limits of climate change adaptation and on addressing its impacts. It is important to not only address NELs-BES, but to enhance efforts to avert and minimize them, given that they are interlinked and have cascading impacts on the entire socio-ecological system. Only when reducing NELs-BES overall can detrimental flow-on effects be avoided. Working directly with ecosystems to maintain their health is of great relevance here, as this can help not only to minimize NELs-BES from climatic changes, but can even directly avert NELs-BES. Actions to address the losses are needed when NELs-BES can no longer be averted or minimized.

2.B.i Acting to avert, minimize and address NELs-BES

Actions to avert, minimize and address NELs-BES and their cascading impacts can be categorized into the following seven key actions, which are described in more detail below: (1) applying comprehensive risk management approaches; (2) enhancing monitoring of, and reporting on, NELs-BES; (3) establishing appropriate financial mechanisms to support those experiencing NELs-BES; (4) adapting and diversifying livelihoods; (5) developing community capacity to cope with and adapt to NELs-BES; (6) implementing nature-based solutions and/or ecosystem-based approaches; and, (7) integrating actions to address NELs-BES into policies and planning.

2.B.ii Applying comprehensive risk management approaches

Comprehensive risk management approaches offer multiple entry points for averting, minimizing and addressing NELs, including through emergency preparedness; response measures and measures to enhance recovery, rehabilitation and building back better; universal social protection systems with transferable benefits; and transformational approaches (UNFCCC, n.d.-a).

Actions to avert, minimize and address NELs-BES and their cascading impacts can be categorized into seven key actions.

Response options are prioritized based on collective and individual value trade-offs and what is considered acceptable, tolerable or intolerable (Tschakert et al., 2017; Henrique et al., 2022). Therefore, the first step in response is to understand what people value, and consequently what is at risk of being lost (van Schie et al., 2023). A values-based approach

Ideally, responses would recover what has been lost, such as by restoring ecosystems, and would address the root cause of the NELs to avoid further cascading losses.

can help us better understand the limits to adaptation, and what risks are acceptable, tolerable or intolerable, and how individuals, communities and societies may wish to concentrate efforts in risk reduction, risk transfer, adaptation and restoration to avert, minimize and address NELs (Tschakert et al., 2017). This can also be useful in helping to understand the drivers of NELs, beyond climate change. To do so it is important to identify structural issues that increase people's likelihood of experiencing NELs, such as social or ethnic inequalities. Ideally, responses would recover what has been lost, such as by restoring ecosystems, and would address the root cause of the NELs to avoid further cascading losses. Sometimes, however, it is not possible to recover what is lost, so actions can be taken to find replacements or alternatives, such as implementing relocation programmes or building a well after a stream dries up.

Further, financial assistance can be given where losses can neither be recovered nor replaced immediately, such as cash transfers to pay for lost assets. Social protection can also provide support in case of livelihood loss due to, for example, inability to work.

Despite these efforts, in both instances there may still be some further loss in the form of emotional/spiritual damage or distress, and in some cases, a loss can never be recovered or replaced (such as the loss of a life). Often in these cases, the acknowledgement of loss, for example through memorials, can be a powerful means to address feelings and heal.

It must be noted that challenges may arise in averting, minimizing and addressing risks associated with slow onset events, as phases such as response and repair may not be clearly defined from one another.

2.B.iii Enhancing monitoring of and reporting on NELs-BES

Monitoring and reporting on NELs-BES is key to understanding, and consequently to implementing, actions to avert, minimize or address them. A prerequisite for this are data and monitoring frameworks for NELs in general, and NELs-BES in particular; these are, however, often lacking. The majority of countries (Vysna et al., 2021) are yet to establish regular measurement-taking of ecosystem extent, condition and service provision. Therefore, data on biodiversity, ecosystems and their services are often patchy or completely missing. Such data would, however, be crucial as a baseline against which to understand, monitor and assess changes in ecosystems associated with climate change. Accordingly, scientists call for the establishment of ecosystem inventories and the collection of baseline data (Janzen et al., 2021). Suggestions have been made on how to incorporate the necessary resources for such extensive monitoring and reporting into existing frameworks. One proposal is to monitor NELs-BES under the System of Environmental-Economic Accounting, as this already provides a frame for monitoring the environment (United Nations Office for Disaster Risk Reduction [UNDRR], 2023). Integrating NELs-BES into the System of Environmental-Economic Accounting remains challenging since the monetary and non-monetary value of ecosystem services is not accounted for by traditional economic reporting systems and is therefore difficult to accurately determine.

Monitoring and reporting on NELs-BES is key to understanding, and consequently to implementing, actions to avert, minimize or address them.

Another study on NELs of ecosystem services found entry points for reporting these losses in the Sendai Framework monitor (Walz et al., 2021). The authors suggest that ecosystems be considered as critical green or blue infrastructure, which provide basic services to society

Regarding biodiversity, the headline indicators established under the Kunming-Montreal Global Biodiversity Framework could serve as entry points to collect baseline data and therefore to monitor changes in, and losses of, biodiversity.

through their ecosystem services, and could thus be integrated into Sendai indicators D-4 and D-8 (Walz et al., 2022). This would, however, require that countries consistently report on ecosystems as green infrastructure, which is not being done yet.

Regarding biodiversity, the headline indicators established under the Kunming-Montreal Global Biodiversity Framework could serve as entry points to collect baseline data and therefore to monitor changes in, and losses of, biodiversity. As the Convention on Biological Diversity (CBD) urges Parties to include the introduced headline indicators when updating their National Biodiversity Strategy and Action Plans to track the progress of their commitments, this could be an opportunity for collecting data relevant for monitoring NELs-BES (Decision 15/6, CBD, 2022). As the capacity for biodiversity monitoring is found to be currently unevenly distributed across the globe, Leadley et al. (2022) call for investments to advance local and national capacities to collect new data.

One further, promising development is the establishment of a new disaster losses and damages tracking system by UNDRR. It seeks to better reflect on complex, direct, indirect and cascading impacts and to include evolving methods to assess losses and damages (UNDRR, n.d.), which could be an entry point for integrating NELs-BES.

While not under the above-mentioned frameworks, there are concrete national and regional examples of how to advance NELs-BES monitoring. In the Philippines, a research initiative worked with local fishers to develop markers to detect NELs (Manila Observatory, 2024). Markers included the complete discoloration of corals, which acted as an indicator for coral bleaching, the deaths of coral reefs and the loss of their protective functions. Alternatively, changes in fish catches acted as indications of rising water temperatures that result in species range shifts and changes in, or losses of, food provision for fisher communities. Such local and everyday indicators that capture ecosystem conditions are useful for monitoring NELs-BES, and improving understandings of NELs and their cascading impacts, which should then inform targeted action to address these losses.

2.B.iv Establishing appropriate financial mechanisms to support those experiencing NELs-BES

Financial mechanisms to respond to NELs-BES include loans, grants or insurances (Durand et al., 2016). While a great variety of such mechanisms exists, the Parties of the UNFCCC and the Paris Agreement agreed on establishing the funding arrangements and the Fund for responding to Loss and Damage as a unified instrument. This new funding arrangement aims to assist developing countries that are particularly vulnerable to the adverse effects of climate change in responding to loss and damage, and was established at COP27 in 2022 (Decision 2/CMA.4, 2/CP.27, UNFCCC, 2023). The establishment of the Fund marks a pivotal moment in responding to NELs and can serve as a starting point for building similar initiatives at national scales. For example, the Government of Vanuatu is already in the process of establishing a National Loss and Damage Fund to support and enable rapid, equitable and contextualized disbursements to affected individuals and groups, such as small-scale fishers, whose food security and livelihoods are affected when fish stocks decline due to climate change (Waiwai et al., 2023).

The establishment of the Fund for responding to Loss and Damage marks a pivotal moment in responding to NELs and can serve as a starting point for building similar initiatives at national scales.

While the current financial mechanisms do, rightly, face criticism, in some circumstances such monetary interventions can still help repair, recover or replace what was lost.

Ultimately, it must be ensured that any financial mechanism established to avert, minimize and address NELs-BES is inclusive, granting access for marginalized and vulnerable groups.

In Bangladesh, for example, the loss of freshwater provisioning was addressed through grants to construct deep-water tube wells, which restored access to safe drinking water (Water Justice Fund, n.d.). Another example is the R4 Rural Resilience Initiative, which was developed from the Ethiopian Horn of Africa Risk Transfer for Adaptation programme. This programme was jointly developed by Oxfam America, the Relief Society of Tigray and Swiss Re and included an "insurance-for-work" programme. It allowed cash-poor farmers to pay their crop insurance premiums through labour contributions to community-identified projects aimed at reducing risks, such as land restoration efforts (Oxfam America, 2013). By engaging in activities like catchment treatment, gully reclamation and compost production, farmers enhanced their own resilience by profiting from the protection of the crop-insurance and enhancing the resilience of the ecosystems they depend on.

Ultimately, it must be ensured that any financial mechanism established to avert, minimize and address NELs-BES is inclusive, granting access for marginalized and vulnerable groups. Some initiatives such as the Water Justice Fund, for example, ensure that women and girls, as a marginalized group, are participating in grant utilization decision-making, helping to address their needs in responding to losses (Water Justice Fund, n.d.).

Importantly, financial mechanisms should also apply environmental safeguards to prevent unintended harm to ecosystem services and biodiversity, for example to prevent natural resources from being overexploited in the process of responding to losses.

2.B.v Adapting and diversifying livelihoods

Another type of action to avert, minimize and address NELs-BES is adaptation of livelihood strategies. The IPCC (2022a) cautions that such livelihood changes are highly dynamic and often remain reactive to any ongoing risk and loss, posing the risk of maladaptive shifts like intensification of farming, which in turns leads to deforestation. Nevertheless, adapting livelihood strategies can evidently be an efficient action to avert, minimize and address NELs-BES. Examples from Kenya and the Solomon Islands (Unitarian Universalist Service Committee, 2024; Secretariat of the Platform on Disaster Displacement and the Global Network of Civil Society Organisations for Disaster Reduction, 2024) include different, small-scale interventions, such as adjusting agricultural practices to mitigate climate change impacts on agroecosystems and developing water harvesting techniques to sustain freshwater supply. In Vanuatu, fishers are adapting to the loss of coral reef fish by introducing backyard tilapia farming (Waiwai et al., 2023). Such adaptation measures are particularly relevant for communities whose livelihoods directly depend on ecosystems and their services, such as small-scale fishers who depend on the provision of climate-sensitive marine resources for securing food and income.

Adapting livelihood strategies can evidently be an efficient action to avert, minimize and address NELs-BES.

Livelihood strategies can also be diversified to reduce dependency on the livelihood that is impacted by NELs-BES. For instance, in Kenya, women are diversifying their livelihoods to reduce their dependency on ecosystems. These practices often focus on women as the main recipient of capacity-building initiatives and investments in order to also support empowerment and gender equity (Secretariat of the Platform on Disaster Displacement and the Global Network of Civil Society Organisations for Disaster Reduction, 2024).

2.B.vi Developing community capacities to cope with and adapt to NELs-BES

Developing capacity strengthens the agency of communities to actively avert, minimize and address NELs-BES, rather than passively facing the impacts of climate change.

Developing community capacities is also key to accelerating action to avert, minimize and address NELs-BES and their cascading impacts on communities. McNamara et al. (2021) found that, in the context of Pacific small Island states, people affected by NELs-BES strongly prefer education and training to enable them to reduce the risk of these losses, and to help them cope with, and adapt to, them. Such capacity development can include training programmes in community-led coastal and marine resource protection, such as that provided in Vanuatu (Waiwai et al., 2023; Stephens et al., 2023), which can enhance sustainable ecosystem management and thereby reduce NELs-BES. Developing capacity strengthens the agency of communities to actively avert, minimize and address NELs-BES, rather than passively facing the impacts of climate change.

2.B.vii Implementing nature-based solutions and/or ecosystem-based approaches

Implementing NbS and/or ecosystem-based approaches to restore and conserve ecosystems has the potential to avert, minimize and address NELs-BES and their cascading impacts. The term ecosystem-based approaches is often used to describe a specific subset of NbS: for example, ecosystem-based adaptation is a NbS for climate change adaptation and mitigation. The three Rio Conventions, as well as the Sendai Framework for Disaster Risk Reduction, commonly refer to "nature-based solutions and/or ecosystem-based approaches" (UNFCCC, n.d.-b; UNDRR, 2020), which is why this wording was adopted for this paper. When adhering to the global standards for NbS of the International Union for the Conservation of Nature (IUCN, 2020), the implementation of NbS and/or ecosystem-based approaches, specifically through ecosystem-based adaptation and ecosystem-based disaster risk reduction, can therefore be considered the most effective action in the context of NELs-BES.

These approaches use sustainable management to maintain ecosystems' protective capacities (Sudmeier-Rieux et al., 2021; Walz et al., 2021) and reduce the overall risks – current and future – of climatic and non-climatic hazards (Estrella and Saalismaa, 2013; McVittie et al., 2018; Secretariat of the Convention on Biological Diversity, 2009). In Egypt, for example, local practices include reed fencing to promote the formation of sand dunes that reduce flood impacts (United Nations Economic and Social Commission for Western Asia, 2024). In Vanuatu, coral transplantations and restoration of beach forests and mangrove zones are being used to mitigate storm and flood impacts (Waiwai et al., 2023). Such approaches do not only provide adaptation and risk reduction benefits, but also support biodiversity conservation and ecosystem integrity (Key et al., 2022). This increases the capacity of ecosystems to cope with, and adapt to, climatic stressors and to continuously provide ecosystem services, thereby minimizing NELs-BES, even in the face of climate change impacts.

Implementing financial mechanisms to ensure the long-term protection of ecosystems and their services can further advance the contribution of NbS and/or ecosystem-based approaches to averting, minimizing and addressing NELs-BES.

Implementing financial mechanisms to ensure the long-term protection of ecosystems and their services can further advance the contribution of NbS and/or ecosystem-based approaches to averting, minimizing and addressing NELs-BES. In Mexico and Hawaii, for example, funding mechanisms have been established to insure coral reefs for the critical

Despite evidence for the effectiveness of NbS and/or ecosystem-based approaches and their contribution to building the climate resilience of vulnerable communities and the ecosystems they depend on, only 1.4 per cent of global climate finance is invested in these solutions.

ecosystem service they provide of dissipating wave energy and mitigating storm hazards. When a wind speed threshold is exceeded during a storm event, funding is released to repair reef damage and to re-establish the protective capacities of the reef (Coral Restoration Consortium, 2023). Despite evidence for the effectiveness of NbS and/or ecosystem-based approaches and their contribution to building the climate resilience of vulnerable communities and the ecosystems they depend on, only 1.4 per cent of global climate finance is invested in these solutions. Therefore, the Partnership on Ecosystems for Disaster Risk Reduction called for upscaling investments in NbS, specifically to avert, minimize and address NELs in light of the UNFCCC COP27 in 2022 (Partnership on Ecosystems for Disaster Risk Reduction and Friends of Ecosystem-based Adaptation, 2023). Further, the global standards of the IUCN demand that NbS be mainstreamed into jurisdiction to ensure they are continuously supported by national policies and plans in the long term (IUCN, 2022).

2.B.viii Integrating actions to address NELs-BES in policies and planning

Ultimately, integrating NELs-BES into policies and planning and creating a more enabling environment is key to promoting actions that avert, minimize and address such losses.

Ultimately, integrating NELs-BES into policies and planning and creating a more enabling environment is key to promoting actions that avert, minimize and address such losses. NELs-BES can, for example, be mainstreamed into national efforts to combat climate change and its impacts. Vanuatu exemplified this by revising their nationally determined contributions and committedly calling for finance to address losses, including intangible and non-economic losses, as well as to assess and quantify NELs, particularly through Post Disaster Needs Assessments (PDNAs) (Waiwai et al., 2023). This approach is unique, as only a minority of PDNAs report on loss of ecosystem services, and they rarely provide disaggregated values, which limits understanding (Janzen et al., 2021). The approach of Vanuatu to embed the assessment of NELs, including ecosystem services losses, into policy, can serve as a blueprint for other States. To facilitate uptake of this approach, however, data and capacity constraints need to be addressed first. Many countries have capacity constraints when it comes to collecting the baseline data needed to assess NELs (Jeggle et al., 2018). This issue is reflected in the limited institutionalization of tracking systems at a national level. Further, many countries are only able to conduct PDNAs when they are externally supported to do so: using these plans to upscale reporting on NELs-BES would thus require continuous assistance for affected countries that do not have any monitoring capacities themselves.

2.C Lessons learned from losses to biodiversity and ecosystem services

Lesson 1: The multiple dimensions of NELs-BES are not yet sufficiently visible.

NELs-BES are often still considered in isolation, although there is ample evidence of the cascading impacts of NELs-BES on the entire socio-ecological system.

NELs-BES are often still considered in isolation, although there is ample evidence of the cascading impacts of NELs-BES on the entire socio-ecological system. While science has often emphasized the important role biodiversity, ecosystems and their services play for human life, health and well-being (Millennium Ecosystem Assessment, 2005; IPBES, 2019; IPCC, 2022a), their importance still appears to be unrecognized or neglected in some instances. This hinders the acceleration of efforts to conserve and restore ecosystems and therefore to avert, minimize and address NELs-BES.

Lesson 2: It is essential to raise awareness on these losses, taking the perspectives of affected communities in particular into consideration.

This chapter builds on local case studies submitted to the NELs expert group to communicate local experiences of NELs-BES and to highlight practices to empower affected communities to cope with, and adapt to, climate change and its impacts. Considering such local examples can help to build a better understanding of the cascading impacts of NELs-BES and to design context-specific actions based on existing knowledge and best practices. This is why it is also essential to engage with multiple actors to respond efficiently and inclusively to NELs-BES. Including local communities in restoration actions, for example, is key to ensuring that the measures implemented are mindful of local needs. Other, often marginalized groups, such as women, Indigenous communities, persons with disabilities or youth also need to be included (Water Justice Fund, n.d.). Policy formulation, planning and implementation must incorporate the perspectives of these actors, not only to reduce their vulnerabilities to NELs-BES, but also to formulate and apply social safeguards when addressing losses. When developing financial mechanisms to address NELs it is also key to integrate these perspectives in order to ensure, for example, that poor households have access to insurance schemes and grants, or that women and girls have equal decision-making authority on how funds directed to their communities should be used.

Including local communities in restoration actions, for example, is key to ensuring that the measures implemented are mindful of local needs. Other, often marginalized groups, such as women, Indigenous communities, persons with disabilities or youth also need to be included.

Lesson 3: Monitoring and reporting is essential for developing and implementing actions to avert, minimize and address NELs-BES.

Monitoring and reporting on ecosystem services and biodiversity is crucial, as it can illuminate the multifold benefits that ecosystems provide, and the damage NELs-BES

Increased monitoring and reporting efforts require more funding to improve institutional data collection capacities.

cause, to the socio-ecological system. Increased monitoring and reporting efforts require more funding to improve institutional data collection capacities (Jeggle et al., 2018; Vysna et al., 2021). There is a further need to establish ecosystem inventories in order to have baseline data against which changes in ecosystem services and biodiversity can be tracked (Janzen et al, 2021). Key challenges in this context concern financing, but there are also questions surrounding the valuation of ecosystem services and biodiversity for NELs-BES reporting. While some provisioning ecosystem services can be expressed in monetary terms, such as crop yield, others, for example regulation of extreme events, cultural services such as inspiration through nature, and biodiversity itself, are intangible and cannot be valued the same way (Bartkowski et al., 2015; IPBES, 2019).

Another challenge remains regarding slow onset events. Many insurance schemes require that a specific threshold is passed (e.g. wind speed during a hurricane) to initiate pay-outs for losses, but slow onset events, such as droughts or sea level rise, do not have a clearly identifiable trigger. Consequently, affected communities receive limited or no monetary remedy, even though they experience losses, including NELs-BES. Continuously monitoring ecosystem services and biodiversity against a baseline could help track such changes, and, in combination with financial mechanisms specifically targeted at slow onset events, address this challenge.

Lesson 4: It is not only the losses related to NELs-BES that are interlinked: the solutions to tackling them should be too.

Since NELs-BES can trigger a chain reaction of adverse impacts, it is not sufficient to only manage those losses that have already arisen. It is important to design and implement actions to avert and minimize NELs-BES in the first place, including through tackling the root causes of climate change. In this context, NbS and/or ecosystem-based approaches can be a powerful tool, as they make it possible to harness the natural potential of ecosystems for reducing and mitigating the risks of disaster, thus minimizing the risk of NELs-BES.

At the same time, NbS and/or ecosystem-based approaches can increase the resilience of ecosystems, and as healthy and resilient ecosystems are less susceptible to climate pressures, this can help avert NELs-BES. It is important to acknowledge that how ecosystems are managed can change their susceptibility to loss associated with climate change. Unsustainable management, such as overexploiting forest ecosystems for timber, can make these ecosystems more susceptible to the impacts of short-term events or longer-term climatic changes, while forest restoration with native tree species contributes to the continued provision of ecosystem services and maintains biodiversity.

It is important to design and implement actions to avert and minimize NELs-BES in the first place, including through tackling the root causes of climate change.

Consequently, developing and implementing appropriate solutions that follow the IUCN global standards for NbS is essential to avert, minimize and address NELs-BES. Here, future climate projections should also be considered to ensure that NbS are adaptive and effective in the long term, even under changing climatic conditions (Gómez Martín et al., 2021). Being mindful of this when designing NbS and/or ecosystem-based approaches can avoid potential maladaptation and resulting additional NELs-BES.

3

Loss of territory and habitability

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3.A Overview of loss of territory and habitability, and its interlinkages with other NELs

This section focuses on the loss of territory (i.e. physical land that is lost to the jurisdiction of an established politically organized collective) and loss of habitability (i.e. habitable land that is no longer able to support and sustain human life). At their core, loss of territory and loss of habitability involve the loss of land, either as physical land or habitable land, due to climate change hazards such as sea level rise, desertification, glacial retreat, flooding, storm surge and coastal erosion (Ekoh et al., 2023; Wündisch, 2019; Table 1).

Table 1: Examples of slow onset hazards and impacts that contribute to loss of territory and/or habitability

 **SEA LEVEL RISE**	• Salinization of soils and reduced crop yields in cultivated areas • Salinity intrusion into coastal aquifers reduces the quality of drinking water and reduces fish production • Loss of territory through inundation • Damage to coastal ecosystems weakens protection mechanisms against floods, storms, tsunamis and typhoons, leaving populations more exposed to the risks of displacement • Sea level rise can progressively decrease the habitability of an area until a tipping point is reached
 **DESERTIFICATION**	• Food and nutritional insecurity due to losses in agricultural productivity and income • Decreasing quality and quantity of water, thus reducing the availability to meet water, sanitation, hygiene and production needs • Can act as a threat multiplier for drought, in that repeated, severe droughts may force people to abandon their pastoralist or agropastoralist lifestyle as it becomes unviable • Can lead to loss of territory through the encroachment of sand dunes (e.g. an estimated 23 ha of land are lost to desertification per minute, with concomitant losses to homes, fields and livelihoods)
 **GLACIAL RETREAT**	• Rising temperatures and pollution can cause glaciers to melt and retreat which can decrease the level of river flows, cause glacial-lake outburst flooding or permafrost melt, affecting the resources that are relied on by mountain populations • Polar regions are altered by permafrost melt, which causes the sinking of the earth's surface, or subsidence, as well as coastal erosion

Source: Internal Displacement Monitoring Centre, 2017.

A loss of territory causes the people of that collective, and under whose jurisdiction the territory falls, to experience a reduced ability to derive a level of political self-determination in their place.

As a normative concept, territory describes a place under the jurisdiction of an agent, where the agent is a politically organized collective with a degree of self-determination because of its jurisdictional rights over that place. A loss of territory causes the people of that collective, and under whose jurisdiction the territory falls, to experience a reduced ability to derive a level of political self-determination in their place (Mancilla and Baard, 2023; Wündisch, 2019). The loss of entire territories, which threatens the right to exist, has been discussed in the context of small island developing States such as the Maldives, Tuvalu and Kiribati (Mancilla and Baard, 2023), yet partial loss of territory will be far more pervasive (Wündisch, 2019). For example, in Uganda, the River Semliki is widening and changing course due to flooding and altered weather patterns, meaning local farmers' lands are being lost across the country border to the Democratic Republic of the Congo (Kaddu et al., 2023; Talanoa, 2010). For countries like Bangladesh, 18 per cent of coastland may be inundated by 2080, adding further pressure to the 13.3 million people that are already likely to be displaced internally as a result of partial territory loss by 2050 (Khan et al., 2021).

The loss of land is also linked to the loss of habitability, which can be understood as the (perceived) capacity of a socio-ecological system to sustain and support human life and provide economic opportunities which contribute to health and well-being (Bennett et al., 2019; Duvat et al., 2020; Spencer et al., 2023). Uninhabitable landscapes affect life plans that are bound to that place (Draper, 2023; Mancilla and Baard, 2023) and can degrade the feeling of control that agents have over their territory by affecting their access to its resources (Mancilla and Baard, 2023). This is critical to consider, as it is likely that the consequences of compounding physical changes on living conditions will make many coastal areas uninhabitable long before global sea level rise causes permanent inundation and loss of territory (Duvat et al., 2022). Along Arctic and Alaskan coasts, for example, permafrost thawing and sea ice loss, and temporary and permanent flooding due to more ice-free open water and diminished coastal protection threaten community livelihoods, basic subsistence, coastal settlements and infrastructure through shoreline retreat and inland collapse (Albert et al., 2017; Archer et al., 2017; Spencer et al., 2023).


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The availability of sufficient and safe land, along with access to fresh water, food supply, safe settlements and infrastructure, and sustainable economic activities, have been identified as the five habitability pillars which are directly affected by climate change impacts.

The availability of sufficient and safe land, along with access to fresh water, food supply, safe settlements and infrastructure, and sustainable economic activities, have been identified as the five habitability pillars which are directly affected by climate change impacts (Duvat et al., 2020). Habitable land is considered the 'major habitability pillar', critical to settlements and infrastructure, freshwater and food supply, economic activities, and natural vegetation development in habitability systems such as atoll islands and Arctic coasts (Duvat et al., 2020; Spencer et al., 2023). Irreversible changes to land and/or the overshoot of land-related thresholds are critical to understand in order to determine climate risk severity in these low-lying coastal settlements (Duvat et al., 2020; Spencer et al., 2023).

Yet habitability and uninhabitability are not solely material phenomena. Instead, they are relational to specific cultures, cosmologies and relations to land, they unfold as processes over time, are experienced differently by different people depending on perceived thresholds of uninhabitability, and are shaped by human and environmental characteristics of multiple places (Farbotko and Campbell, 2022). Climate-affected populations can be disempowered when their wider notions of what makes their place acceptable to live in are not considered, with flow-on effects on planning, investment and security (Farbotko and Campbell, 2022). A solely material understanding of habitability, for example, could provide a habitability threshold that is lower than the local population's (Farbotko and Campbell, 2022). Similarly, communities can reach a 'social tipping point' – causing people to move or want to move – before a climate tipping point is reached (Platform on Disaster Displacement, 2020).

The link between loss of land (i.e. loss of territory and/or habitability) and human mobility is well established. As areas gradually become less habitable and land is lost, increased human mobility can be expected as an impact and response, in the form of displacement, migration and planned relocation. Displacement as a result of slow onset climate change processes such as desertification and sea level rise, however, can be more difficult to identify than that resulting from a sudden-onset disaster such as flooding or storms (Internal Displacement Monitoring Centre [IDMC], 2017). Since the 1970s, over 400 planned relocations have been identified across 78 countries (Bower and Weerasinghe, 2021; International Organization for Migration, 2022). Various case studies from multiple contexts have demonstrated the link between land loss and human mobility:

- In the case of Bangladesh, for example, the loss of physical territory and habitability has caused extensive internal displacement over time. Drivers of displacement in coastal areas can include higher tidal waters and flooding, land subsistence, continuous squeezing of tidal plains, and saline water intrusion (which can reduce freshwater availability and soil fertility), while in riverine areas, communities face significant riverbank erosion and flooding, forcing people to move and rebuild their lives (Ayeb-Karlsson et al., 2016; Displacement Solutions, 2012). As a local from Singpur explained: "I experienced the extreme effect of riverbank erosion in 2010 when 25 houses [in the village] went under water over a night. Several crop fields were also damaged. We lost everything…We never managed to overcome the damages of this disaster. Now we are close to being landless people" (Ayeb-Karlsson et al., 2016: 685).

As areas gradually become less habitable and land is lost, increased human mobility can be expected as an impact and response, in the form of displacement, migration and planned relocation.

- In Fiji, Tropical Cyclone Yasa caused extensive land instability, affecting the safety and structure of homes throughout Nabavatu village. More than half of all households were displaced and sought refuge for years in a 'tent village' while they waited to be permanently relocated to a new community site (Unitarian Universalist Service Committee [UUSC], 2024).

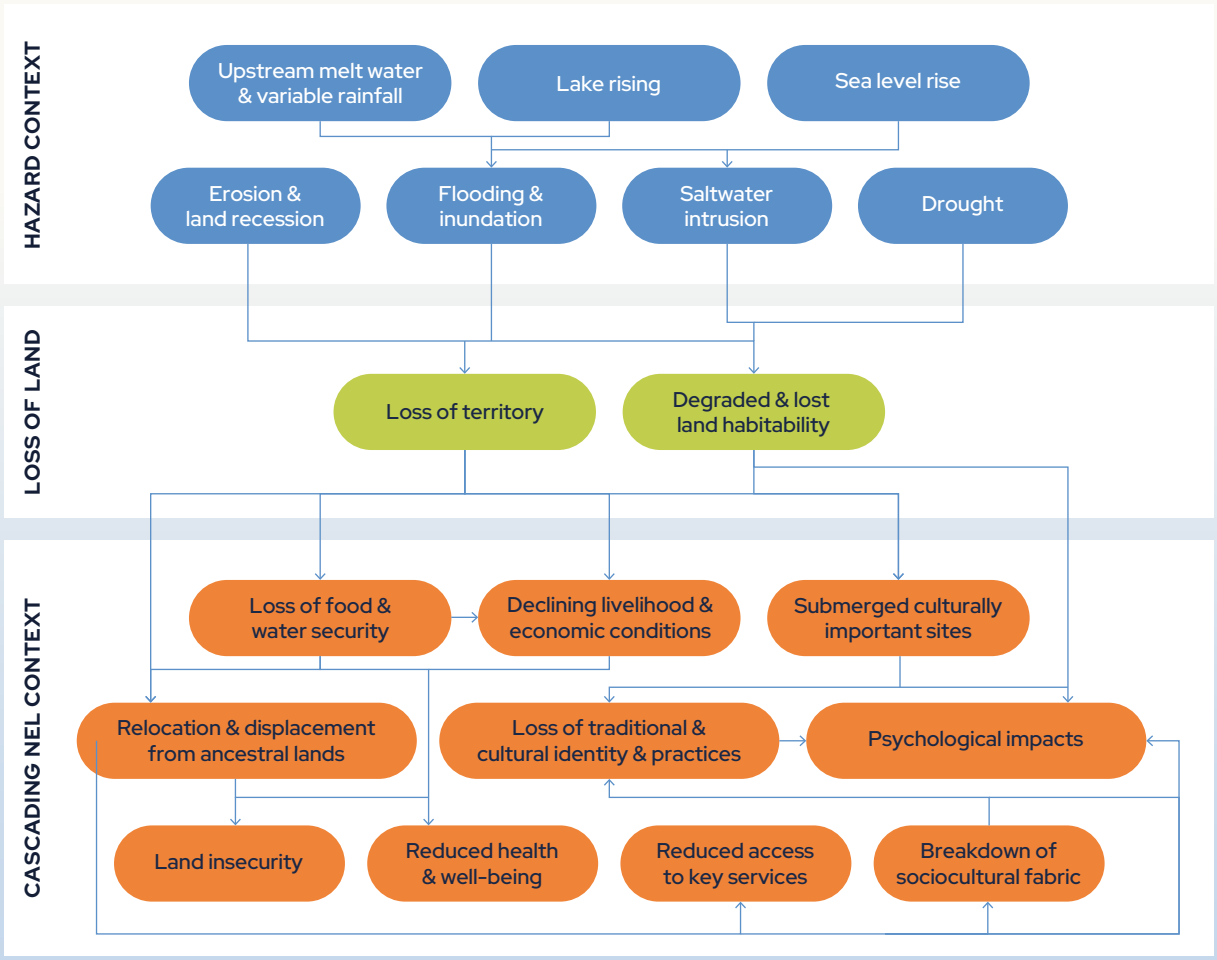
The case studies and literature have demonstrated how the loss of territory and/or habitability causes a chain reaction of further losses, causing harm to many aspects of a socio-ecological system.

- In the north of Ghana, the scarcity of fertile land and resulting low crop yields, and unreliable harvests as a result of high rainfall variability and droughts were seen as contributing environmental push factors for migration to urban centres, causing a "figurative and literal desiccation of self and place in these landscapes" (Tschakert et al., 2013: 24).

- In the Dominican Republic, the community of Boca de Cachón was relocated a few kilometres to higher ground in 2014 due to rising waters in Lake Enriquillo. Despite reducing exposure to rising waters and improving access to education and health, the villagers' livelihoods were negatively affected as the new site was far from the road used to sell their products, increasing their vulnerability (Pérez and Tomaselli, 2021).

The case studies and literature have demonstrated how the loss of territory and/or habitability causes a chain reaction of further losses, causing harm to many aspects of a socio-ecological system (Westoby et al., 2021). Explored below are some examples of these interlinkages between loss of territory and habitability, and loss of well-being and identity, cultural heritage, community and social cohesion, and biodiversity and ecosystem services (Figure 3).

Figure 3: Some examples of cascading impacts of loss of territory and habitability to a socio-ecological system



Loss of territory and habitability can have cascading implications on physical and mental health and well-being.

Loss of territory and habitability can have cascading implications on physical and mental health and well-being. Loss of territory can, for example, affect accessibility to health services due to displacement to isolated locations (Displacement Solutions, 2012) or destroyed infrastructure. An example of the latter is illustrated by the Endorois people's experience in Lake Bogoria, Kenya, where medical clinics and hospitals once located near the rising lake were submerged, resulting in the loss of maternity services and rising maternal mortality rates, deaths of children, and the need to "walk several kilometres elsewhere to access even basic medicines" (Climate Refugees, 2023). Risks of waterborne diseases can also increase as clean water springs and pit latrines are submerged, or people are displaced to temporary settlements with inadequate living standards and sanitation (Climate Refugees, 2023).

The loss of territory can also result in exposure to new hazards or threats, endangering physical health and security. For the Ilchamus communities facing submerging land in Lake Baringo in Kenya, for example, loss of land is resulting in increased wildlife incursions, as well as increased exposure to conflict, resulting in multiple levels of insecurity (Climate Refugees, 2023). Women and young girls are also forced to walk further in search of water, which can expose them to gender-based violence (Climate Refugees, 2023). Similarly, in Lake Turkana of Kenya, the children of the El Molo minority are no longer able to walk to school due to rising lake waters and must use a boat to cross the lake – a financially difficult and dangerous activity (Climate Refugees, 2023). The experience of Denimanu village on Yadua Island, Fiji, also demonstrated how relocation, although reducing exposure to coastal threats, resulted in increased vulnerability to new dangers such as landslides: this was as a result of the new settlement being located on a hillslope, coupled with clearing of land for the new village, inadequate site drainage and soil erosion (Piggott-McKellar et al., 2019).

The loss of territory can also result in exposure to new hazards or threats, endangering physical health and security.

Impacts on emotional and mental health as a result of loss of territory or habitability have also been documented in several contexts (Climate Refugees, 2023; Ndhlovu and Kusseni, 2024): in Vunidogoloa in Fiji, a lingering sense of grief and sadness emerged as community members had to leave their homes (Charan et al., 2017; McNamara and Jacot des Combes, 2015), and in the north of Ghana reduced habitability (i.e. drying water sources, failing agriculture and loss of scenic beauty) resulted in sadness, fear and helplessness as expressions of solastalgia (Tschakert et al., 2013). Also affecting health and well-being are the cascading impacts on the social and cultural dimensions of people's lives, as is discussed in the sections below.

In terms of interconnections with cultural heritage, the loss of territory and/or habitability is intimately tied with the loss of tangible and intangible cultural heritage, because the disconnection from the land affects people-environment interactions, resulting in weakened knowledge transference and changed ways of being.

In places such as the Pacific Islands, health and well-being are understood holistically: "If we are healthy, then we must be physical, mental, emotional, social and cultural healthy or fit" (McNamara et al., 2021: 6). In the Pacific Islands context, deep-rooted cultural and spiritual attachments to land mean that place can be an extension of 'self' (Gharbaoui and Blocher, 2018). Campbell (2019) suggests that loss of territory and/or habitability due to climate change can threaten material, social and cultural security, and ultimately 'ontological security'. This relates to a "feeling of continuity in one's life that is based on a sense of belonging and confidence in one's identity", which is difficult to re-establish and impossible to compensate (Campbell, 2019: 4). Villagers in Vunidogoloa in Fiji, for example, were relocated after in situ risk reduction initiatives proved ineffective against seawater inundation, and although able to move within customary land boundaries, the villagers still experienced significant psychological stress and the loss of identity and belonging (Edwards, 2014). Connection to the land and the environment, and the traditions and customs associated with the land are significant for a Fijian community, forming part of their identity (Barnett et al., 2022). In the Pacific Island context, concerns have also been expressed for the capacity of youth and future generations to maintain a sense of security and identity: "They [young people] must wonder, 'will I be able to live in my home when I am older, and if not, how can I prepare to live elsewhere? Will I be welcome?'" (McNamara et al., 2021: 7). Similar degradations in identity have been illustrated by the experience of the Sena people in Maseya, Malawi, who faced loss of territory and relocation to smaller plots of land with little space for cultivation. This separated them from their traditional identity as custodians of land and pastoralists, resulting in losses in their sense of belonging and confidence in identity: "Here we are just like children without land and we are not even respected. We feel empty and helpless. I personally feel as if I am walking naked" (Ndhlovu and Kusseni, 2024).

In terms of interconnections with cultural heritage, the loss of territory and/or habitability is intimately tied with the loss of tangible and intangible cultural heritage, because the disconnection from the land affects people-environment interactions, resulting in weakened knowledge transference and changed ways of being. Inundation and coastal erosion, which can lead to territory loss, can, for example, result in the direct loss of cultural sites and sacred places (McNamara et al., 2021). In Sese village and Togoru settlement, in Fiji, for example, the loss of sacred burial grounds has threatened cultural, spiritual and kin-based relations and connections to ancestors (Nand et al., 2024; Yee and McNamara, 2023). Such losses are intolerable given the immense importance of burial grounds to Fijian people, playing a crucial role in the cultural, social and spiritual fabric of community (Vave et al., 2023). As a local from Togoru settlement expressed: "Our loved ones who have passed away – when we bury them, we say 'sili vakarua' ('bath twice') because one is the bath before they are put in the coffin, and they bath again after they are buried as the waves come in and enter the new burial site. This is just traumatizing for us…" (Yee and McNamara, 2023: 99). Similarly, increased coastal erosion on the island of Kosrae in the Federated States of Micronesia is affecting the burial rituals and practices of residents (Monnereau and Abraham, 2013). The loss of these burial grounds has triggered other cascading impacts on people's well-being, cultural traditions and heritage, and social and family cohesion.

Losing land, either through inundation or displacement, can also mean the loss of the "place of practicing our custom songs and dances" – that is, the places that give rise to intangible cultural heritage, and then also self-esteem and identity.

Losing land, either through inundation or displacement, can also mean the loss of the "place of practicing our custom songs and dances" – that is, the places that give rise to intangible cultural heritage, and then also self-esteem and identity (Campbell, 2019; McNamara et al., 2021: 1242; Movono et al., 2018). For the Sena people in Maseya, Malawi, for example, the loss of territory and relocation to smaller plots of land has meant that cultural practices that affirm group identity are no longer practised.

The physical loss of territory and resulting displacement or relocation can also affect social cohesion by "decimat[ing] tribal/extended family networks that were custodian to traditional titles, family lands etc".

The practice of 'Gowero', for example, is becoming lost due to the lack of space to celebrate the tradition: "This is our tradition, but with limited land which we have, we cannot do this anymore. There are reasons why our forefathers introduced this which now we can no longer honour and we have failed them" (Ndhlovu and Kusseni, 2024). Further, in the Marshall Islands, there is significant concern for the loss of cultural knowledge and practice (e.g. weaving, or stories and proverbs) that will follow from the loss of the specific parcels of land, and associated traditional resources, that these practices are tied to (Marshall Islands submission, 2023).

The physical loss of territory and resulting displacement or relocation can also affect social cohesion by "decimat[ing] tribal/extended family networks that were custodian to traditional titles, family lands etc" (McNamara et al., 2021: 8). Relocation and displacement can mean that families and communities become geographically fragmented, social traditions and connections are lost due to increased exposure to outside influences, and communal ways of life are lost due to the non-traditional set up of new villages and housing (Albert et al., 2018; Nand et al., 2024). The displacement of locals in Nabavatu village in Fiji as a result of extensive land instability from Tropical Cyclone Yasa, for example, meant that half of all households sought refuge in a 'tent village', where strained communal unity and tensions between those in the old and new/displaced site emerged (UUSC, 2024). Other community-driven relocations in the Solomon Islands and Alaska showed similar issues, such as a reduced sense of community and degraded community life due to the inability to continue annual gatherings and traditions (Albert et al., 2018).

Lastly, the loss of land is also intricately linked with the loss of biodiversity and ecosystem services, especially through the loss of habitability. The loss of land, as a 'major habitability pillar', can have cascading impacts on ecosystem services such as freshwater and food provision. In the island atoll context, for example, land area loss and inundation can cause salinization, decrease fresh groundwater availability and reduce the extent and quality of arable land for food (Duvat et al., 2020). Similarly, in Assasuni Upazila in Bangladesh, where residents endure five to six months of inundation in saline water annually, which is exacerbated by sea level rise, an increasingly significant amount of land and groundwater are becoming saline, and contaminated with iron and arsenic (Water Justice Fund, n.d.). Another example from Cedeño in Honduras demonstrates how inundation and loss of territory can result in cascading losses to marine ecosystem services: the inundation of a shrimp processing factory resulted in the contamination of local waters and reduced access to safe food supply for local fishers who were having to travel further offshore (Office of the United Nations High Commissioner for Human Rights, 2024).

The availability of sufficient and safe land can also be dependent on a series of ecosystem services. Adequate land, for example, is dependent on the quality of soil on the available land area, which is then also critical for food provision. The persistence of land, especially in coastal areas, can also be dependent on supporting ecosystems. Examples include reef ecosystems, which provide the island with sediment and reduce wave energy reaching the coastline, or mangroves, seagrass and natural strandline vegetation which stabilize shoreline systems and limit erosion and marine flooding (Duvat et al., 2020). Ecosystem degradation and a loss of ecosystem services can also result in relocation (and the loss of, or detachment from, land and territory) as people are forced to move due to reduced habitability, an inability to meet basic needs (i.e. food and water insecurity) and losses to local people's sense of place, affecting the level of political self-determination that they can derive from that place.

The loss of land, as a 'major habitability pillar', can have cascading impacts on ecosystem services such as freshwater and food provision.

3.B Spectrum of actions to avert, minimize and address loss of territory and habitability

A series of immediate/early and long-term initiatives and adaptation efforts have been adopted in the face of losses to territory and habitability. These responses are often dependent on the type of hazard and cascading impacts experienced by a community.

A series of immediate/early and long-term initiatives and adaptation efforts have been adopted in the face of losses to territory and habitability. These responses are often dependent on the type of hazard and cascading impacts experienced by a community. Disaster risk reduction plans, climate change adaptation and mitigation strategies, and support for the livelihoods and human capital of vulnerable groups can help people to cope with changes and migrate safely, as well as prevent or delay displacement, the ultimate impact of territory and/or habitable land loss (IDMC, 2017). Below, we focus on the strategies of humanitarian relief, landscape protection and restoration, and planned relocation.

3.B.i Humanitarian relief

Providing relief, the immediate support given to minimize suffering and meet basic human needs, emerged as a key component in addressing the loss of territory and habitable land.

Providing relief, the immediate support given to minimize suffering and meet basic human needs, emerged as a key component in addressing the loss of territory and habitable land. Relief is given directly before, during or immediately after a disaster to save lives, reduce health impacts, ensure public safety and meet basic subsistence needs. Humanitarian relief is especially necessary where loss of territory and habitable land leads to displacement and concomitant cascading NELs impacts. People displaced by loss of territory and habitable land, their communities of origin and of refuge, face different impacts on their livelihoods, health, security, housing conditions, social life, education and environment (IDMC, 2017).

Temporary shelters can range from evacuation buildings within a village, to areas linked to a customary land tenure system, or temporary settlements set up elsewhere by external agencies for those in high-risk areas (Albert et al., 2018; Climate Refugees, 2023; UUSC, 2024). In Mexico, for example, Hurricane Stan caused the saturation of riverbeds and thus severe flooding and mudslides in 800 localities of Chiapas, resulting in more than USD 2 million in damage and the evacuation of approximately 92,000 people from their villages to improvised accommodations in schools, auditoriums or other public buildings, before they were relocated as far as 150 kilometres away from the affected villages for 15 days to 6 months (Díaz-Leal, 2017; Pérez and Tomaselli, 2021). Humanitarian relief is then needed to address the disconnection from land, water and food sources, community and shelter resulting from displacement. The Indigenous Sena tribe of Maseya, for example, faced significant food insecurity after being relocated as they were left with little space for cultivation (Ndhlovu and Kusseni, 2024). Beyond food, water, shelter and livelihoods, security and safety are also important. In Singh, Pakistan, for example, Oxfam and its local partners established safe spaces and healthy learning environments for flood-affected displaced women and girls (Oxfam, 2023b).

Funding for localized and community-level humanitarian relief from loss and damage is also critical, especially in ways that build on existing local capacity and which are operationally efficient and scalable. Too often, insurance is not a viable option for vulnerable communities who are then left with minimal resources to address losses

Two examples for deploying funding to communities facing loss and damage to territory and habitability include the Climate Bridge Fund in Bangladesh and the UNCDF microinsurance product in Vanuatu.

(Waiwai et al., 2023). Two examples for deploying funding to communities facing loss and damage to territory and habitability include:

1. The Climate Bridge Fund in Bangladesh, which disperses funding to local civil society organizations to support adaptation activities for communities who have been displaced or are at risk of being displaced by the climate crisis. It has been used as a mechanism to support those affected by loss and damage by funding activities such a livelihood development, psychological counselling, developing climate-resilient infrastructure and delivering health and educational services. Although an important potential model for how humanitarian relief can be operationalized, emerging challenges include the fact that there is significantly more demand than can be deployed (e.g. the Climate Bridge Fund received 102 applications but was only able to fund 4 in 2020, or received 110 and funded 18 in 2021), and that some projects took longer to implement due to the need to prove their potential for generating sustainable impact. As well as this, future projections were also not always adequately considered, the Secretariat observed challenges in differentiating between development and climate-adaptation activities, and local civil society organizations faced challenges from local authorities in selecting project locations and participations (International Centre for Climate Change and Development, Bangladesh Rural Advancement Committee and Climate Bridge Fund, 2023).

2. The UNCDF launched a microinsurance product in Vanuatu that was designed to protect climate-vulnerable populations such as the poor, women and girls, Ni-Vanuatu families and people with disabilities against adverse financial impacts of extreme weather hazards. It provides a quick injection of relief funds within 10–14 days following a disaster (Waiwai et al., 2023).

Financing of loss of land must be able to tackle the short-term humanitarian needs of affected communities by finding suitable lands for temporary shelters, but also address the long-term needs relating to permanent relocation.

A case study from Sri Lanka has illustrated how disseminating support through existing community structures is not always equitable and inclusive. Farmer and irrigation societies in Sri Lanka are often used as the main mechanism through which government-led support is channelled, yet land ownership is a key criterion for membership, meaning those without official land tenure, such as low-income groups and women, were excluded from land titling, humanitarian relief and relocation benefits, or support on adaptation and mitigation measures: "We have been occupying these lands for over three generations, but…[we] don't receive any extension services or technical support related to climate mitigation or adaption [sic] from the Agrarian Services Department… because they don't recognize us as farmers as we don't own this land. We are unable to register for crop insurance or drought relief for the same reason. The State is refusing to formalize our ownership and to watch our farming communities deteriorate in the face of extreme drought is now a question of our dignity and worth as small-scale food producers" (Oxfam, 2023a).

For those from high-risk areas where conditions worsen or do not improve, displacement may become indefinite. Too often, temporary displacement is an initial trigger for the delivery of aid, but is not followed by a continuity of support for climate-driven loss and damage to territory (Climate Refugees, 2023; Oxfam, 2023a). One thousand climate-displaced Indigenous Ilchamus people from Baringo County in Kenya, for example, have been residing in an initially-temporary internally displaced persons camp with limited long-term access to humanitarian services and protection programming, including in terms of shelter and livelihoods (Climate Refugees, 2023). Similarly, half of all households in Nabavatu village in Fiji were living in temporary tent shelters for years after most community structures were identified as being in the 'red zone' by flood inundation risk assessments (Government of Fiji, 2023; UUSC, 2024). Financing of loss of land must, therefore, be able to tackle the short-term humanitarian needs of affected communities by finding suitable lands for temporary shelters, but also address the long-term needs relating to permanent relocation (see below section; IDMC, 2017; Oxfam, 2023b).

3.B.ii Protection and rehabilitation of landscapes

Initiatives focused on protecting and rehabilitating landscapes aim to avert and minimize future or continued loss of territory and habitability. They aim to do this, where possible, by recovering what has been lost so far or by protecting what has not yet been lost by increasing the resilience of ecosystems and reducing their exposure to hazards such as erosion, flooding or inundation. Protection and restoration responses can be focused on hard structures (e.g. locally built ad hoc defences using available material for the construction of planned seawalls or revetments), NbS, or hybrid solutions (Table 2). The rehabilitation of degraded land can also provide land and livelihood opportunities for relocated populations (Displacement Solutions, 2023). The efficacy of these approaches is dependent on many factors, including cost, governance and social acceptability (Chausson et al., 2020; Martin et al., 2021; Woroniecki, 2013).

Initiatives focused on protecting and rehabilitating landscapes aim to avert and minimize future or continued loss of territory and habitability.

Hard protection measures have proved ineffective in the long term in several contexts (Albert et al., 2018; Charan et al., 2017; Piggott-McKellar et al., 2020) due to issues such as the underlying socio-economic causes and other contextual drivers of vulnerability being overlooked (Piggott-McKellar et al., 2020). In Vunidogoloa in Fiji, for example, traditional disaster relief responses, and thousands of dollars spent on the construction of sea walls, were no longer protecting the village, and relocation became the only cogent solution to safeguard inhabitants (Charan et al., 2017; Edwards, 2012). Some highly engineered urban

islands such as Hulhumale in the Maldives, however, have been transformed in such ways that their landforms (and water systems, food systems, housing and social systems) may sustain their habitability longer-term (Barnett et al., 2022; Brown et al., 2020).

NbS are actions that use biophysical processes to protect, sustainably manage or restore natural ecosystems to address societal challenges. Ecosystem-based approaches are a subset focused specifically on restoring and enhancing ecosystem services to achieve resilience outcomes and respond to the changes in conditions caused by climate change. These are often more culturally and environmentally appropriate in rural areas (Barnett et al., 2022; Piggott-McKellar et al., 2020). Comprehensive scientific and broadly accepted standards for NbS and/or ecosystem-based approaches are needed for them to be on an equal footing (i.e. in terms of indemnities and public liability risks for the investors and agencies involved in implementation) with the standards that support contemporary engineering approaches such as sea walls, revetments and sand nourishment in coastal areas (Barnett et al., 2022). Further co-produced research is also needed to understand efficacy and impact and this can be difficult in areas where hard protection has already degraded natural coastal processes (Barnett et al., 2022; Duvat and Magnan, 2019). There is a growing need for options that combine traditional practices with modern solutions enabled by advances in environmental science and engineering (Barnett et al., 2022).

There is a growing need for options that combine traditional practices with modern solutions enabled by advances in environmental science and engineering.

Table 2: Some examples of nature-based measures used for protecting against loss of land or restoring habitability

 **HARD STRUCTURES**	• In the Netherlands, sea dykes and revetments are used to protect coastlines from flooding and erosion and support coastal protection defences for sand dunes. • Sea walls have been implemented in communities on Vanua Levu Island, Fiji, to safeguard communities against coastal pressures, although they are proving ineffective. • Anti-salt dykes in Senegal have been used to reclaim land for rice cultivation. • In Bhutan and Nepal, risks of glacial outbursts have been reduced through artificial lake management systems that drain water through siphon pipes, outlet channels, controlling breaching or pumping, and river stabilization through gabion revetment and bioengineering.
 **NATURE-BASED SOLUTIONS**	• In Kiribati, a type of natural fence known as the buibui, made with branches and trunks and held together with sand coir, is built on the shore as a barrier against the wind and seawater, while also trapping sediment. • Mangrove planting in lagoons has been used in Funafuti, Tuvalu, to address saline intrusion and prevent further erosion, while also providing opportunities for aquaculture activities. • Communities in Mali and Niger whose landscapes were transformed by land degradation have been undertaking composting and fertilizing techniques to increase soil fertility, assisted natural regeneration and rehabilitation of degraded land through bio and mechanical techniques. • For atoll areas, NbS for reefs, lagoons and land have been identified to address the challenge of habitability. This includes: (1) coral reef protection and restoration (e.g. through outplanting on reefs or assisting coral recruitment) which can reduce the risk of extreme events by dissipating wave energy and contributing to the production of sediments for shoreline protection; (2) mangrove planting or protection to facilitate sedimentation that raises the level of land at pace with sea level rise, mitigates wave damage from storms and prevents erosion and saline intrusion where conditions are suitable; (3) marine-based aquaculture infrastructure in lagoons such as long-line culture of shellfish and seaweeds that can attenuate wave energy to assist coastal armouring as a mitigation solution to coastal hazards; and, (4) the protection, enhancement and restoration of littoral vegetation to enhance sediment accretion, attenuate wave energy and increase soil cohesion to reduce erosion.
 **HYBRID SOLUTIONS**	• In Bangladesh, communities have developed a combination of embankments by planting vetiver grass and trees while also constructing village defence walls and dykes to protect against sea level rise and coastal erosion. • In New South Wales, Australia, a seawall coastal defence is complemented by establishing vegetation (e.g. mangroves and seagrass or artificial or shellfish reef) directly in front of them, and preserving landward vegetation to manage wave energy, tidal flooding and storm surge. • For coastal communities such as those in the Nile Delta, groynes and breakwaters, and NbS such as reed fencing and clay core dykes are being used for beach restoration, encouraging the development of sand dunes and reducing flood impacts.

Sources: Barnett et al., 2022; Cauchi et al., 2021; United Nations Economic and Social Commission for Western Asia, 2024; Feagin et al., 2015; Ferrario et al., 2014; Harris et al., 2018; Nepal and Bhutan submission, 2023; Mikaelian, 2022; Morris et al., 2018; Piggott-McKellar et al., 2020; Siegel, 2019; UNCDF, 2024.

3.B.iii Planned community relocation

Relocation has been labelled as an impact of climate change and a failure of adaptation, but also a positive opportunity when guided by appropriate evidence-based policy.

Planned relocations in the context of climate change refer to the coordinated, permanent movement of people from places that are, or soon will be, affected by acute climate impacts and associated land loss (Gini et al., 2024). In Malawi, for example, five communities and 1,600 households were relocated from their territories in 2023 in response to flooding (Ndhlovu and Kusseni, 2024). In 2014, 676 coastal communities in Fiji were identified as needing relocation based on climate change projections – 42 of which will require relocation in this decade, 17 of which are prioritized for relocation as soon as possible, and six of which have already been partially or completely relocated (Government of Fiji, 2023).

Relocation has been labelled as an impact of climate change and a failure of adaptation (Campbell, 2008), but also a positive opportunity when guided by appropriate evidence-based policy (Black et al., 2011). It can be a forced or voluntary movement of communities to safer areas when in situ adaptation options are exhausted and direct and indirect socio-economic and environmental costs of staying are too high (Kimura et al., 2023). In the same way that habitability is influenced by many factors beyond the physical state of the place, it is important to recognize the multi-causality of human mobility and how the negative impacts of climate change often interact with political, economic, social and demographic factors to drive relocation decision-making (Kimura et al., 2023; Platform on Disaster Displacement, 2020). In Panama, for example, the Gardí Sugdub island community underwent the first Latin American planned relocation to protect their community from sea level rise, erosion and extreme rainfall, while also addressing overcrowding and other social issues on the island (Displacement Solutions, 2016; Pérez and Tomaselli, 2021).

The literature has identified various facilitators and inhibitors of the relocation process, and the concerns and benefits associated with the outcomes to livelihood capital as important for guiding future relocation efforts (Table 3). In terms of process, for example, poor governance and delays in, or inefficient deployment of, funding have resulted in some communities, such as the Guna people of Gardí Sugdub, waiting nearly 10 years for construction work of their new village to start, exposing them to inter- and intra-community tensions and conflicts (Pérez and Tomaselli, 2021).

In terms of outcomes, relocation can be costly and is often considered as a last resort for vulnerable communities addressing loss of territory and habitability, especially for Indigenous populations whose identities and livelihoods are fundamentally tied with their land.

In terms of outcomes, relocation can be costly and is often considered as a last resort for vulnerable communities addressing loss of territory and habitability (Ferris, 2020; McNamara and Jacot des Combes, 2015; Pérez and Tomaselli, 2021), especially for Indigenous populations whose identities and livelihoods are fundamentally tied with their land (Kimura et al., 2023; Pérez and Tomaselli, 2021). For Vunidogoloa village in Fiji, for example, plans to relocate had begun in 1956 but were not implemented until 2006 due to a profound spiritual predicament and the reluctance of some villagers (especially elders) to leave their ancestral grounds/boundaries: "Initially relocating was not an option to us at all but climate change came like an enemy that chased us away by taking our land, taking our food, taking everything" (Charan et al., 2017: 25). Similarly, it took the Gardí Sugdub island community decades to make a final decision in 2010 to relocate due to concerns around the uncertainty of public services and support in new areas, the adverse effects on economic conditions, impacts on sociocultural traditions and cultural ties, and other uncertainties about health and security (Kimura et al., 2023; Pérez and Tomaselli, 2021).

Table 3: Summary of findings from relocated communities in terms of process and outcome of relocation

PROCESS	**FACILITATORS OF RELOCATION**	**INHIBITORS OF RELOCATION**
	• Customary land tenure • Adequate resources, including finances • Decision-making framework • Identification of relocation site • Understanding risk • Institutional support • Community and household-level decision-making (i.e. considering different or conflicting views of different members of the community) • Multi-sectoral and participatory approach • Mental health support and long-term economic resilience as a priority • Identifying potential and anticipated risks during planned relocation	• Complex multi-stakeholder planning • Lack of available land and disputes over land rights • Tensions with host communities or neighbouring communities at new site • Legislative issues and extensive community consultations complicate processes and can result in delays • Relocation site subject to future climate hazards • Lack of governance and funding • Traditional and emotional attachment to 'place', kinship, cultural connections and loss of livelihoods • Traditional values and awareness, which can lead to refusal to leave • Inaccessibility of original site can create challenges and high costs in relocating communities
OUTCOME	**BENEFITS OF RELOCATION**	**CONCERNS AND CHALLENGES OF RELOCATION**
	• Access to fertile soils and increased subsistence food production • Improved and safer infrastructure/climate-proofed housing • Space for expansion • Sense of security and safety from hazards • Maintained community unit where possible • Long-term land security	• Fractured community • Exacerbation of existing inequalities related to land, income, gender and access to resources • Reduced involvement in cultural events • Reduced access to infrastructure • Disruptions to healthcare and sanitation systems • Decreased personal safety • Loss of political representation • Reduced access to traditional resources (marine or terrestrial) • Loss of livelihoods • Loss of identity and culture • Reduced access to services (e.g. church, education) • Emotional and mental health impacts as a result of the above and lack of support • Changes to traditional lifestyles and ways of life

Sources: Albert et al., 2018; Charan et al., 2017; Displacement Solutions, 2016; Displacement Solutions, 2023; Ferris, 2020; Kimura et al., 2023; Pérez and Tomaselli, 2021; Yee et al., 2024.

The literature is increasingly emphasizing the importance of developing government frameworks that can draw on and resource the decision-making authority and strength of community-led approaches to relocation.

Many relocation initiatives to date have been either ad hoc, due to governance gaps (i.e. lack of governance framework and lack of government agency funding, expertise or capacity to facilitate relocation), or government-mandated. Local communities from highly exposed areas such as Fiji, the Solomon Islands and Alaska have proved profoundly resourceful and resilient in the face of relocation, basing movements and decisions on customary tenure and traditional knowledge, yet relocation can occur at the family level, resulting in the fracturing of a single community into small hamlets (Albert et al., 2018; Charan et al., 2017). Meanwhile, studies have demonstrated how government-mandated relocations can remove options and reduce choices for local communities, resulting in the eroded efficacy of traditional practices, undermined traditional structures and community coherence, and reduced viability of traditional livelihoods (Albert et al., 2018). The literature is, therefore, increasingly emphasizing the importance of developing government frameworks that can draw on and resource the decision-making authority and strength of community-led approaches to relocation. Equally important are the incorporation of sociocultural parameters in policy, in-depth consultations and community outreach programmes, and a cross-sectoral and participatory approach inclusive of various stakeholders, while also providing a mechanism for communities to stay intact (Albert et al., 2018; Charan et al., 2017; Kimura et al., 2023; McNamara and Jacot des Combes, 2015; Ndhlovu and Kusseni, 2024).

The Fijian government is the first in the world to develop a national climate change relocation policy, which follows best practices and provides an important example for other countries. In 2018, it developed the Planned Relocation Guidelines, providing a bold national commitment to social protection for climate-affected communities. This was followed by a Climate Relocation of Communities Trust Fund in 2019 and a Climate Change Act in 2021. The Trust Fund allows combined sources of funding from domestic, private, international and bilateral means to support the safe and effective relocation of communities who request to relocate, while the Climate Change Act "is the first piece of legislation in the world to create a legislated approach to the organization, governance, and execution of planned relocation as a means to address loss and damage and enable adaptation" (Government of Fiji, 2023).

Under the Climate Change Act, an inter-governmental Fijian Taskforce on the Relocation and Displacement of Communities Vulnerable to the Impacts of Climate Change has been established to oversee the Trust Fund, the relocation assessment and implementation arrangements, and to produce and update the Standard Operating Procedures for Relocation. The Procedures, along with the associated Comprehensive Risk and Vulnerability Assessment Framework, outline a consultative, evidence-based and demand-driven process for relocating communities in a safe, orderly and equitable way. It is a complicated process, involving various stages of consultation, technical assessment and design, and is guided by a close awareness of cultural linkages and values (Government of Fiji, 2023).

The relocation of Cogea village, for example, has emphasized the importance of implementing a thorough relocation plan that integrates local governance, technical and institutional support, and inclusivity, and prioritizes the preservation of cultural and social integrity.

The Procedures have been designed, and will continue to be updated, based on the experiences of relocated communities (Government of Fiji, 2023). The relocation of Cogea village, for example, has emphasized the importance of implementing a thorough relocation plan that integrates local governance, technical and institutional support, and inclusivity, and prioritizes the preservation of cultural and social integrity (UUSC, 2024). Nabavatu village has showcased the usefulness of establishing a community-led taskforce to preserve cultural identity and unity, holding traditional communal meetings and discussions with elders, using historical insights which guided the selection of a new site, and prioritizing inclusivity through participatory decision-making and transparency (UUSC, 2024).

3.C Lessons learned from loss of territory and habitability

Humanitarian relief in the context of displacement faces complexities and tensions when it comes to the delivery of finance. Such difficulties need to be managed and alleviated to ensure effective, equitable and sustainable outcomes.

Experiences of loss of territory and habitability, and the responses to avert, minimize and address these losses, have provided several important lessons for responding to NELs more broadly. Humanitarian relief in the context of displacement faces complexities and tensions when it comes to the delivery of finance. Such difficulties need to be managed and alleviated to ensure effective, equitable and sustainable outcomes. For example, there can be challenges in differentiating between development and climate adaptation activities for funding purposes, insurance mechanisms can fail to recognize slow onset processes due to the lack of a defined 'trigger', funding deployment can be delayed or inequitable, and future projections are sometimes overlooked (International Centre for Climate Change and Development, Bangladesh Rural Advancement Committee and Climate Bridge Fund, 2023; Oxfam, 2023a; Pérez and Tomaselli, 2021). In some of the most vulnerable nations, local authorities frequently lack the resources to take action in ways that align with established decision-making processes and public planning and budgeting cycles, which can also create complexities for humanitarian relief dispersal (UNCDF, 2024). Beyond tackling these issues, it is also important that financing prioritizes the short-term and long-term humanitarian needs of affected communities (IDMC, 2017; Kimura et al., 2023; Oxfam, 2023b). Further, universal social protection should be a critical part of responding to losses, as its wide coverage ensures effective risk-sharing and the effective deployment of aid, regardless of type of hazard (e.g. slow or sudden) or group membership.

The availability and persistence of sufficient and safe land depends on services provided by healthy ecosystems, such as reefs, mangroves or natural strandline vegetation. As such, landscape restoration and protection, especially through NbS and/or ecosystem-based approaches that are less likely to degrade coastal processes, is an important strategy. Other studies have also found that healthy ecosystems are critical for minimizing and preventing various NELs beyond land loss, since ecosystems and the 'place' they are in often form the basis for people's health and well-being, culture, community, way of life, identity, kinship and other non-economic aspects of their lives (McNamara et al., 2021; Westoby et al., 2021). Restoration, especially through nature-based solutions, of the people-ecology interactions within their socio-ecological system, is important, because these interactions allow people to learn, build self-esteem and gain a sense of identity and security (Campbell, 2019; Ford et al., 2020; Movono et al., 2018; Westoby et al., 2021).

There are various mechanisms through which forefront communities are being engaged in the design, implementation and monitoring of responses, especially in terms of planned relocation.

Experiences of, and responses to, territory loss have highlighted the criticality of inclusive, participatory and rights-based mechanisms to address losses (Albert et al., 2018; Charan et al., 2017; Kimura et al., 2023; Oxfam, 2023a). Centring the experiences and knowledge of those who are at the forefront of losses – and their understandings of habitability and perceived thresholds of uninhabitability – in science, law, policy and planning is critical for climate justice and avoiding forms of power exertion over vulnerable people, which can lead to harmful outcomes (Farbotko and Campbell, 2022).

There are various mechanisms through which forefront communities are being engaged in the design, implementation and monitoring of responses, especially in terms of planned relocation. The policy landscape of Fiji, for example, prioritizes a demand-driven approach to relocation defined by circumstances at the local level and sensitized to

In some contexts, alternative means for delivering support, and an awareness of different land tenure systems and territorial rights of communities may be needed to engage those at the forefront of territory and habitability loss.

cultural, legal and societal norms. This inherently necessitates free, prior and informed consent (including the right to say no to relocation), participatory processes inclusive of all community members, and a blending of traditional and modern tools and knowledge in decision-making processes (i.e. modern risk assessment tools alongside traditional meetings and historical insights for the selection of a new site) (Government of Fiji, 2023; Kimura et al., 2023; Pérez and Tomaselli, 2021; UUSC, 2024). Within these processes, however, and as adaptation contexts and values evolve, it is also critical to understand the tensions and complexities arising from whose values are being prioritized in decision-making and adaptation priorities, who defines what is considered 'intolerable' or 'uninhabitable' and what losses are 'acceptable' (Farbotko and Campbell, 2022; Nand et al., 2024; Tschakert et al., 2017).

Although disseminating government support through existing community channels (e.g. farmer and irrigation societies in Sri Lanka or subcounty ward planning committees in Kenya) can be important for local context, it is also important to assess whether these methods entrench existing inequalities, excluding vulnerable groups such as women or low-income groups. In some contexts, alternative means for delivering support, and an awareness of different land tenure systems and territorial rights of communities may be needed to engage those at the forefront of territory and habitability loss (Oxfam, 2023a).

Efforts to engage communities should also be complemented by multi-stakeholder partnerships to ensure financial, technical and institutional support for such communities. A multifaceted approach helps leverage both internal community strengths and external resources in efforts to address NELs. Co-production between multiple stakeholders and cross-scale and cross-agency partnerships can be key to feasibility in terms of research and assessments, catalysing investments in implementation and institutionalization and promoting collective solutions that do not exacerbate inequalities and can help overcome implementation challenges (Barnett et al., 2022: 6). Stege (2018), for example, explores a potential Marshallese data-driven atoll habitability threshold management tool (adapted from the community-based resource management planning Reimaanlok Framework) which encourages in situ and ex situ actor collaboration, fosters a sense of trust and shared purpose, and synthesizes scientific and Indigenous knowledge systems to accurately understand and communicate the temporal and spatial parameters of flood risk, determine adaptation limits and assess if or when it might be appropriate to move.

It is also important to take a proactive approach to creating awareness among citizens to ensure that they are equipped and ready to tackle the looming dangers. Awareness and community outreach programmes by civil organizations and government can ensure that people understand the causes of the hazards they face, and can spark behavioural changes that enhance social resilience and enable people to better adapt. Government monitoring of communities that are particularly vulnerable, and raising awareness on initial detection of vulnerability, is also important to ensure that community members are actively searching for options to adapt rather than being caught unprepared by the full effects of climate change (Charan et al., 2017).

Efforts to engage communities should also be complemented by multi-stakeholder partnerships to ensure financial, technical and institutional support for such communities.

Experiences with land loss, and associated responses, have also highlighted how important it is to improve the security of land tenure as a key criterion for the longevity and sustainability of all efforts to address NELs; the duration of these efforts often depends on the continued availability of the lands on which they are focused (Displacement Solutions, 2023; Oxfam, 2023a).

4

Loss of cultural heritage

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4.A Non-economic losses of cultural heritage in the context of climate change and their interlinkages with other NELs

4.A.i The significance and meaning of cultural heritage

Aside from its absence in climate-related discussions, the difficulty of assessing the significance of cultural heritage loss is compounded by a general ambiguity surrounding the meaning of cultural heritage itself.

Cultural heritage has so far been largely invisible in climate change agreements, policies and discourse. Aside from its absence in climate-related discussions, the difficulty of assessing the significance of cultural heritage loss is compounded by a general ambiguity surrounding the meaning of cultural heritage itself. UNESCO, the only United Nations agency with a mandate on culture, defines cultural heritage as artefacts, monuments, groups of buildings and sites, and museums, meaning cultural heritage can have symbolic, historic, artistic, aesthetic, ethnological or anthropological, scientific and social value. It includes tangible heritage (movable, immovable and underwater), intangible cultural heritage embedded into cultural, and natural heritage artefacts, sites or monuments (UNESCO, 1972, 1978, 2001a, 2003, 2023a). The 1972 UNESCO Convention on Protection of the World's Cultural and Natural Heritage (World Heritage Convention) includes archaeological sites, monuments, ensembles of buildings, historic cities, vernacular settlements, historic routes, industrial heritage, natural heritage, mixed heritage and cultural landscapes (UNESCO, 2023a). Intangible cultural heritage includes traditions or ways of living inherited from our ancestors and passed on to our descendants, such as oral traditions, performing arts, social practices, rituals, festive events, knowledge and practices concerning nature and the universe, or the knowledge and skills to produce traditional crafts (UNESCO, 2003).

Cultural and natural heritage sites are repositories of knowledge on climate change over time and resources for climate solutions.

Cultural heritage may have significance to the local communities of which it forms a part, but it may also be of subnational or national significance, or be of value to all of humanity, as is the case of UNESCO World Heritage properties recognized for their Outstanding Universal Value[8] (UNESCO, 2023a). There are also cultural landscapes inscribed on the UNESCO World Heritage List which combine the "works of nature and people" (UNESCO, 2023a), reflecting the relationship between people and their natural environment. This diversity of heritage expresses the diversity of people, geographies, types of knowledge, practices and histories. As such, historic places are an extensive source of knowledge and solutions for future generations. Cultural and natural heritage sites are repositories of knowledge on climate change over time and resources for climate solutions. Furthermore, cultural heritage and its myriad forms contribute to cultural diversity, from the local to the global level.[9]

8 Outstanding Universal Value means cultural and/or natural significance which is so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity.

9 Cultural diversity, besides including all aspects of cultural heritage described above, includes all aspects of culture, namely its distinctive spiritual, material, intellectual and emotional features, in addition to art and literature, lifestyles, ways of living together, value systems, traditions and beliefs (UNESCO, 2001b). The diversity of human cultures includes the wealth of languages, ideas, beliefs, kinship systems, customs, tools, artistic works, rituals and other expressions they collectively embody (UNESCO, 2009b).

Out of the 1,223 properties inscribed on the UNESCO World Heritage List, climate change threatens a third of natural and one in six cultural heritage sites.

Extreme weather events and climate-related disasters are becoming increasingly common: States Parties report that World Heritage sites now have to contend with storms, flooding, drought and desertification, and wildfires, which they either did not experience before or did not experience with the same frequency. States Parties reporting on UNESCO World Heritage properties[10] (UNESCO, n.d.-a), including the State of Conservation reporting (UNESCO, n.d.-b) for World Heritage properties, as well as multiple studies in recent years have all confirmed that both cultural and natural heritage, including World Heritage properties, are impacted by climate change. In fact, out of the 1,223 properties inscribed on the UNESCO World Heritage List (UNESCO, n.d.-c), climate change threatens a third of natural and one in six cultural heritage sites (World Heritage Centre, 2021).

The intensity and impact of extreme weather events is also increasing. The changing temperatures of oceanic waters (National Aeronautics and Space Administration, n.d.) over the last three decades have had impacts on marine ecosystems, such as mass bleaching of reefs, including on those inscribed on the UNESCO World Heritage List. Climate-related hazards, and in particular wildfires, have become one of the biggest threats to World Heritage forests. World Heritage properties lost 3.5 million hectares of forest (more than the area of Belgium) between 2001 and 2020, and forests in at least 10 World Heritage properties have become carbon sources (emitting more carbon than they absorb) (UNESCO, World Resources Institute, IUCN, 2021). The disappearance of glaciers will impact mountain people's lives and livelihoods, including cultural, religious and recreational practices that have been recognized in the UNESCO List of the Intangible Cultural Heritage of Humanity. These practices include the pilgrimage to the sanctuary of the Lord of Qoyllurit'i, or the Snow Star Festival in Peru, and alpinism (UNESCO, 2011a, 2019a). According to a UNESCO and IUCN study on World Heritage glacierized sites (UNESCO, IUCN, 2022), the glaciers in one third of these areas will disappear by 2050, regardless of the climate change mitigation scenario applied, and glaciers in around half of all sites could almost entirely disappear by 2100, if no change is made to emissions levels. While these losses have been documented for UNESCO World Heritage sites, the loss of forests, marine reefs and glaciers are evidently also a loss of biodiversity and ecosystems as well as a loss of territory, demonstrating the intricate interlinkages between different types of NELs.

The loss of forests, marine reefs and glaciers are evidently also a loss of biodiversity and ecosystems as well as a loss of territory, demonstrating the intricate interlinkages between different types of NELs.

Nearly a third of World Heritage properties are cities (UNESCO, n.d.-c), and 70 per cent of cultural assets are concentrated in urban areas (UNESCO, n.d.-d) where climate change impacts are further exacerbated by compounding urban stressors, including development pressure, land use changes, air pollution and unsustainable resource management. Rising sea level, high tide and storm surge, ocean acidification, flooding, coastal erosion and warming temperatures endanger cultural heritage in coastal areas. This includes underwater cultural heritage, such as sunken cities, prehistoric sites, shipwrecks and unexplored archaeological remains, as well as UNESCO World Heritage cities like Venice and its Lagoon, the Medina of Tunis, the Historic City of Trogir, and the Ruins of Kilwa Kisiwani and the Ruins of Songo Mnara in Tanzania, as well as other cultural sites such as the Gorham Cave Complex (Reimann et al., 2018).

10 The state of conservation refers to the condition and preservation status of World Heritage properties, including the threats they have faced or are currently facing, for the protection of their Outstanding Universal Value as monitored and reported through a comprehensive system of reports and decisions by the World Heritage Committee.

The loss of some distinctive and meaningful places, structures, forms and landscapes, which may be significant in themselves, can also constitute the loss of distinctive intangible cultural heritage elements and their practice.

Cultural heritage sites, artefacts and elements have many different values and meanings. This frequently results in multiple and overlapping losses, given the multiple values and meaning of cultural heritage. Moreover, the loss of cultural heritage is a loss at multiple levels: a loss for the local communities who belong to the historic place, or to whom the tangible movable heritage or intangible cultural heritage element belongs, and, at the same time, a larger national or regional loss or a loss to the whole of humanity. Below is an overview of the different types of losses resulting from the loss of cultural heritage.

4.A.ii Loss of cultural heritage forms

The loss of some distinctive and meaningful places, structures, forms and landscapes, which may be significant in themselves, can also constitute the loss of distinctive intangible cultural heritage elements and their practice. For instance, the 15th century Tomb of Askia in northern Mali is inscribed on the UNESCO World Heritage List for the way local traditions have adapted to create an architectural structure unique across the West African Sahel. The site faces sandy winds, heavy rains, flooding and repeated water erosion (UNESCO, n.d.-e). Similarly, the Sanké mon, a collective fishing rite of the Sanké in Mali and a practice deeply rooted in community and tradition, faces threats from the adverse effects of drought and desertification on the lake (UNESCO, 2009a). The disappearance of such distinctive cultural heritage forms and elements due to the impacts of climate change would be an enormous loss for the local community, but equally for the Sahel region, for Africa and for all people as these examples of cultural heritage are identified and safeguarded as UNESCO Heritage of Humanity.

4.A.iii Loss of cultural heritage expressing socio-cultural identity

As built heritage, artefacts and intangible cultural heritage elements express the identity of the society to which they belong, the loss of a cultural heritage form or element diminishes the ability of a community to express their identity.

As built heritage, artefacts and intangible cultural heritage elements express the identity of the society to which they belong, the loss of a cultural heritage form or element diminishes the ability of a community to express their identity. This might be the case for Indigenous Peoples who use certain heritage forms for practices. But it could also be the case for a larger group of people, as in the example above of the Tomb of Askia. When an example of cultural heritage is of regional, national or international significance, the loss of such a cultural heritage form could be a loss for national or regional identity. For instance, in the Coffee Cultural Landscape of Colombia, the strong community focus on coffee production in all aspects of life produced a cultural identity, which finds its physical expression in the cultural patterns of coffee farming. Yet climate change threatens coffee production and communities' livelihoods and sense of identity (UNESCO, n.d.-f). As the Coffee Cultural Landscape of Colombia is inscribed on the UNESCO World Heritage List, its loss would affect all of humanity.

4.A.iv Loss of functional use of cultural heritage

Cultural heritage sites and artefacts usually have a functional use. The loss of a cultural heritage form means the functions of that site or artefact are also lost. From a palace to a funerary site, from a temple to a bridge, from priceless ritual objects to objects of everyday use, each cultural heritage form has a function that is lost with the disappearance of that cultural heritage. Depending on the community and whether that particular site was the only space for that function, the loss may be of greater or lesser significance for a community.

4.A.v Loss of the cultural/symbolic value of cultural heritage

The cultural or symbolic value of cultural heritage is at the core of its recognition as valuable heritage in need of protection and safeguarding for future generations.

The cultural or symbolic value of cultural heritage is at the core of its recognition as valuable heritage in need of protection and safeguarding for future generations. This cultural/symbolic value may derive from the historical and social significance of the heritage, and it is for that reason that it may be included as meaningful in local, subnational, national or international registers and classification. Losing such cultural heritage forms would thus result in the loss of cultural/symbolic value potentially significant for local communities, and potentially also meaningful to national and international communities. The Nubian Monuments from Abu Simbel to Philae in Egypt are an example: these monuments were saved from the rising waters of the Nile thanks to an international campaign that succeeded in relocating them away from the danger of inundation, signalling that ancient monuments such as these are of international significance and form part of all humanity's indivisible heritage (World Heritage Centre, 2022).

4.A.vi Loss of cultural skills related to local resources and construction

The transmission of related knowledge and skills is at risk due to climate-driven population displacement, cultural erosion and degradation of the natural environment, decreasing access to traditional materials, and changing local climatic needs.

Many historical and vernacular buildings and settlements, including those of Indigenous Peoples, are constructed with local building materials using traditional knowledge, techniques and craftsmanship. The loss of such cultural heritage is first and foremost a loss of cultural knowledge, skills and competencies, which have at times been acquired and refined over generations. The transmission of related knowledge and skills is at risk due to climate-driven population displacement, cultural erosion and degradation of the natural environment, decreasing access to traditional materials, and changing local climatic needs. For instance, in Timbuktu, due to desertification, local tree species used in traditional construction are disappearing, forcing residents to resort to imported materials such as concrete and steel (UNESCO, 2021).

4.A.vii Loss of social value and traditional governance of cultural heritage

Cultural heritage sites and elements also carry social value. This includes the traditional social systems used by the communities living in and around a cultural heritage site to govern, manage and safeguard it.

Cultural heritage sites and elements also carry social value. This includes the traditional social systems used by the communities living in and around a cultural heritage site to govern, manage and safeguard it. For instance, the World Heritage property East Rennell in the Solomon Islands is under customary ownership and management by Indigenous Peoples, and their ancestral lands as well as food and livelihood security within the World Heritage property are increasingly affected by climate change and associated disasters, requiring urgent action (UNESCO, n.d.-g). Similarly, the Maasai community in Kenya have three interconnected male rites of passage, Enkipaata, Eunoto and Olng'esherr, that educate young men about their future role in Maasai society and transmit social values and traditional knowledge. However, with changes in the climatic conditions of the area, where frequent drought has claimed the lives of many cattle and impoverished many Maasai, the donations of cattle for the rituals have seen a downward trend and enactment of the rituals has thus been negatively affected, threatening the long-term endurance of these traditional rites (UNESCO, 2018). Another example from Cameroon shows how climate change threatens the viability of sacred sites on the Lobé River, the performance of Nguon festivals in the Bamoun community and the timing of Ngondo cult practices essential for the transmission of intangible cultural heritage. Aimed at promoting dialogue, harmony and peace, the rituals are over 600 years old and serve as a source of social cohesion and resilience as well as a means of upholding values such as accountability, freedom of expression and humility (UNESCO, 2023b).

The compounding effect of these losses, and a breakdown in the traditional governance of culture, result in diminished social cohesion and greater potential for conflict, in particular for Indigenous Peoples. In the Stone Town of Zanzibar (UNESCO, n.d.-h), the loss of mangrove habitats has led to a shortage of mango poles, which are required to maintain the buildings of this World Heritage property.

4.A.viii Loss of a source of inspiration and innovation

The loss of cultural heritage is a loss of artistic inspiration and innovation – for local communities as much as for the global community.

Cultural heritage is a wellspring for innovation, design and problem solving: it can cover significant artistic value, a singular innovation, or generations of accumulated competency for everyday skills, from constructing houses with local building materials and technologies, to fishing. The loss of cultural heritage is a loss of artistic inspiration and innovation – for local communities as much as for the global community. An example is the tidal stone walled fish weirs or fish traps constructed in low-lying coastal communities in southern Africa and Asia (Iwabuchi, 2022): their destruction would result in the loss of innovative practices.

4.A.ix Loss of cultural knowledge, including Indigenous knowledge and practices, and ways of living with nature

Both tangible and intangible cultural heritage is often linked to, and rooted in, specific places or landscapes (including seascapes). Cultural heritage uses and practices may be disrupted when access to places for such practices and rituals is lost or restricted, or when places that have provided environmental knowledge and skills are lost or transformed. For instance, the Wet Tropics of Queensland World Heritage property in Australia is home to one of the world's oldest living cultures, the Rainforest Aboriginal People, who have lived on the ancestral land and derived their traditions from it for at least 40,000 years, including through major environmental change (Pannell, 2008). They have developed a specialized and distinctive cultural heritage including food gathering, food processing and land management techniques through the use of fire, which has shaped the landscape, including animal and plant species' composition and distribution. Their culture speaks to the complex adaptive capacity of humans to merge cultural and social systems with biological niches, yet their ability to do so is increasingly threatened by climate change, as warming reduces habitat ranges of local and endemic species (UNESCO, n.d.-i).

NELs may include the loss of detailed knowledge of the environment, including unrecorded knowledge of biological diversity and analysis of the interaction of climate, weather and food systems.

NELs may include the loss of detailed knowledge of the environment, including unrecorded knowledge of biological diversity and analysis of the interaction of climate, weather and food systems. For example, World Heritage cultural landscapes are repositories of knowledge on climate change over time, including the environments of local and Indigenous knowledge holders. Their environments were adapted over time to changing conditions, making them observatories of climate change. The World Heritage property of the Rice Terraces of the Philippine Cordilleras is an outstanding example of sustainable land use resulting from the harmonious interaction between people and their environment, and long-standing communal efforts over the last two millenniums (UNESCO, n.d.-j). UNESCO's Local and Indigenous Knowledge Systems programme has supported African Indigenous Pastoralists to document seasonal phenomena related to weather, precipitation and climate changes. Indigenous languages encode complex and interlocking information about celestial, atmospheric, terrestrial, plant, insect and animal knowledge, understood through various refined taxonomies and seasonal calendars. Knowledge and terminology can vary even in one language across a landscape, carrying important yet fragile intergenerational knowledge (Roué et al., 2017).

4.A.x Loss or transformation of natural heritage values of cultural heritage

While the loss or transformation of habitats or built structures is a loss in itself, it is also a loss of space for cultural practices and cultural resources as well as social functions.

Cultural heritage is closely related to the particular environmental conditions that define it. While the loss or transformation of habitats or built structures is a loss in itself, it is also a loss of space for cultural practices and cultural resources as well as social functions. Such losses may range from the degradation, destruction and disappearance of places, cultural practices and practitioners to slower but equally dangerous processes such as disruption of knowledge transmission, increasing precarity of community livelihoods and dislocation of populations.

As the foregoing examples of cultural heritage losses clearly indicate, tangible and intangible heritage are intricately interconnected with place, including territorial, geographical and environmental dimensions. For countless communities across the world, adapting to living in a place has required them to accumulate knowledge on how to live alongside the environmental conditions of that place, connecting their cultural practices and environmental knowledge with their cultural forms and beliefs. Hence, territorial and environmental losses impact not only the physical forms of heritage or a sacred space, but are above all a debilitating loss of the knowledge that could be used to aid recovery from disasters. When agricultural practices and extraction of building materials are impacted by climate change, it equally impacts the knowledge and practices affected communities are able to transmit to future generations. For instance, the rice terraces and water temples in Bali, Indonesia (UNESCO, n.d.-k), are the focus of a cooperative water management system of canals and weirs, known as subak, based on the philosophy of Tri Hita Karana, which brings together the realms of the spirit, the human world and nature. This ancient egalitarian farming practice is increasingly threatened by changes in hydrological regimes (International Council on Monuments and Sites [ICOMOS], International Centre for the Study of the Preservation and Restoration of Cultural Property [ICCROM], 2015).

4.A.xi Diminished food and water security due to loss of cultural heritage

Land and water management, and agricultural practices are also deeply cultural practices. Provision of food and water is a vital ecosystem service that is impacted by climate change, including in traditional agricultural landscapes. For instance, climate change threatens the genetic diversity of crops, including crop species integral to cultural diets of Indigenous communities. Changes in precipitation and extreme weather events like drought impact water availability for local and Indigenous communities and put agricultural traditions at risk. For instance, the World Heritage cultural landscape of the Viñales Valley in Cuba is suffering from the effects of climate change, as water shortages impact traditional methods of agriculture that have been in practice there for centuries (UNESCO, n.d.-l).

Tangible and intangible heritage are intricately interconnected with place, including territorial, geographical and environmental dimensions.

The close relationship between place and cultural heritage in many of the foregoing examples demonstrates the irrefutable and intricate interlinkages between the loss of cultural heritage, Indigenous knowledge, social/cultural identity, biodiversity and ecosystem services, the loss of territory and the loss of well-being and health.

4.A.xii Loss of adaptive capacity and resilience of communities

The loss of objects or practices imbued with cultural significance can threaten the sort of social coordination that holds up resilient communities, by disrupting values or the identity connected with them.

A core principle of cultural resilience is the coming together of people to organize in their communities based on a shared common identity and values (Morrissey and Oliver-Smith, 2013). The loss of objects or practices imbued with cultural significance can threaten the sort of social coordination that holds up resilient communities, by disrupting values or the identity connected with them. At the same time, a wealth of traditional knowledge and intangible heritage practices help bolster the resilience of communities in coping with natural disasters and adapting to climate change. For instance, in Kenya's Lamu Old Town, traditional knowledge on weather patterns, sea movement and naturally safe areas during adverse atmospheric conditions, accumulated over the centuries, enhances the community's resilience during extreme weather or disasters. Yet changing weather patterns, excessive spring tides and destruction of mangroves, mean traditional knowledge is at risk of losing its functionality (UNESCO, n.d.-m). Thus, the foregoing examples also highlight how significantly cultural heritage loss can diminish cultural resilience, which is closely linked to diminished resilience to disasters.

As cultural heritage has many different and overlapping values, the loss of a single cultural heritage site may create a ripple effect of cultural heritage losses which together have a much greater significance than the initial loss of a single structure or monument might suggest. Furthermore, significant sites or places may have multiple types of heritage associated with them which are also lost. For example, a historic monument may represent outstanding artistic value on its own, but it may exist in the context of other examples of heritage. For instance, it could be surrounded by traditional houses or form a part of the local people's way of life, their artisanal crafts, music, festivals and processions, or other living heritage practices. There may also be archaeological excavations and materials associated with the monument and its setting, as well as art, objects and artefacts of high value. Thus, the perceived single loss of one individual monument could actually represent any number of connected losses for the local communities, not just in the present, but for future generations as well.

Above all, as cultural heritage also contributes to cultural diversity, its loss results in diminished cultural diversity – locally, nationally and internationally.

Above all, as cultural heritage also contributes to cultural diversity, its loss results in diminished cultural diversity – locally, nationally and internationally. The protection of cultural heritage and the promotion of cultural pluralism, particularly at a time when armed conflicts (conflicts can also result from climate change related displacements, as well as food and water insecurity) and natural disasters are upending people's lives, contributes to the protection of human rights, conflict prevention and peace-building, weaving of the social fabric and strengthening the resilience of communities.

4.B Spectrum of actions to avert, minimize and address loss of cultural heritage

The most urgent step needed is for international assessments and bodies to recognize the enormity of the impacts of climate change on cultural heritage, as well as to harness the power of cultural heritage to offer solutions to reduce the impacts of climate change.

The most urgent step needed is for international assessments and bodies to recognize the enormity of the impacts of climate change on cultural heritage, as well as to harness the power of cultural heritage to offer solutions to reduce the impacts of climate change. UNESCO is addressing the loss of cultural heritage through a variety of actions, ranging from its own international culture-related conventions, to integrating culture within other important instruments, carrying out studies, developing tools, providing technical assistance on the ground and emergency assistance where possible.

From the foregoing discussions, it is clear that averting, minimizing and addressing the loss of cultural heritage due to climate change demands multiple lines of response: (1) recognizing and integrating cultural heritage in climate action; (2) assessing climate change risks and monitoring protection of cultural heritage; (3) enhancing cultural resilience; (4) knowledge-sharing and building capacities; (5) enhancing climate resilience and advancing emergency risk management and recovery; and (6) developing tools, guidance and good practices for adaptation and mitigation strategies.

4.B.i Recognizing and integrating cultural heritage into climate action

It is both urgent and essential to recognize the vulnerability of cultural heritage, and the significant risks and impacts of climate change on cultural heritage of all types, in relevant international agreements, including under the UNFCCC. It is equally urgent to recognize cultural heritage as a valuable resource for climate solutions to address climate risks and include it in relevant national and local plans for adaptation. At the moment, all major United Nations instruments on the environment and climate call for the inclusion of Indigenous and local knowledge systems in scientific assessments and in policymaking. This is elaborated particularly the Paris Agreement, in Article 7 (The Paris Agreement, 2016), and further elaborated in the Kunming-Montreal Global Biodiversity Framework (CBD, 2022). However, direct references to cultural heritage, or culture more broadly, including the creative sector, are still largely absent from the climate change discourse and climate action plans and policies, making the impacts on cultural heritage or its role in innovating solutions invisible, and obscuring the solutions which cultural heritage, in all its forms, offer to combating climate change. This absence needs to be urgently addressed by the international community. Equally urgent and essential is the integration of cultural heritage at all levels, from national to local, in policies, plans and strategies for climate action and comprehensive risk management.

It is equally urgent to recognize cultural heritage as a valuable resource for climate solutions to address climate risks and include it in relevant national and local plans for adaptation.

Some international efforts have been made to recognize the role of cultural heritage in climate action, but much more is needed to integrate it into plans at the international, national and local levels. In September 2024, Heads of State and the General Assembly of the United Nations placed culture at the heart of their response to the strategic challenges of our century in the 'Pact for the Future', following the direction of the UNESCO World

In November 2023, the updated UNESCO Policy Document on Climate Action for World Heritage was adopted by the General Assembly of States Parties to the World Heritage Convention.

Conference on Cultural Policies and Sustainable Development – MONDIACULT 2022, organized by UNESCO and hosted by Mexico.

In November 2023, the updated UNESCO *Policy Document on Climate Action for World Heritage (WH Policy Document)* (UNESCO, 2023c) was adopted by the General Assembly of States Parties to the World Heritage Convention. It is the lead guiding document on World Heritage and climate change with high-level guidance on enhancing the protection and conservation of heritage deemed of outstanding universal value through comprehensive adoption of climate action measures, including climate adaptation, mitigation, resilience building, innovation and research.[11]

Organized as part of the thematic initiatives under the 2003 Convention for the Safeguarding of the Intangible Cultural Heritage, as established by its Intergovernmental Committee, UNESCO has launched a reflection on the relationship between climate change and safeguarding intangible cultural heritage. The initiative comprised an expert reflection on the roles and risks for living heritage in the climate emergency, and how such heritage may be leveraged to contribute to climate change adaptation, mitigation and living heritage safeguarding.

Joining forces with the IPCC and ICOMOS, UNESCO organized the first-ever International Co-Sponsored Meeting on Culture, Heritage and Climate Change (ICSM CHC) in December 2021, to further integrate culture into the international climate agenda, including in future IPCC assessment reports (ICOMOS, ICSM CHC, n.d.), with a resulting publication compiling the outcomes of the papers.

4.B.ii Assessing climate change risks and monitoring protection of cultural heritage

In order to avert, minimize and address cultural heritage loss, including events involving irreversible loss and damage and slow onset events, it is essential to bring together scientific assessments, new methodologies and policies, local and cultural knowledge, and Indigenous knowledge systems and traditional management.

It is essential to bring together scientific assessments, new methodologies and policies, local and cultural knowledge, and Indigenous knowledge systems and traditional management.

As the *WH Policy Document* notes, improving the assessment of climate change risks and impacts on cultural heritage is urgent and essential on the local, national and international scale. Methodologies and mechanisms to systematically assess risks and identify potential losses are necessary. However, given the wide range of different types of cultural heritage and their many values, many different types of effective and cost-efficient methodologies are necessary for assessment. Furthermore, as the ICSM CHC report (Morel et al., 2022) has emphasized, the methodologies for measuring risks and vulnerabilities must include a plurality of knowledge systems and scientific analysis, integrating the knowledge of local communities and Indigenous Peoples.

11 UNESCO has worked closely with the Advisory Bodies to the World Heritage Committee, ICOMOS, IUCN, and ICCROM in the development of this document.

Enhancing cultural resilience includes inventorying and strengthening governance systems and legislation as well as empowering local communities and Indigenous Peoples to engage in protecting and safeguarding their cultural heritage.

As the secretariat of several major Culture Conventions, UNESCO monitors cultural heritage through regular State Party reporting for the different Culture Conventions and Recommendations including the 1972 World Heritage Convention, the 2003 Convention on the Safeguarding of Intangible Cultural Heritage, the 2011 Recommendation on the Historic Urban Landscape and the 2015 Recommendation concerning the protection and promotion of museums and collections, their diversity and their role in society (UNESCO, 1972, 2003, 2011b, 2015). These periodic monitoring exercises serve to oversee the continued safeguarding of cultural heritage and flag significant threats and potential losses. However, red flags and early warning signs of loss and damage need to be systematically developed and integrated into the periodic monitoring processes.

4.B.iii Enhancing cultural resilience

Enhancing cultural resilience includes inventorying and strengthening governance systems and legislation as well as empowering local communities and Indigenous Peoples to engage in protecting and safeguarding their cultural heritage. Protecting and safeguarding cultural heritage is itself a significant climate action.

UNESCO supports the governance of culture by setting international standards to ensure that all different forms of cultural heritage – tangible, intangible, movable and natural heritage – are protected and safeguarded, and that communities are encouraged to inventory and document all cultural resources, especially those that are important in facing the threats of climate change. Each of the UNESCO Culture Conventions and Recommendations calls on the States Parties to put robust management systems and legislation in place to safeguard cultural heritage of all types and which recognize and include local communities and Indigenous Peoples. Moreover, UNESCO recognizes the value of culture, World Heritage properties, living heritage practices and livelihoods in the cultural and creative industries. UNESCO thus calls on countries, in line with the Declaration of MONDIACULT 2022 (UNESCO, 2022a), to integrate cultural heritage and creativity into international discussions on climate change, and establish culture as the fourth pillar of sustainable development, alongside the economic, social and environmental pillars.


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4.B.iv Knowledge-sharing and building capacities

The need for cultural heritage for climate action is particularly acute for those who are especially vulnerable to the adverse effects of climate change, such as small island developing States, and least developed countries.

Advantage must be taken of the potential that cultural heritage has to offer local solutions and strategies for adaptation and mitigation. When harnessing this potential, local communities and Indigenous Peoples must be consulted and the shared knowledge put towards building capacities.

The 2015 Paris Agreement adopted under the UNFCCC, as well as the WH Policy Document, recognizes the importance of awareness-raising, education and capacity-building for climate action. At the same time, the UNESCO Culture Conventions recognize and support awareness-raising, education and capacity-building on cultural heritage to ensure its protection, safeguarding and transmission to future generations. As the WH Policy Document points out, the capacity-building needs to happen at all levels for decision-makers, stakeholders, local communities, users, site managers and other relevant professionals. With regard to cultural heritage, UNESCO, as well as other partner institutions, has been carrying out capacity-building activities in different countries on cultural heritage. Nevertheless, the urgent need and demand for capacity-building and knowledge-sharing remains enormous and requires international financial support.

The need for cultural heritage for climate action is particularly acute for those who are especially vulnerable to the adverse effects of climate change, such as small island developing States, and least developed countries. Recent work by UNESCO to develop capacity-building for safeguarding living heritage in disaster contexts, including the ongoing three-year project in five small island developing States – Bahamas, Belize, Fiji, Tonga and Vanuatu (UNESCO, n.d.-n) – has provided valuable insights into supporting communities in mobilizing their living heritage for disaster risk reduction and preparedness.

4.B.v Enhancing climate resilience and advancing emergency risk management and recovery

Enhancing preparedness for extreme climate events, reducing disaster risks and supporting recovery are crucial to averting, minimizing and addressing the loss of cultural heritage due to climate-related disasters and emergencies.

Enhancing preparedness for extreme climate events, reducing disaster risks and supporting recovery are crucial to averting, minimizing and addressing the loss of cultural heritage due to climate-related disasters and emergencies. The risk of disaster arises from the inherent vulnerabilities existing at any given site. Harnessing the significant potential of cultural heritage for mitigating disaster risks could reduce the vulnerabilities of local communities and their cultural heritage, and thus diminish the negative consequences on lives, property and livelihoods before, during and after a catastrophic event. Heritage plays a crucial role during the post-disaster recovery phase, by attracting investment, creating employment or providing renewable natural resources. The 2007 UNESCO Strategy for Risk Reduction at World Heritage Properties (UNESCO, 2007) aims to strengthen the protection of World Heritage properties and contribute to sustainable development by assisting States Parties to integrate a concern for heritage into their national disaster risk reduction policies, as well as into the management plans for World Heritage properties.

The *Operational Directives* for the Implementation of the Convention for the Safeguarding of the Intangible Cultural Heritage (UNESCO, 2022b) stress the role of intangible cultural heritage in strengthening community-based resilience to natural disasters and climate change. Similarly, the Operational Principles and Modalities for Safeguarding Intangible

Cultural Heritage in Emergencies underscore the dual role of intangible cultural heritage in all emergencies, including the climate emergency.

Cultural Heritage in Emergencies (UNESCO, 2019b) underscore the dual role of intangible cultural heritage in all emergencies, including the climate emergency. For instance, in order to address the issue of the increasing risk to cultural and natural heritage of climate-change-induced fire, UNESCO has developed a practical tool on fire risk management and is preparing regional training for the Latin America and the Caribbean region.

UNESCO has established different mechanisms to support Member States to protect and recover cultural and natural heritage during and after disasters, and to minimize loss and damage of cultural heritage. For World Heritage properties this includes the World Heritage Fund International Assistance and Emergency Assistance, and the Rapid Response Facility for natural heritage (UNESCO, n.d.-o) which is carried out together with the three Advisory Bodies to the World Heritage Committee: ICCROM, IUCN and ICOMOS. The UNESCO Heritage Emergency Fund (UNESCO, n.d.-p) is a key financial mechanism supporting Member States to prepare for and respond to emergencies affecting culture, including disasters resulting from both human-induced and natural hazards and those related to climate change. In addition, ICCROM, IUCN and ICOMOS each carry out other activities to support disaster risk reduction and recovery for cultural and natural heritage sites.

4.B.vi Developing tools, guidance and good practices for adaptation and mitigation

Following the adoption of the *WH Policy Document*, guidance to implement it on the ground has been requested by the General Assembly of the 1972 Convention.

UNESCO, alongside ICCROM, ICOMOS and IUCN, are developing their first joint toolkit on climate action for World Heritage to support States Parties and site managers to integrate climate change into the management strategies of World Heritage sites.

Following the adoption of the *WH Policy Document*, guidance to implement it on the ground has been requested by the General Assembly of the 1972 Convention. In addition, ICCROM, IUCN and ICOMOS offer guidance and tools related to disaster risk management and recovery and reconstruction.[12]

The Resilient Reefs Initiative, which UNESCO partners with, supports four World Heritage reefs, and the communities that depend on them, to adapt to climate change by reducing local threats. A valuable example is the Resilience Strategy developed for the Belize Barrier Reef Reserve System.

The UNESCO Urban Heritage Atlas (UNESCO, n.d.-d) platform and tool for geo-referenced cultural mapping of the key characteristics of urban heritage, enables an inventory to be taken of the built heritage characteristics, intangible cultural heritage elements and natural features that together support the uniqueness and heritage value of historic cities and settlements. Together with the Group on Earth Observations, and the Initiative's office in Greece, UNESCO has launched the *Urban Heritage Climate Observatory,* applying earth observation tools for World Heritage cities. Other monitoring activities include the UNESCO eDNA project (UNESCO, n.d.-r), which helps to measure marine biodiversity and the impacts climate change might have on the distribution patterns of marine life.

The UNESCO FutureKeepers campaign (UNESCO, n.d.-s) on the impacts of climate change on natural World Heritage sites also provides seed support to improve the capacity of World Heritage property managers in developing countries to ensure cultural resilience and safeguarding.

UNESCO is testing mitigation measures against the impacts of changing water currents on underwater cultural heritage. In partnership with the United Nations Development Programme and others, UNESCO is currently updating the Post-Disaster Needs Assessment Guide for the Culture Sector and developing a Disaster Recovery Frame Guide for the Culture Sector, which will take into consideration the non-economic losses aspect and provide guidelines for stakeholders.

With a view to knowledge-sharing and disseminating good practices and local solutions, UNESCO has developed online tools such as the World Heritage Canopy.

With a view to knowledge-sharing and disseminating good practices and local solutions, UNESCO has developed online tools such as the World Heritage Canopy (UNESCO,

12 Publications from these organizations include the recent joint ICOMOS-ICCROM Guidance on Post-Disaster and Post-Conflict Recovery and Reconstruction for Heritage Places of Cultural Significance and World Heritage Cultural Properties (ICOMOS, ICCROM, 2023), the ICOMOS The Future of Our Pasts: Engaging Cultural Heritage in Climate Action (ICOMOS, 2019), the IUCN Safe havens: Protected Areas for Disaster Risk Reduction and Climate Change Adaptation (IUCN, 2014), and the seminal resource manual Managing Disaster Risks for World Heritage, developed jointly by UNESCO and all three Advisory Bodies (UNESCO, ICCROM, ICOMOS, IUCN, 2010).

Despite the many ongoing efforts, more concerted action needs to be taken at the national, subnational and local levels – engaging local communities.

n.d.-t). This is an online platform of innovative practices featuring more than 65 case studies across all regions which promote the integration of local environmental knowledge and cultural heritage safeguarding and conservation to improve current living conditions in and around heritage sites, while reducing their impact on the environment.[13] In addition, UNESCO provides multiple resources, publications and guidance on responding to climate change (UNESCO, n.d.-u).

Despite the many ongoing efforts, more concerted action needs to be taken at the national, subnational and local levels – engaging local communities. This includes actions to incorporate cultural heritage in national and local plans and strategies for climate action and disaster risk reduction.

4.C Lessons learned from loss of cultural heritage

4.C.i Loss of cultural heritage often results in multiple compounded losses at different scales.

As cultural heritage is usually anchored to a particular place, the loss of a specific heritage form may trigger a ripple effect of multiple compounding losses, including of related artefacts, intangible heritage elements or ecosystems associated with that place. Furthermore, in addition to being a loss to its local communities, loss of heritage that is of great significance at the national or even the international level translates to a loss to all of humanity.

4.C.ii Protecting and safeguarding cultural heritage is itself a significant contribution to countering climate change impacts and risks.

Loss of heritage that is of great significance at the national or even the international level translates to a loss to all of humanity.

Cultural heritage of various forms offers solutions to climate change: (1) by reducing carbon emissions, including as evidenced by the UNESCO papers on glaciers, forests and marine heritage (UNESCO, 2020; UNESCO, WRI, IUCN, 2021; UNESCO, IUCN, 2022); (2) as a source and marker of the cultural diversity of humankind, expressing different beliefs and alternative ways to adapt to place and the natural habitat; (3) as a source of environmental knowledge and management systems for land, water and other natural resources; and (4) as a resource for adaptation and mitigation strategies, since both innovative capacities as well as the accumulated local knowledge of generations contribute to adaptation solutions and enhancing climate resilience.

13 The climate change adaptation and mitigation thematic in the World Heritage Canopy owes special thanks to the support of the Government of the Netherlands.

4.C.iii Identification, inventorying and documentation of cultural heritage is essential for monitoring.

Cultural heritage is increasingly at risk from climate-related impacts, but equally is an invaluable source of environmental knowledge, resilience and adaptation strategies.

Cultural heritage at the local, subnational and national levels should be documented and its state of conservation and the viability of its safeguarding regularly monitored to protect it. Innovative methodologies and solutions are needed for documentation, including new digital technologies. But in all cases, the identification, inventorying and documentation should include the engagement of local communities and Indigenous Peoples.

4.C.iv Adequate laws and legislation and robust governance systems are needed for safeguarding all types of cultural heritage.

UNESCO Conventions such as the 1972 World Heritage Convention and the 2003 Intangible Heritage Convention are not only about safeguarding sites and elements recognized as the heritage of humanity, but they provide frameworks for strengthening national, subnational and local systems of safeguarding all heritage. Cultural resilience is enhanced by raising the awareness of local communities of the importance of their cultural heritage and the potential consequences of its loss, engaging them in finding strategies to protect and safeguard cultural heritage, including the knowledge and skills associated with it.

4.C.v Cultural heritage is vulnerable to climate change impacts but is also a resource for solutions.

Cultural heritage is increasingly at risk from climate-related impacts, but equally is an invaluable source of environmental knowledge, resilience and adaptation strategies. On the one hand, multi-disciplinary and inclusive methodologies are needed to assess the risks and vulnerabilities of cultural heritage in order to safeguard the most endangered examples. At the same time, in most societies, cultural heritage that has survived through centuries or generations is an invaluable repository of accumulated knowledge, including that of local communities and Indigenous Peoples, which needs to be harnessed to find local solutions and strategies for adaptation and mitigation. Knowledge-sharing of local solutions that are inclusive, participatory and rights-based would inspire others.

Scientific methodologies must be integrated alongside the knowledge systems of local communities and Indigenous Peoples, including for slow onset events and to avert and minimize losses from events involving irreversible loss and damage.

4.C.vi Scientific assessments of climate risks, policies and cultural knowledge must be integrated with cultural and Indigenous knowledge systems.

Assessment and monitoring is essential to avert, minimize and address loss of cultural heritage. However, scientific methodologies must be integrated alongside the knowledge systems of local communities and Indigenous Peoples, including for slow onset events and to avert and minimize losses from events involving irreversible loss and damage.

4.C.vii Cultural heritage could act as a means to recover and build community resilience when facing climate-related emergencies and disasters.

Lived experiences and local solutions offer a wealth of lessons and knowledge that must be harnessed and shared for all aspects of climate action, from addressing climate impacts, to improving preparedness and creating adaptation and mitigation measures to minimize the risk of disasters.

Enhancing preparedness for extreme climate events, reducing disaster risks and supporting recovery are crucial to averting, minimizing and addressing the loss of cultural heritage. At the same time, cultural heritage should be harnessed for resilience and post-disaster recovery.

4.C.viii Knowledge-sharing and capacity-building at all levels are essential to ensure an enhanced understanding of climate-related loss of all types of cultural heritage.

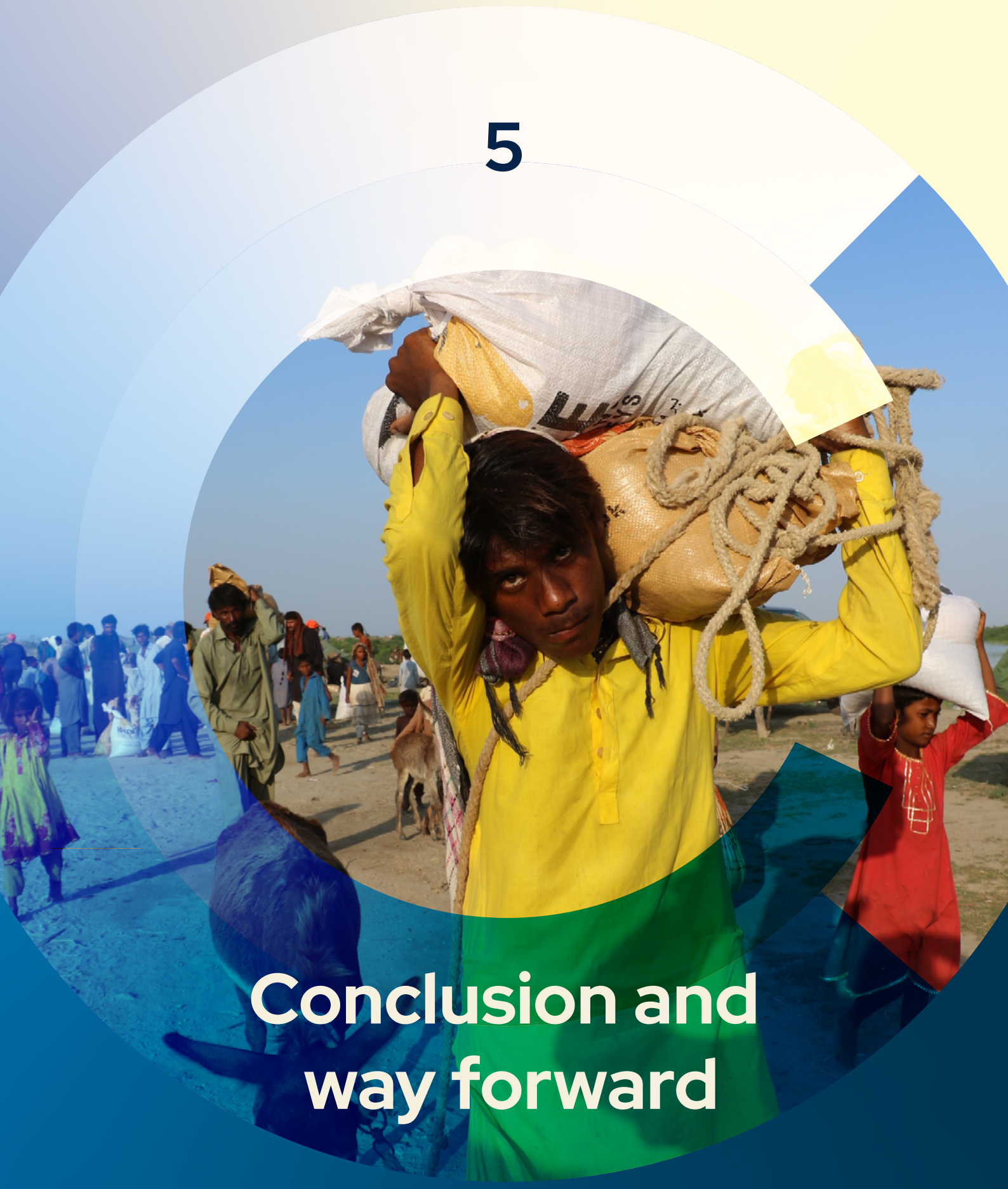
As is evident from the foregoing analysis, lived experiences and local solutions offer a wealth of lessons and knowledge that must be harnessed and shared for all aspects of climate action, from addressing climate impacts, to improving preparedness and creating adaptation and mitigation measures to minimize the risk of disasters. Comprehensive risk management and climate action must integrate cultural heritage and its potential losses into plans, policies and strategies and empower local communities and Indigenous Peoples to respond, in addition to other stakeholders. Moreover, national, subnational and local comprehensive risk management plans and climate action plans must integrate the potential of cultural heritage for community resilience and disaster recovery.

4.C.ix National and international partnerships should be mobilized to protect cultural diversity.

From technical support to financing, it is important for local, national and global communities to come together to ensure the protection and safeguarding of cultural heritage.

From technical support to financing, it is important for local, national and global communities to come together to ensure the protection and safeguarding of cultural heritage, the benefits of which go beyond its immediate local communities to have national and global significance – whether the value they contribute is grand artistic excellence or innovative local solutions to ecosystem management. Diversity of cultural heritage contributes to cultural diversity, which is essential for stable and peaceful societies and which fosters intercultural dialogue and inclusion for all.

5



Conclusion and way forward

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LOSS OF BIODIVERSITY AND ECOSYSTEM SERVICES

- NELs-BES and the cascading impacts they have on the entire socio-ecological system need to be 'visible'. This requires raising awareness, taking into account the perspectives of local communities and establishing a monitoring system that captures the diverse values of ecosystems, their services and biodiversity.

- It is not sufficient to address only those NELs-BES that have already appeared. It is imperative to enhance actions to avert and minimize NELs-BES, including through appropriate management of ecosystems, for example via the implementation of NbS and/or ecosystem-based approaches.

- Thinking of each NELs-BES in isolation limits the opportunities to tackle them. The discourse on these losses needs to be mainstreamed in various policy areas, and coherent policies to avert, minimize and address NELs-BES in different countries, sectors and aspects of people's lives need to be developed.

LOSS OF TERRITORY AND HABITABILITY

- Loss of territory and habitability is ultimately about the loss of land. This is being experienced in numerous places around the world, with cascading effects on people's well-being, sense of self and identity, cultural practices, and ecosystem services. It is critically important that loss of land, and the effect this can have on people's lives, is recognized in global policy processes and funding schemes.

- There are different ways of responding to loss of land, including through the delivery of immediate emergency relief to support people's basic needs, the rehabilitation and protection of landscapes, and, as a last resort, the permanent relocation of communities. All these responses require funding, resourcing and support. It is also imperative to continuously monitor these responses to ensure that any other impacts, or other NELs, that might emerge can be iteratively addressed.

- Experiences of, and responses to, territory loss have highlighted the criticality of inclusive, participatory and rights-based mechanisms to address losses. There are various mechanisms through which communities, such as those at the forefront of loss of territory and habitability, are being engaged in designing, implementing and monitoring of responses. It is important to understand existing inequalities and power dynamics in NELs adaptation and responses, including which groups are being excluded and whose values and perceptions of adaptation limits are being prioritized and enacted. In some contexts, alternative means for delivering support and cognizance of different land tenure systems and territorial rights of communities may be needed to engage those at the forefront of territory and habitability loss.

LOSS OF CULTURAL HERITAGE

- Cultural heritage comes in many different forms, from sites to artefacts and living heritage elements, so cultural heritage losses too are experienced in multiple and overlapping ways. Moreover, depending on the values of the cultural heritage, its disappearance may not just be a loss to its local communities but also nationally, or to all of humanity. It may also be interlinked with other NELs including loss of territory, biodiversity and ecosystem losses, as well as the loss of Indigenous knowledge and the loss of social/cultural identity.

- Recognition of cultural heritage in international processes and initiatives is urgent and essential, both regarding climate impacts on cultural heritage and its vulnerability, and as an important resource for climate resilience for communities and for mitigation and adaptation solutions. Protection and safeguarding of cultural heritage is itself a significant climate action. Reinforcing cultural resilience is urgent and essential. This includes strengthening governance systems and legislation while also engaging local communities and Indigenous Peoples.

- Scientific assessments and monitoring of climate risks and impacts on cultural heritage must be multidisciplinary, integrating local and Indigenous knowledge systems. The multiplicity of local solutions for mitigation and adaptation must be harnessed and knowledge shared to build resilience, including for reducing the risk of climate-related disasters and emergencies. Furthermore, cultural heritage must be integrated into all national, subnational and local climate plans and policies as well as those related to disaster risk reduction and management.

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Section 2

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