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Biodiversity and climate change

Expanded supplement to the Voluntary Guidelines for the Design and Effective Implementation of Ecosystem-based Approaches to Climate Change Adaptation and Disaster Risk Reduction**

Note by the Secretariat

1. The present document has been produced as an expanded supplement to the Voluntary Guidelines for the Design and Effective Implementation of Ecosystem-based Approaches to Climate Change Adaptation and Disaster Risk Reduction adopted by decision [14/5](#).
2. In paragraph 17 of decision [16/22](#), the Conference of the Parties to the Convention on Biological Diversity requested the Executive Secretary to develop, subject to the availability of resources, a supplement to the Voluntary Guidelines for the Design and Effective Implementation of Ecosystem-based Approaches to Climate Change Adaptation and Disaster Risk Reduction providing voluntary guidance and tools based on good practices for the design, effective implementation and scaling up, as appropriate, of nature-based solutions and/or ecosystem-based approaches to climate change mitigation and adaptation to support the implementation of Targets 8 and 11, as well as other related targets, of the Kunming-Montreal Global Biodiversity Framework, where appropriate, consistent with United Nations Environment Assembly resolution 5/5, noting Mother Earth-centric actions, as recognized by some countries, in line with different national circumstances, priorities and capabilities, including updating guidance for fit-for-purpose social and environmental safeguards, based on existing safeguards, for consideration by the Subsidiary Body on Scientific, Technical and Technological Advice before the seventeenth meeting of the Conference of the Parties.
3. The Secretariat of the Convention hired a consultant to prepare a draft supplement, under its guidance. Two online consultation sessions were held on 19 March 2025 to define the structure of the supplement. A technical workshop was hosted by the United Nations Environment Programme World Conservation Monitoring Centre from 7 to 9 May 2025 to review the first draft of the guidelines and provide additional information. Funding for the preparation of the guidelines and the hybrid workshop was generously provided by the Deutsche Gesellschaft für Internationale

* CBD/SBSTTA/27/1.

** The present document is being issued without formal editing.

Zusammenarbeit, the European Union, the Government Canada and SwedBio at the Stockholm Resilience Centre through the Biodiversity and Ecosystem Services Network.

4. The present document provides an expanded version of the supplement annexed to document [CBD/SBSTTA/27/4](#). It includes a primer for policymakers, a list of relevant tools and a stepwise approach for the design, effective implementation and scaling-up, as appropriate, of nature-based solutions and/or ecosystem-based approaches to climate change mitigation and adaptation.

Expanded supplement to the Voluntary Guidelines for the Design and Effective Implementation of Ecosystem-based Approaches to Climate Change Adaptation and Disaster Risk Reduction

I. Introduction and background

1. The Voluntary Guidelines for the Design and Effective Implementation of Ecosystem-based Approaches to Climate Change Adaptation and Disaster Risk Reduction published in 2019 included: (a) a primer for policymakers, offering high-level policy guidance; (b) voluntary guidelines for practitioners, focused on operationalizing ecosystem-based approaches; and (c) a compilation of briefs intended to support outreach into different sectors (SCBD, 2019).

2. The present supplement closely follows the original structure and is intended to be consulted alongside the original primer for policymakers and voluntary guidelines. It was developed in response to the request in paragraph 17 of decision [16/22](#), which is focused on guidance and tools based on good practices for the design, effective implementation and scaling up of nature-based solutions and ecosystem-based approaches, with a particular focus on fit-for-purpose safeguards and the other topics highlighted in the decision. The aim of the supplement is to add to the existing Voluntary Guidelines, with minimal repetition, while remaining a readable document. As the Voluntary Guidelines already cover ecosystem-based approaches to adaptation and disaster risk reduction, the supplement provides a stronger coverage of the new topic of climate change mitigation. The present expanded supplement elaborates upon the supplement put before Subsidiary Body on Scientific, Technical and Technological Advice for discussion in document [CBD/SBSTTA/27/4](#).

3. The present supplement was prepared through consultation with a range of representatives of Parties, United Nations entities, international organizations and representatives of indigenous peoples and local communities, women and youth through two online consultation sessions (both held on 19 March 2025)¹ and a three-day hybrid technical workshop (7–9 May 2025)² hosted by the United Nations Environment Programme World Conservation Monitoring Centre. The consultation sessions and the workshop were attended by experts and practitioners from a wide range of countries and organizations, ensuring a geographically balanced representation. Funding for the preparation of the supplement and the technical workshop was generously provided by the Deutsche Gesellschaft für Internationale Zusammenarbeit, the European Union, the Government of Canada and SwedBio at the Stockholm Resilience Centre through the Biodiversity and Ecosystem Services Network.

¹ See www.cbd.int/meetings/CC-OM-2025-02.

² See www.cbd.int/meetings/CC-WS-2025-01.

* CBD/SBSTTA/27/1.

Contents

I.	Introduction and background.....	3
II.	Primer for policymakers	5
	A. Key messages.....	5
	B. Introduction.....	5
	C. Principles and safeguards	6
	D. Overarching considerations	7
	E. Stepwise approach to design and implementation	8
III.	Supplement to the Voluntary Guidelines: the design and effective implementation of nature-based solutions and/or ecosystem-based approaches	12
	A. Introduction.....	12
	B. Overview of the supplement	12
	C. Principles and safeguards	13
	1. Principles and safeguards for climate change mitigation	15
	2. Respecting different value systems	15
	3. Respect for human rights.....	15
	4. Existing safeguards frameworks and guidance.....	16
	5. Applying safeguards at jurisdictional and project scales.....	18
	D. Overarching considerations for design, implementation and scaling up	19
	1. Scaling up	19
	2. Integrating traditional knowledge and the efforts of indigenous peoples and local communities.....	20
	3. Mainstreaming nature-based solutions and/or ecosystem-based approaches	21
	4. Raising awareness and capacity building and strength.....	22
	E. Stepwise approach to design and implementation	23
	Introduction.....	23
	Step A: Understanding the social-ecological system.....	24
	Step B: Assessing vulnerabilities and risks	25
	Step C: Identifying options for nature-based solutions and/or ecosystem-based approaches	26
	Step D: Prioritizing, appraising and selection of options	27
	Step E: Project design, implementation and scaling up.....	28
	Step F: Effective monitoring and evaluation mechanisms	30
	Annex I: Sectoral contributions	32
	Annex II: Tools and guidance.....	33
	Annex III: References.....	36

II. Primer for policymakers

A. Key messages

4. The *Voluntary Guidelines for the Design and Effective Implementation of Ecosystem-based Approaches to Climate Change Adaptation and Disaster Risk Reduction* address ecosystem-based approaches for climate change adaptation and disaster risk reduction (Eco-DRR). This supplement responds to the request in [decision 16/22](#) for further guidance. It pays particular attention to the specific design considerations, safeguards and monitoring needed to ensure that nature-based solutions and/or ecosystem-based approaches for climate change mitigation deliver for both people and nature, as adaptation and Eco-DRR are well covered by the *Voluntary Guidelines*.

5. Nature-based solutions and/or ecosystem-based approaches provide many tangible benefits that directly support the achievement of global environmental, climate and development goals and targets, including Targets 8 (on minimizing the climate impacts of climate change on biodiversity and building resilience) and 11 (on restoring, maintaining and enhancing nature's contributions to people) of the Kunming-Montreal Global Biodiversity Framework. The effective implementation of those approaches enhances synergies across the Rio conventions, as well as other environmental and social priorities, including those of the biodiversity-related multilateral environmental agreements and the Sustainable Development Goals.

6. Embedding nature-based solutions and/or ecosystem-based approaches into climate action budgets, spatial governance, and national and subnational development plans enhances policy coherence. Looking forward, post-2030 strategies that are ambitious, rights-based and long-term in vision can help to ensure the continued central contribution of ecosystem health and integrity to resilience while increasing equity.

7. Fit-for-purpose social and environmental safeguards, including frameworks for applying and monitoring them, are essential for promoting the multiple benefits offered by nature-based solutions and/or ecosystem-based approaches, while avoiding or minimizing social and environmental risks.

8. Nature-based solutions and/or ecosystem-based approaches are most effective when there is broad and sustained engagement and support from stakeholders. Planning, design, implementation, governance and monitoring efforts that foster whole of government and whole-of-society participation will help to ensure success. This is most effective when grounded in respect for diverse worldviews and knowledge systems, which may favour either an intrinsic or a human-centred values of nature. Inclusive, rights-based design and governance are built on key principles such as free, prior and informed consent (FPIC), gender equality, and respect for traditional knowledge, cultures and practices. Adaptive monitoring frameworks will support ownership, accountability and long-term impact.

9. The *Voluntary Guidelines for the Design and Effective Implementation of Ecosystem-based Approaches to Climate Change Adaptation and Disaster Risk Reduction* and the present supplement could be usefully complemented by regionally and culturally tailored toolkits, which may be ecosystem- or sector-specific. User-friendly, actionable toolkits could offer guidance on various topics, such as safeguards, design standards, co-benefit evaluation and institutional readiness.

B. Introduction

10. Nature-based solutions and/or ecosystem-based approaches form part of effective and coherent responses to interdependent crises including biodiversity loss, climate change and disaster risk. They are recognized as actions that can be undertaken to tackle societal, economic and environmental challenges by, *inter alia*, the Convention on Biological Diversity, the United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa, the United Nations Framework Convention on Climate Change, the United Nations Environment Assembly, the United Nations Office for Disaster Risk Reduction, the Intergovernmental Panel on Climate

Change and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. When well designed, they can deliver resilience and restore ecological integrity while advancing societal well-being.

11. The [*Voluntary Guidelines for the Design and Effective Implementation of Ecosystem-based Approaches to Climate Change Adaptation and Disaster Risk Reduction*](#) were adopted by CBD COP 14 in 2018. A more detailed version was published in 2019 by the Secretariat of the CBD as [Technical Series 93](#). They provide clear guidance on how to integrate ecosystem-based approaches into climate change adaptation and disaster risk reduction effectively. Much of this guidance, including the principles and safeguards, is also broadly applicable to climate change mitigation and other societal challenges. Since 2019, there have been substantial developments in international policy and scientific understanding, notably, the adoption of the Kunming-Montreal Global Biodiversity Framework in 2022. The present supplement is aimed at complementing the *Voluntary Guidelines* and relevant CBD decisions, responding to these new developments and paying particular attention to climate change mitigation, which was not covered in the *Voluntary Guidelines*.

12. In its resolution 5/5 of 2 March 2022, the United Nations Environment Assembly defined nature-based solutions as “actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services, resilience and biodiversity benefits” (UNEP 2022a).

13. CBD Secretariat (2022) guidance considers ecosystem-based mitigation as “the use of ecosystems for their carbon storage and sequestration service to aid climate change mitigation”, through ecosystem management activities that reduce greenhouse gas emissions and enhance carbon removals from the atmosphere. In [decision X/33](#), Parties are invited to follow specific guidance for different ecosystems.

14. This supplement to the *Voluntary Guidelines* has been prepared pursuant to paragraph 17 of [decision 16/22](#) and is intended for use by a wide range of actors. The request from COP 16 is for “voluntary guidance and tools based on good practices for the design, effective implementation and scaling up, as appropriate, of nature-based solutions and/or ecosystem-based approaches to climate change mitigation and adaptation to support the implementation of Targets 8 and 11, as well as other related targets, of the Framework, where appropriate, consistent with [United Nations Environment Assembly resolution 5/5](#), noting Mother Earth-centric actions, as recognized by some countries, in line with different national circumstances, priorities and capabilities, including updating guidance for fit-for-purpose social and environmental safeguards, based on existing safeguards”. This supplement has been co-created through two online consultation sessions (19 March 2025) and a three-day hybrid expert workshop (7-9 May 2025), hosted by the Secretariat of the Convention on Biological Diversity (CBD) in collaboration with the United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC).

C. Principles and safeguards

15. The *Voluntary Guidelines* adopted by Parties are underpinned by a set of 10 principles and nine safeguards. The principles serve as “high-level standards to guide planning and implementation”. They are framed as actions that promote (a) resilience and adaptive capacity, (b) inclusivity and equity, (c) success at multiple scales and (d) effectiveness and efficiency. The safeguards are aimed at preventing harm to people and to nature, facilitating transparency and promoting multiple benefits. The principles and safeguards, designed for ecosystem-based adaptation and Eco-DRR, are also broadly applicable to nature-based solutions and/or ecosystem-based approaches to climate change mitigation. The present supplement updates the guidance on fit-for-purpose social and environmental safeguards by integrating some additional principles and safeguards for climate change mitigation and strengthening the safeguards for indigenous and local communities. Together, the principles and safeguards are an essential part of the inclusive, participative approaches to design and implementation described throughout this text.

Additional principles and safeguards for climate change mitigation

16. When climate change mitigation is a key objective, additional principles and safeguards are necessary to ensure that the actions to be undertaken meet both climate and nature goals. These additions are focused on multiple benefits, urgency, mitigation hierarchy, additionality, permanence and leakage (Table 1).

Strengthening safeguards for indigenous peoples and local communities

17. Building on the principles and safeguards laid out in the *Voluntary Guidelines*, and consistent with the section C of the Kunming-Montreal Global Biodiversity Framework, two areas deserve further attention:

18. **Respecting different value systems:** Nature itself is assigned an intrinsic value and rights, including within legal frameworks, under a Mother Earth-centric world view. (Espinosa, 2014; Washington, et al. 2017). This worldview is rooted in a common indigenous perspective that sees humans as part of nature and does not privilege them above other parts of an ecosystem. While existing safeguards, frameworks and standards often address the rights and traditional knowledge of indigenous peoples and local communities, they do not directly address Mother Earth-centric worldviews. This aspect could be further developed as appropriate in diverse national contexts and in ways that are supportive of human rights.

19. **Respect for human rights:** Human rights-based approaches are essential to the legitimacy, integrity and effectiveness of nature-based solutions and/or ecosystem-based approaches. This is already embedded in the existing safeguards, but further strengthening in line with the KMGBF is recommended. Ensuring accountability, building trust, and supporting flexible, inclusive implementation are also critical to successful scaling up. To address concerns around the recognition of nature's intrinsic value and the distribution of benefits and burdens, the rights of indigenous peoples and local communities must be fully integrated into project design, implementation and governance. This will involve giving attention to free, prior and informed consent (FPIC).^[9] It will also include attention to customary rights, cultural protection, participatory decision-making, participatory implementation, transparent communication and equitable benefit-sharing. Wherever solutions are proposed that would affect existing rights-holders, the guidance outlined here is relevant.

D. Overarching considerations

20. The considerations below are intended to complement those presented in the *Voluntary Guidelines* in relation to the stepwise approach to design and implementation.

Scaling up

21. Good practices for the scaling up of nature-based solutions and/or ecosystem-based approaches to climate change mitigation, adaptation and disaster risk reduction include:

- a. Building a common understanding of these approaches, including clarity on the costs and benefits (social, environmental and economic) of different choices,
- b. Developing more insight into the factors that enable success and the barriers to scaling, through systematic monitoring, evaluation and reporting on effectiveness and efficiency,
- c. Adopting integrated approaches for scaling up, combining policy, finance and safeguard measures, and including regional planning,
- d. Applying fit-for-purpose safeguards, standards and guidelines,
- e. Enabling locally-led actions and scaling up existing local initiatives, with safeguards tailored to risk and setting.

Integrating traditional knowledge and the efforts of indigenous peoples and local communities

22. Integrating traditional knowledge, cultures and practices can be crucial for successful design, implementation and scaling up of nature-based solutions and/or ecosystem-based approaches. Key actions include:

- a. Meaningful inclusion of the views and practices of indigenous peoples and local communities, both at the design stage and throughout project implementation, ensuring co-creation of actions to be taken, and enabling ownership at the local level. This consideration builds upon Principle 4 of the *Voluntary Guidelines*.
- b. Addressing land tenure rights and access to natural resources and recognizing the role of indigenous peoples and local communities in managing biodiversity and ecosystem services. Many indigenous peoples and local communities face unclear and unrecognized tenure despite having customary land- or sea-use rights, which undermines their ability to implement actions that address biodiversity and climate concerns and build resilience within their traditional territories. If this issue is left unaddressed, outside interventions can exacerbate land dispossession (Notess et al., 2018). This consideration builds upon Safeguard 9 of the *Voluntary Guidelines*.
- c. Seeking advice on the best approaches to build bridges between different science and knowledge systems. Much traditional knowledge is passed on orally and is context specific. For this reason, inclusion of such knowledge alongside with scientific findings needs care, and attention to data sovereignty. Data sovereignty policies can provide frameworks for “the ethical use of data to advance collective indigenous wellbeing and self-determination” (Russo and Carroll, 2021).

Mainstreaming nature-based solutions and/or ecosystem-based approaches

23. Nature-based solutions and/or ecosystem-based approaches can only deliver their full transformative potential when mainstreamed into appropriate governance and policy frameworks. To help ensure a just transition as described by IPBES (2024b), these efforts will be underpinned by inclusive planning, monitoring and accountability systems. When operationalizing the KMGBF, governments can ensure that these approaches are embedded through coherent land- and sea-use planning, climate-biodiversity budget alignment, and spatial strategies. Governments can and increasingly do integrate them into national biodiversity strategies and action plans (NBSAPs), land degradation neutrality (LDN) targets, national adaptation plans (NAPs) and nationally determined contributions (NDCs). Nature-based solutions and/or ecosystem-based approaches can be used to foster collaboration and integrated policy and planning approaches across the Rio conventions (Annex I). Enhanced collaboration among the responsible ministries will help to leverage synergies and avoid the duplication of efforts.

Raising awareness and building capacity

24. Communicating the multiple benefits of nature-based solutions and/or ecosystem-based approaches to a wide audience is crucial to uptake and sustainability. It is also essential to opening avenues for funding. Understanding the information and communication needs of diverse stakeholder groups will help to ensure effective outreach, build a common knowledge base, raise awareness and strengthen capacities in accordance with the long-term strategic framework for capacity-building and development. Many organizations, partnerships, initiatives and coalitions are working on awareness-raising and capacity building or on offering platforms for knowledge exchange.

E. Stepwise approach to design and implementation

25. The *Voluntary Guidelines* present a stepwise approach designed for adaptation and Eco-DRR objectives. This section highlights some additional considerations for each of the steps, including for initiatives working towards climate change mitigation.

Step A: Understanding the social-ecological system

26. In the context of climate change mitigation, it is important to explore several issues when defining the challenge to be tackled and setting objectives for a new initiative:

- a. In order to assess mitigation potential, the history of the target social-ecological system, the drivers of ecosystem change and the rate of greenhouse gas emissions from ecosystem loss or degradation must be identified. This assessment will feed into an estimate of emissions reductions and removals from possible activities that will be undertaken in step D.
- b. With regard to social context, the dependence of local jobs, industries, livelihoods and cultures on natural and managed ecosystems, the destruction of ecosystems, the barriers to ecosystem restoration and the aspirations of the local population must be considered.
- c. In order to identify the market and non-market approaches, existing policy or agreements on how and with whom the benefits, including any monetization of carbon emissions reductions and removals would need to be shared. In addition, the carbon rights and land and sea tenure must be recognized and respected, as well as the local attitudes towards payments for ecosystem services.

Step B: Assessing vulnerabilities and risks

27. Step B focuses on the vulnerability of nature and people to climate change and hazardous events. Engaging early with traditional knowledge holders and including their knowledge into climate vulnerability and risk assessments, with full respect for knowledge and data sovereignty, are essential.

28. Social and environmental safeguards are crucial tools to supporting the understanding and reduction of risks. Environmental safeguards include addressing the risk of reversals of emissions reductions and removals that may result from extreme events or slower onset climate impacts.

Step C: Identifying options for nature-based solutions and/or ecosystem-based approaches

29. To reflect the KMGBF, step C will need to accommodate effective, equitable and scalable nature-based solutions and/or ecosystem-based approaches. The potential multiple benefits derived from each envisaged option should be identified. Key actions for identifying climate change mitigation options specifically could involve: (a) identifying broad options for action, based on step A; (b) exploring specific options undertaken in other similar geographies (e.g. through case studies); and (c) working with the multi-stakeholder group to identify favoured options.

Step D: Prioritizing, appraising and selecting options

30. Some additional criteria should be considered when prioritizing and appraising options for action with a climate change mitigation objective (Key Action (a) of the *Voluntary Guidelines*). The criteria may include: the position in the mitigation hierarchy, mitigation potential, resilience to climate change, and capacity to implement over the long term (The Nature Conservancy, 2023; UNEP, 2021). If there is a choice between the protection of threatened intact ecosystems and restoration of lost or degraded ecosystems, the mitigation hierarchy would prioritize protection. Relatively simple methods can be used to derive a first estimate of mitigation potential for many options. The IPCC distinguishes tier 1 data and methods (default global values), tier 2 (country-specific), and tier 3 (more detailed models, more local data). Current understanding of ecosystem resilience to climate change (Step B) is a factor in assessing the long-term viability of each option in delivering mitigation benefits. The capacity to implement will depend upon existing skills and knowledge, training opportunities and access to the financial and other resources needed to enable implementation through time.

Step E: Project design, implementation and scaling up

* CBD/SBSTTA/27/1.

31. Alongside the Key Actions specified in the *Voluntary Guidelines*, nature-based solutions and/or ecosystem-based approaches will also be more successful when diverse knowledge systems are acknowledged and incorporated. It may be especially helpful to integrate traditional knowledge into design and implementation (Seddon et al., 2020; IPBES, 2019; IPBES, 2024). When climate change mitigation benefits are intended, attention to the carbon-focused safeguards detailed in Table 1 is needed at the design and implementation stage.

32. One clear pathway to scaling up is the inclusion of nature-based solutions and/or ecosystem-based approaches within NDCs, NAPs and other national plans. Several toolkits exist to support countries in doing so (Annex II). A first step is to quantify the potential for contribution to benefits including climate change adaptation, mitigation and disaster risk reduction, often through spatial analysis and planning.

Step F: Effective monitoring and evaluation (M&E) mechanisms

33. Nature-based solutions and/or ecosystem-based approaches result in multiple benefits that help to address several societal challenges. Monitoring and evaluation frameworks will need to encompass the multiple intended impacts, as well as track any negative impacts. In a mitigation context, the requirements for assessing carbon benefits are more stringent when the results are intended to be monetized than when they are not. Multiple carbon standards and protocols are available, though they do not cover all types of nature-based solutions and/or ecosystem-based approaches (WBCSD, 2022). Governments that deploy REDD-plus actions are expected to develop Safeguard Information Systems that transparently communicate how safeguards are being addressed and respected, and summaries of information that update the status of each country's approach to safeguards under the UNFCCC.

Tools and guidance

34. Annex II details selected tools and approaches on participation, rights and equity across the stepwise approach, on scaling up (mainstreaming nature-based solutions and/or ecosystem-based approaches in policy and practice), on capacity building and on assessing and monitoring the carbon and multiple benefits of nature-based solutions and/or ecosystem-based approaches.

Table 1: Proposed principles and safeguards that can support climate change mitigation actions

Theme	Principle	Safeguard
Multiple benefits	Prioritize approaches that address multiple societal challenges, seeking benefits for biodiversity, ecosystem services, resilience and human well-being (see also principle 10 of the <i>Voluntary Guidelines</i>). Prioritize the protection, restoration and management of ecosystems and species important for the full carbon cycle and contributing to climate change adaptation. Ensure a balanced mix of approaches across communities and diverse ecosystems.	Planning for multiple benefits Climate change mitigation actions should be prioritized and designed taking their ability to deliver multiple benefits into account. This may involve: (a) Assessing the benefits, risks and trade-offs of selected actions across multiple societal challenges; (b) Undertaking spatial prioritization that incorporates an analysis of the social and environmental risks and benefits of the proposed actions; (c) Over larger areas, aiming to balance among actions that prioritize several benefits, communities and ecosystems, so that all efforts are not directed to high-carbon ecosystems; (d) Communicating to stakeholders the trade-offs among various benefits when comparing proposed actions, as part of participative decision-making processes.

Urgency	Consider the pressing urgency of the climate crisis, represented by the rapidly diminishing remaining global carbon emissions budget, ³ together with the longevity of greenhouse gases in the atmosphere. Actions that reduce emissions or enhance removals in the short term are more valuable than those with results that materialize over a longer time frame. Avoid the trap of prioritizing speed over resilience (see “permanence” below).	Projection of carbon outcomes through time Climate change mitigation actions should be selected using an assessment of the expected results of the nature-based solution and/or ecosystem-based approach. Cost per ton of carbon should be considered and, together with resilience considerations, may, for example, lead to favouring natural regeneration over planting.
Mitigation hierarchy	First tackle any ongoing loss of carbon stocks in natural habitats. Only when this is addressed, take action to restore historical damage. This principle is closely connected with the urgency principle and multiple benefits principles above. Emissions from the destruction of a natural ecosystem are near-instantaneous, while the carbon removals resulting from the full restoration of an equivalent area of the same ecosystem will typically take many years.	Following the mitigation hierarchy Climate change mitigation actions should be selected in a manner consistent with the mitigation hierarchy. Where there is a choice between reducing emissions through preventing the loss or degradation of natural ecosystems (e.g. deforestation) and emissions removals through restoring natural ecosystems, to follow the mitigation hierarchy is to avoid further negative impacts before restoring degraded ecosystems. Carbon accounting and crediting systems that respect this principle should be chosen.
Additionality	Account only for carbon emission reductions or removals that would not have otherwise occurred (i.e. new climate benefits resulting from the activity).	Ensuring additionality Climate change mitigation actions should be designed on the basis of a stringent assessment of additionality, following accepted carbon standards. The net reduction of carbon stocks in all organic carbon pools (above ground and below ground in the case of terrestrial ecosystems) should be prevented.
Permanence	Prioritize activities where the emission reductions or removals are likely to be long-lasting, taking social and ecological factors into account.	Promoting permanence Climate change mitigation actions should have long-lasting results. They should protect, maintain and restore biodiversity and ecological integrity (ecosystem condition, composition, structure and function). Actions should be designed to reduce the risk of reversals (i.e. Cancun safeguard f), ⁴ which typically means tackling the underlying drivers of ecosystem degradation and barriers to ecosystem restoration or sustainable management. Actions should be designed for climate resilience, for example, when planting, local, climate-resilient native species should be prioritized. Monitoring systems should be able to assess any reversals, and carbon accounting or crediting

³ Robin D. Lamboll and others, “Assessing the size and uncertainty of remaining carbon budgets”, *Nature Climate Change*, vol. 13 (December 2023).

⁴ Decision 1/CP.16, appendix I, of the Conference of the Parties to the United Nations Framework Convention on Climate Change.

* CBD/SBSTTA/27/1.

		systems should include buffers to cater for the remaining risk of reversals.
Leakage	Avoid displacement (“leakage”) of emissions to another location. Leakage can include local, national and international leakage.	Avoiding leakage Climate change mitigation actions should be designed to avoid leakage. Solutions include: (a) Locating mitigation activities in well-governed landscapes and as part of an integrated spatial plan (see Target 1 of the Kunming-Montreal Global Biodiversity Framework); (b) Working collaboratively with actors dependent on land-use change to develop alternative livelihoods and economic pathways that do not lead to leakage or to rebound effects; (c) Undertaking carbon accounting at a jurisdictional scale or within a nested scheme, to integrate local and domestic leakage into overall results; (d) Estimating the remaining risk of leakage on the local, domestic and international scales. (e) Deducting projected remaining leakage from the carbon results in accounting or crediting schemes.

III. Supplement to the Voluntary Guidelines: the design and effective implementation of nature-based solutions and/or ecosystem-based approaches

A. Introduction

35. This expanded supplement to the Voluntary Guidelines for the Design and Effective Implementation of Ecosystem-based Approaches to Climate Change Adaptation and Disaster Risk Reduction is developed in response to CBD COP [Decision 16/22](#) paragraph 17. The objective is to provide “*voluntary guidance and tools based on good practices for the design, effective implementation and scaling up, as appropriate, of nature-based solutions and/or ecosystem-based approaches to climate change mitigation and adaptation to support the implementation of Targets 8 and 11, as well as other related targets, of the Kunming-Montreal Global Biodiversity Framework, where appropriate, consistent with [United Nations Environment Assembly resolution 5/5](#), noting Mother Earth-centric actions, as recognized by some countries, in line with different national circumstances, priorities and capabilities, including updating guidance for fit-for-purpose social and environmental safeguards, based on existing safeguards*”.

36. This supplement has been drafted through a consultative process coordinated by the Secretariat of the Convention on Biological Diversity (CBD), in collaboration with the United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC). It is part of systemic responses that foster coherence across national actions to implement international agreements, including the CBD, UNFCCC, UNCCD, Sendai Framework and the UN Human Rights system. It reflects inputs received during preliminary online consultations conducted on 19 March 2025, as well as substantive contributions from participants in the dedicated hybrid workshop convened from 7-9 May 2025.

B. Overview of the supplement

37. The supplement starts with an introduction covering the CBD decision that requested this text, and the process for its development. It then follows the structure of the Voluntary Guidelines, exploring principles and safeguards in section 2.2, some overarching considerations for design, implementation and

scaling up in section 2.3 and building on the original stepwise approach to design and implementation of ecosystem-based approaches and nature-based solutions in section 2.4.

38. The Voluntary Guidelines address ecosystem-based approaches for adaptation to climate change and to disaster risk reduction. Throughout, this supplement aims particularly to capture additional considerations with a climate change mitigation focus, to support the implementation of [Target 8](#) (Minimize the impacts of climate change on biodiversity and build resilience) and [Target 11](#) (Restore, maintain and enhance nature's contributions to people) of the Kunming-Montreal Global Biodiversity Framework, and fit-for-purpose social and environmental safeguards.

39. The terms 'natural climate solutions' (Griscom *et al.*, 2017) and 'nature-based climate solutions' (Seddon *et al.*, 2019) are often used to describe approaches to better protect, manage and restore ecosystems with the objective of climate change mitigation. There is strong overlap with nature-based solutions, but the typology of natural climate solutions includes some activities in managed ecosystems that may not fully qualify, such as methods for improved rice cultivation. Resources developed using this language have been drawn on in the current supplement where relevant.

C. Principles and safeguards

The Voluntary Guidelines adopted by the parties to the CBD in November 2018, are underpinned by a set of ten principles and nine safeguards. The principles serve as "high-level standards to guide planning and implementation". They are framed as actions that promote (i) resilience and adaptive capacity, (ii) inclusivity and equity, (iii) success at multiple scales and (iv) effectiveness and efficiency. The safeguards aim to prevent harm to people and to nature, facilitate transparency and promote multiple benefits. The principles and safeguards inform the Guidelines' overarching considerations and stepwise approach for design and implementation of ecosystem-based adaptation and Eco-DRR (Table 2 and

40. Table 3).

Table 2: Principles included in the Voluntary Guidelines (SCBD, 2019)

Principles
Principles for building resilience and enhancing adaptive capacity through EbA and Eco-DRR 1. Consider a full range of ecosystem-based approaches to enhance resilience of socio-ecological systems as a part of overall adaptation and disaster risk reduction strategies. 2. Use disaster response as an opportunity to build back better for enhancing adaptive capacity and resilience and integrate climate-resilient ecosystem considerations throughout all stages of disaster management. 3. Apply a precautionary approach in planning and implementing EbA and Eco-DRR interventions.
Principles for ensuring inclusivity and equity in planning and implementation 4. Plan and implement EbA and Eco-DRR interventions to prevent and avoid the disproportionate impacts of climate change and disaster risk on ecosystems as well as vulnerable groups, indigenous peoples and local communities, women and girls.
Principles for achieving EbA and Eco-DRR on multiple scales 5. Design EbA and Eco-DRR interventions at the appropriate scales, recognising that some EbA and Eco-DRR benefits are only apparent at larger temporal and spatial scales. 6. Ensure that EbA and Eco-DRR are sectorally cross-cutting and involve collaboration, coordination, and co-operation of stakeholders and rights holders.
Principles for EbA and Eco-DRR effectiveness and efficiency

* CBD/SBSTTA/27/1.

7. Ensure that EbA and Eco-DRR interventions are evidence-based, integrate indigenous and traditional knowledge, where available, and are supported by the best available science, research, data, practical experience, and diverse knowledge systems.
8. Incorporate mechanisms that facilitate adaptive management and active learning into EbA and Eco-DRR, including continuous monitoring and evaluation at all stages of planning and implementation.
9. Identify and assess limitations and minimize potential trade-offs of EbA and Eco-DRR interventions.
10. Maximise synergies in achieving multiple benefits, including for biodiversity, conservation, sustainable development, gender equality, health, adaptation, and risk reduction.

Table 3: Safeguards included in the Voluntary Guidelines (SCBD, 2019)

Safeguards for effective planning and implementation of Ecosystem-based approaches to Adaptation (EbA) and Eco-DRR	
Applying environmental impact assessments and robust monitoring and evaluation	1. EbA and Eco-DRR should be subject, as appropriate, to environmental impact assessments including social and cultural assessments (referring to the Akwé: Kon guidelines) at the earliest stage of project design, and subject to robust monitoring and evaluation systems.
Prevention of transfer of risks and impacts	2. EbA and Eco-DRR should avoid adverse impacts on biodiversity or people, and should not result in the displacement of risks or impacts from one area or group to another.
Prevention of harm to biodiversity, ecosystems and ecosystem services	3. EbA and Eco-DRR, including disaster response, recovery and reconstruction measures, should not result in the degradation of natural habitat, loss of biodiversity or the introduction of invasive species, nor create or exacerbate vulnerabilities to future disasters. 4. EbA and Eco-DRR should promote and enhance biodiversity and ecosystem functions and services, including through rehabilitation/ restoration and conservation measures as part of post-disaster needs assessment and recovery and reconstruction plans
Sustainable resource use	5. EbA and Eco-DRR should neither result in unsustainable resource use nor enhance the drivers of climate change and disaster risks, and should strive to maximize energy efficiency and minimize material resource use
Promotion of full, effective and inclusive participation	6. EbA and Eco-DRR should ensure full and effective participation of the people concerned, including indigenous peoples and local communities, women, minorities and the most vulnerable, including the provisioning of adequate opportunities for informed involvement.
Fair and equitable access to benefits	7. EbA and Eco-DRR should promote fair and equitable access to benefits and should not exacerbate existing inequities, particularly with respect to marginalized or vulnerable groups. EbA and Eco-DRR interventions should meet national labour standards, protecting participants against exploitative practices, discrimination and work that is hazardous to their well-being.
Transparent governance and access to information	8. EbA and Eco-DRR should promote transparent governance by supporting rights to access to information, providing all stakeholders and rights holders, particularly indigenous peoples and local communities, with information in a timely manner, and supporting the further collection and dissemination of knowledge.

Respecting rights of women and men from indigenous peoples and local communities	9. EbA and Eco-DRR measures should respect the rights of women and men from indigenous peoples and local communities, including access to and use of physical and cultural heritage.
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1. Principles and safeguards for climate change mitigation

41. The principles and safeguards detailed in the *Voluntary Guidelines* are broadly applicable to nature-based solutions and/or ecosystem-based approaches. While climate change mitigation is a key objective of the action to be undertaken, the same care to social and environmental safeguards is needed. There are also some considerations specific to climate change mitigation and its focus on greenhouse gas emissions reductions and removals. Attention to these principles and safeguards will alleviate many of the concerns expressed around the validity of nature-based solutions and/or ecosystem-based approaches to climate change mitigation (Seddon *et al.*, 2020, 2021).

42. When climate change is a key objective, additional principles and safeguards are necessary to ensure that the actions to be taken deliver on both climate and nature goals (Table 1).

2. Respecting different value systems

43. CBD decision 16/22, in requesting that this supplement be developed, notes “Mother Earth-centric actions, as recognized by some countries”. A Mother Earth centric (ecocentric, or biocentric) worldview assigns an intrinsic value and rights to nature itself, including within legal frameworks (Espinosa, 2014; Washington *et al.*, 2017). The view is rooted in a common indigenous perspective that sees humans as part of nature and does not privilege them above other parts of an ecosystem. This perspective aligns with the recognition by IPBES of the importance of respecting diverse value systems, as reflected in its development of the *Methodological Assessment of the Diverse Values and Valuation of Nature*, which seeks to deepen understanding of the relationships between different worldviews and the values they ascribe to nature (IPBES, 2022). Proponents are generally opposed to more utilitarian, anthropocentric views of nature, and to its monetization through payments for ecosystem services or REDD+ results. In a safeguards context, citizens may have the right to lodge a grievance or pursue a legal case to enforce the rights of nature, as in Ecuador (Tanăsescu *et al.*, 2024). Bolivian law mandates a Mother Earth Ombudsman’s Office to ensure the enforcement of nature’s rights. A small number of other countries have recognized rights to parts of the natural world, such as sea turtles and their habitats (article 29, República de Panamá, 2023).

44. Whilst safeguards frameworks and standards often address the rights and traditional knowledge of indigenous peoples, they do not directly address the rights of nature. This aspect could be further developed as appropriate in different national contexts and in ways that are mutually supportive of human rights, just as Ecuador’s Constitution or Bolivia’s Law of Mother Earth legally recognise nature as a legal right holder.

3. Respect for human rights

45. Respect for human rights is central to the legitimacy, integrity and effectiveness of nature-based solutions and/or ecosystem-based approaches. This is already embedded in the existing safeguards, but further strengthening in line with KMGBF is recommended. This will also help to address any concerns around the recognition of nature’s intrinsic value and the distribution of benefits and burdens. The Right to a Healthy Environment (R2HE), as affirmed in UNGA Resolution 76/300 and UNHRC Resolution 48/13, provides an overarching legal and ethical basis for ensuring human well-being through environmental protection. This includes the duty to ensure clean air, water, a stable climate, and healthy biodiversity.

46. The rights of indigenous peoples and local communities, as articulated in the United Nations Declaration on the Rights of indigenous peoples (UNDRIP) and the Declaration on the Rights of Peasants (UNDROP), and as outlined as a nature-based solutions requirement by UNEA (UNEP, 2022a) must be fully integrated into project design and governance, ensuring Free, Prior, and Informed Consent (FPIC), cultural protection, and equitable benefit-sharing. Human rights-based approaches are reinforced through guidance from the Office of the High Commissioner for Human Rights (OHCHR, 2016), which calls for

the full integration of procedural rights, gender equality, and accountability into biodiversity planning. These principles are echoed in Section C of the Kunming-Montreal Global Biodiversity Framework and align with the UN Guiding Principles on Business and Human Rights (UNGPs), which affirm both the state's duty to protect rights and the corporate responsibility to prevent, mitigate, and remedy harm.

47. The UNGPs imply that state and business actors are responsible for acting on climate change, in order to avoid associated human rights impacts (UNHRSP, 2023). They also offer a framework to hold economic actors accountable for ensuring that their actions do not exacerbate social inequalities or violate the rights of affected communities. This is particularly salient in the context of climate change mitigation strategies, including private sector participation in carbon markets and sometimes contested carbon rights, where corporate engagement must not compromise human rights or equitable outcomes.

48. To ensure effective Free, Prior and Informed Consent (FPIC), proponents of nature-based solutions and/or ecosystem-based approaches must communicate clearly with communities about when and how benefits will materialize. This is especially relevant for restoration actions, given the long timeframe often required for ecological recovery. Anticipated trade-offs, along with the distribution of benefits and burdens over time and space must be made transparent, particularly in cases where benefits accrue at regional or global scales while burdens are borne locally. It is also essential to address intersectionality—recognizing how overlapping forms of marginalization affect vulnerability, and to ensure that benefits reach those most at risk, including women, children, indigenous peoples, displaced persons and persons with disabilities. Adopting gender-responsive approaches and facilitating meaningful participation by marginalized groups are vital to achieve both justice and effectiveness.

49. Women-led conservation initiatives in Burkina Faso and Colombia illustrate how these principles can be operationalized: in Burkina Faso, women's cooperatives manage shea-producing landscapes, combining ecological restoration with economic empowerment (UNCCD, 2024a, b) while in Colombia, indigenous women apply ancestral astrological calendars to guide marine conservation. These examples demonstrate how women's leadership and cultural practices can deliver equitable and effective outcomes, aligning with FPIC and rights recognition. Ensuring accountability, building trust, and supporting flexible, inclusive implementation are critical to the success and legitimacy of nature-based solutions and/or ecosystem-based approaches at scale.

4. Existing safeguards frameworks and guidance

50. The effective design, implementation and scaling of nature-based solutions and/or ecosystem-based approaches require a robust foundation of guiding principles. These will integrate social and environmental risks and benefits, including human rights and equity considerations. Indeed, in 2022, UNEA 5/5 determined that nature-based solutions must “Respect social and environmental safeguards, in line with the three ‘Rio Conventions’ (the Convention on Biological Diversity, the United Nations Convention to Combat Desertification and the United Nations Framework Convention on Climate Change), including such safeguards for local communities and indigenous peoples” (UNEP, 2022a). UNEA did not recommend a specific set of safeguards or standards.

51. Existing international standards and safeguards frameworks can offer a basis for shaping best practices (Valverde and Egbuwalo, 2023) or be directly adopted where appropriate. Some relevant frameworks include:

52. [*The Principles for ecosystem restoration to guide the United Nations Decade 2021–2030*](#) (FAO, IUCN CEM and SER, 2021) are accompanied by a [*Standards of practice to guide ecosystem restoration*](#) (Nelson *et al.*, 2024). These guidance documents were developed by the FAO-led Task Force on Best Practices for the UN Decade on Ecosystem Restoration, the Society for Ecological Restoration (SER) and the International Union for Conservation of Nature Commission on Ecosystem Management (IUCN CEM), drawing on experience across different types of ecosystem restoration. The principles emphasize long-term ecological commitments, stakeholder inclusion and locally grounded solutions. They acknowledge the timeframes over which benefits may materialize. The standards put these principles into practice, recommending steps to take throughout the process of planning and implementing restoration.

53. [The seven Cancun Safeguards for REDD+](#) (UNFCCC, 2010) are applied at a jurisdictional scale by developing countries participating in efforts to reduce emissions from deforestation and forest degradation, and to conserve, sustainably manage and enhance forest carbon stocks (REDD+). The safeguards cover topics including transparency in governance, respect for indigenous and local communities' rights and knowledge, full and effective stakeholder participation and the conservation of natural forests. They rule out the conversion of natural forest as a REDD+ action. Instead, they expect that actions are used to incentivize the protection and conservation of natural forests and enhance other social and environmental benefits. Actions to address the risk of reversals and reduce displacement of emissions are included as standalone safeguards. Guidance on operationalizing this simple list of safeguards is offered by the UN-REDD Programme, including a conceptual framework to developing country approaches to safeguards (UN-REDD Programme, 2016), recommendations for developing summaries of information on safeguards (UN-REDD Programme, 2020b) and on designing safeguards information systems (UN-REDD Programme, 2020a).
54. [The IUCN Global Standard for Nature-based Solutions](#) (IUCN, 2020) was developed through an extensive IUCN member multi-stakeholder process. Criteria 3, 6, 7, and 8 of the Standard collectively function to ensure ecological and social integrity. Criterion 3 mandates the preservation and enhancement of ecological integrity, thereby mitigating risks of environmental degradation. Criterion 6 emphasizes inclusive and participatory processes, safeguarding the rights and agency of indigenous peoples and local communities. Criterion 7 ensures transparent governance structures, which are essential for accountability and the prevention of institutional misuse. Criterion 8 promotes adaptive management informed by evidence, enabling continuous risk assessment and mitigation. Together, these criteria operationalize safeguards that underpin the ethical, resilient, and sustainable implementation of nature-based solutions and/or ecosystem-based approaches.
55. The eight [Principles of Locally Led Adaptation \(LLA\)](#), developed by IIED and partners, underline the importance of devolving decision-making to the lowest appropriate level, addressing structural inequalities, securing patient and predictable finance and building enduring local capacity. The principles advocate for decentralized, participatory planning and iterative learning processes. They caution against the fragmented or selective implementation of normative guidance that may compromise the systemic coherence of adaptation actions or diminish their intended impact, especially in contexts where community-led initiatives are already operational.
56. The [Climate, Community and Biodiversity Alliance Standards \(CCB\)](#) aim to ensure that projects deliver across three key areas: climate change mitigation, community development and biodiversity conservation. These standards developed by Climate, Community, Biodiversity Alliance place multiple benefits and holistic approaches central to project design and delivering tangible benefits. The standards are applicable to any land management projects with climate change mitigation benefits.
57. The [Global Biodiversity Standard \(TGBS\)](#) developed by Botanic Gardens Conservation International and a consortium of partners aims to provide science-based guidance to promote the protection, restoration and enhancement of biodiversity (Bartholomew *et al.*, 2024). Their purpose is to combat “greenwashing” and ensure that nature-based solutions truly protect, restore and enhance biodiversity, in addition to providing climate and community benefits.
58. The [Gold Standards for Global Goals](#) provide robust safeguards and detailed guidance for assessing positive sustainable development impacts for all types of project within the voluntary carbon markets (Wissner & Schneider, 2022). Building on the Sustainable Development Goals (SDG) framework, the guidance highlights identification and mitigation of adverse social, economic and environmental impacts. It also includes the establishment of grievance mechanisms to enable stakeholders address their concerns and demand fair treatment.

59. The [Society for Ecological Restoration \(SER\) standards](#) offer principles and guidance documents to ensure that projects strive for optimal ecological outcomes while being socially responsible and embedded in scientific, traditional ecological knowledge and local ecological knowledge. The SER standards have eight principles and include both an Ecological Recovery Wheel (ERW) and Social Benefit Wheel (SBW). They aim to obtain long term sustainability of ecosystem and multiple benefits for stakeholders.

60. The World Bank's [Environmental and Social Framework](#) (ESF, World Bank, 2017) is broadly representative of the policies and standards set by multilateral development banks. The World Bank's norms are often adopted by other banks in co-financed projects. Introduced in 2018, the ESF modernized and consolidated the Bank's approach to managing environmental and social risks across its investments. It includes ten Environmental and Social Standards (ESSs) that address critical issues such as biodiversity, labour rights, community health and safety, and stakeholder engagement. By emphasizing transparency, inclusion, and adaptive risk management, the ESF aligns with the broader efforts in nature-based solutions and/or ecosystem-based approaches to ensure that development interventions are not only effective but also equitable and ecologically sound.

5. Applying safeguards at jurisdictional and project scales

61. The application of safeguards to nature-based solutions and/or ecosystem-based approaches will vary with the scale and institutional context. Safeguards frameworks may be mandated by national governments, international funders or certification bodies. Their operationalization varies significantly between jurisdictional and project-level interventions.

62. At the jurisdictional scale, many countries have developed comprehensive national approaches to safeguards within the context of REDD+. These typically start with the contextualization of the Cancun Safeguards within domestic legal and policy frameworks. Regulatory and institutional gaps are identified, and targeted measures formulated to ensure that safeguards are addressed and respected. Integral to this process is the establishment of a Safeguards Information System (SIS), which serves to track progress through defined indicators and may incorporate co-benefit metrics relevant to multilateral reporting obligations, such as those of the Green Climate Fund (UN-REDD Programme, 2020a). These national approaches often include grievance redress mechanisms to enhance accountability and stakeholder engagement. Guidance from the UN-REDD Programme has been instrumental in supporting countries in the design and operationalization of safeguards frameworks (UN-REDD Programme, 2025).

63. The extensive safeguards architecture developed under jurisdictional REDD+ initiatives can contribute to a robust enabling environment for the broader deployment of nature-based solutions and/or ecosystem-based approaches. The development of a REDD+ safeguards approach has often involved alignment with international environmental and social standards (UNDP, 2021).

64. REDD+ projects typically adopt one or more established project-level standards. These offer a structured and replicable framework for ensuring environmental and social integrity. They delineate safeguard principles, criteria, and performance indicators that guide the design, evaluation, and monitoring of project activities.

65. Where practitioners are free to choose a safeguards framework, the following considerations are recommended:

- **Alignment with National and International Standards:** Preference should be given to frameworks that are compatible with national policies and international conventions, including the CBD, UNFCCC and relevant human rights instruments.
- **Comprehensiveness and Flexibility:** The framework should encompass environmental, social, and governance dimensions while allowing for contextual adaptation.
- **Monitoring and Reporting Capacity:** Robust mechanisms for data collection, indicator tracking and transparent reporting are essential, particularly where co-benefits and climate finance are involved.

- **Stakeholder Inclusivity:** The framework should facilitate meaningful participation of indigenous peoples and local communities, and other stakeholders throughout the project lifecycle.
- **Grievance Redress Mechanisms:** Effective and accessible channels for addressing complaints and disputes should be embedded within the framework.

66. Both jurisdictional and project-level actors frequently encounter overlapping safeguards requirements imposed by diverse funding entities. Best practice involves harmonizing these requirements into a unified safeguards framework that accommodates and monitors compliance across multiple standards. A notable example of this approach is the National Safeguards Framework for Climate Change developed by Honduras, which consolidates safeguard obligations across sectors and scales (UN-REDD Programme, 2021).

D. Overarching considerations for design, implementation and scaling up

67. The *Voluntary Guidelines* highlights three cross-cutting considerations to take account of while implementing the stepwise approach to Ecosystem-based Adaptation and Eco-DRR. These are: (1) integrating the knowledge, technologies, practices and efforts of indigenous peoples and local communities, (2) mainstreaming of Ecosystem-based Adaptation and Eco-DRR, and (3) raising awareness and building capacity. This supplement first considers scaling approaches and then builds on each of the three areas covered in the *Voluntary Guidelines*, adding additional material in response to the elements highlighted in CBD [decision 16/22](#) paragraph 17.

1. Scaling up

68. Scaling-up of nature-based solutions and/or ecosystem-based approaches can be understood in multiple dimensions: scaling up (system-level strategies, such as policy change), scaling out (replicating successful models), and scaling deep (changing cultural values, e.g. to further justice, rights, and sustainability) (Salafsky *et al.*, 2021). Where scaling up involves system-level changes to facilitate nature-based solutions and/or ecosystem-based approaches, there may be scope for broader transformative change to address the structural drivers of biodiversity loss and climate vulnerability. The IPBES Transformative Change Assessment highlights that these drivers include systemic inequalities and unsustainable economic models (IPBES, 2024b).

Box 1: Case studies of Scaling of nature-based solutions and/or ecosystem-based approaches

69. In Argentina, regenerative livestock farming practices are being promoted to reverse land degradation, improve soil carbon, and enhance resilience (Regenerative Fibers of Patagonia, 2025). Using holistic pasture management, these initiatives build long-term productivity and ecological integrity. However, challenges in scaling persist, including the need for technical capacity, access to finance, and supportive policy frameworks. This case highlights the importance of systemic approaches to scaling nature-based solutions and/or ecosystem-based approaches in agricultural landscapes. Similarly, efforts to restore ancient crop varieties in Tuscany, Italy, demonstrate how reviving traditional agricultural systems can enhance food system resilience and generate niche markets (Gualandi and Williams-Gualandi, 2021). By linking heritage grain cultivation to local economies and agroecological principles, these initiatives promote both biodiversity and economic diversification. This approach supports system-level change through cultural revitalisation and sustainable livelihoods.

70. Questions of scale (both spatial and temporal) should be considered throughout the implementation of the stepwise approach. UNEP and EEA offer recommendations for scaling of nature-based solutions that are broadly applicable also to ecosystem-based approaches (UNEP, 2022b; EEA, 2023). These recommendations are summarized as follow:

- building a common understanding of nature-based solutions, including clarity on the social, environmental and economic costs and benefits of different approaches
- developing more insight into the factors that enable success and the barriers to scaling, through systematic monitoring, reporting and evaluation on effectiveness and efficiency

- adopting integrated approaches to scale up nature-based solutions, combining policy, finance and safeguard measures, and including regional planning
- applying fit-for-purpose safeguards, standards and guidelines
- enabling locally-led actions and scaling existing local initiatives, with safeguards tailored to risk and setting.

2. Integrating traditional knowledge and the efforts of indigenous peoples and local communities

71. The *Voluntary Guidelines* present various tools for integrating the knowledge, technologies, practices and efforts of indigenous peoples and local communities. They recommend actions to pursue during design and implementation.

72. Local understandings of ecosystem history, function and nature's contributions to people can significantly increase the success and resilience of these approaches. Blending traditional ecological knowledge developed over generations together with modern knowledge can provide deeper ecological understanding on managing resources sustainably. It can also provide wider perspectives that can drive more innovative strategies (Weaver, 2023). For example, integrated solutions like *cosechas de agua y tierra* (water and soil harvesting) in Central America deliver drought resilience, soil regeneration and food sovereignty, all while engaging communities in place-based ecological governance (Gras, 2009).

73. Working with indigenous peoples and local communities requires full engagement and consent of these groups in a way that respects their cultural and ecological rights as well as their access to land and natural resources (Seddon *et al.*, 2021). However, there are some inherent challenges involved in ensuring approaches are inclusive and collaborative (UNEP, 2022). Practitioners designing nature-based solutions and/or ecosystem-based approaches often prioritize quantitative, process-based knowledge and scientific data and metrics. Meanwhile, traditional knowledge is broadly holistic, relational and qualitative and can be influenced by social and economic factors (Latulippe *et al.*, 2020). Misunderstanding or devaluation of local efforts and knowledge can lead to negative consequences for both people and biodiversity.

74. As such, the following additional key actions are recommended:

75. Meaningful inclusion of views and practices of indigenous peoples and local communities, both at the design stage and throughout project implementation ensuring co-creation of actions to be taken and enabling ownership at local level. This builds upon Principle 4 of the *Voluntary Guidelines*.

76. Addressing land tenure rights and access to natural resources and recognizing the role of indigenous peoples and local communities in managing biodiversity and ecosystem services locally (e.g. WRI and Climate Focus, 2022; OHCHR, n.d.). Many indigenous peoples and local communities face unclear and unrecognized land tenure despite having customary land or sea use rights, which undermines their ability to implement actions that address biodiversity and climate concerns and build resilience within their traditional territories. If this issue is left unaddressed, outside interventions can exacerbate land dispossession (Notess *et al.*, 2018). This builds upon Safeguard 9 of the *Voluntary Guidelines*.

77. Seeking advice on the best approaches to build bridges between different science and knowledge systems. Much traditional knowledge and many practices are passed on orally and are context specific. Inclusion of such knowledge alongside scientific findings requires attention to data sovereignty. Data sovereignty policies can provide frameworks for "the ethical use of data to advance collective indigenous wellbeing and self-determination" (Russo Carroll *et al.*, 2021).

78. Annex II lists some relevant tools and guidance on integrating traditional knowledge.

Box 2: Case studies: Traditional knowledge

79. The Shinyanga Soil Conservation Programme or HASHI in Tanzania, East Africa provides an insight into how participatory approaches can be effectively implemented. This programme for land restoration has promoted the return of an indigenous land management system, "ngitilis" (or fodder reserves) (Barrow,

2014; Nzyoka *et al.*, 2021). Severe desertification involving declining soil fertility was identified and addressed, restoring 300,000 ha of forest (Barrow, 2014), sequestering 23 million tonnes of carbon across 25 years and providing biodiversity benefits with up to 152 species of trees recorded (Barrow, 2014). Benefits to local households included improved availability to water and forest products such as firewood and fruit. The respect for traditional practices helped to build trust among local community members and stakeholders from the start of the initiative. This encouraged greater community willingness to support the restoration and get involved (Wainaina *et al.*, 2021).

80. In Zimbabwe, community-led wetland restoration is enhancing both ecological integrity and food security (BirdLife International, 2023). With support from local governments, communities are trained in restoring degraded wetlands, managing grazing pressure and monitoring key species. These efforts revive traditional land stewardship while strengthening long-term ecosystem governance and resilience.

81. In Nepal, indigenous women have used their traditional knowledge to launch eco-enterprises based on sustainable harvesting of forest products. This improved their livelihoods while enhancing forest health and reducing fire risk (ForestAction, 2023). Their efforts led to changes in local forest governance and demonstrated how integrating traditional knowledge with supportive policy can deliver social and ecological benefits.

3. Mainstreaming nature-based solutions and/or ecosystem-based approaches

82. The *Voluntary Guidelines* provide clear guidance on how to effectively integrate ecosystem-based approaches into climate change adaptation and disaster risk reduction planning. This supplement expands the focus to also address climate change mitigation, to minimize the impacts of climate change on biodiversity and enhance human wellbeing benefits, as highlighted in Targets 8 and 11 of the KMGBF. When operationalizing the framework, governments can ensure that these approaches are embedded through coherent land and sea use planning, climate-biodiversity budget alignment and spatial strategies. In this context, ocean-based actions and land-based actions are complementary and equally essential pillars in the global response to climate change and biodiversity loss—while ocean-based efforts like protecting blue carbon habitats, advancing sustainable aquaculture, and implementing marine spatial planning target marine ecosystems and coastal resilience, land-based strategies such as reforestation, regenerative agriculture, and soil restoration address terrestrial carbon sinks, food security, and ecosystem health. Both are increasingly recognised as critical for National Biodiversity Strategies and Action Plans (NBSAPs), Land Degradation Neutrality (LDN) targets, National Adaptation Plans (NAPs) and Nationally Determined Contributions (NDCs) and to foster collaboration and integrated policy and planning approaches across the Rio conventions (Annex II). Enhanced collaboration between the responsible ministries will help to leverage synergies, maximise resource efficiency and avoid duplication of efforts.

83. UNEA resolution 5/5 recognizes the significant contribution that nature-based solutions may make to effectively and efficiently addressing major social, economic and environmental challenges, such as biodiversity loss, climate change, land degradation, desertification, food security, disaster risks, urban development, water availability, poverty eradication, inequality and unemployment, as well as social development, sustainable economic development, human health and a broad range of ecosystem services.

84. A high-profile effort to scale up nature action for climate change mitigation is the REDD+ initiative under the UNFCCC. The concept is that efforts to reduce emissions from forest loss and degradation, and increase removals, are tracked and rewarded at jurisdictional scale. This addresses many of the concerns about the true mitigation benefits of site-based nature-based solutions but has taken much longer to implement and to finance than early advocates expected. Lessons from REDD+ can help to inform the integration of other nature-based solutions and/or ecosystem-based approaches into NDCs (UNDP, 2021).

85. Case studies from Africa, Latin America, and Southeast Asia demonstrate that community-led nature-based solutions and/or ecosystem-based adaption initiatives, especially when supported by enabling policies and secure financing, can be replicated and scaled effectively (Reij *et al.*, 2009; Seddon *et al.*, 2021).

86. As for adaptation, mainstreaming nature-based solutions and/or ecosystem-based approaches into national and subnational policies offers a vital pathway to enhance climate change mitigation and resilience. To scale up best practices, including for safeguards, it is essential to integrate these solutions and/or approaches into planning and budgeting processes, supported by robust monitoring frameworks and inclusive stakeholder engagement.

87. Financial instruments such as climate finance, green bonds and blended finance can help to deliver investment. Success is likely to require proponents to quantify ecosystem services benefits, climate mitigation and measurable returns (UNEP, 2022c). Only 17% of total investment in nature-based solutions comes from private finance (UNEP, 2023b). Bridging this divide requires collaborative efforts, for example to de-risk investment for private sectors through blended finance approaches.

88. Awareness of the Rio Conventions (UNFCCC, CBD and UNCCD, as addressed in Section **Error! Reference source not found.**) and inter-ministerial coordination are vital for the effective design and implementation of strategies for nature-based solutions and/or ecosystem-based approaches. These three conventions, while focused on climate change, biodiversity, and land degradation respectively, share overlapping goals that these tools and approaches can holistically address (UNFCCC, CBD and UNCCD, 2024). Enhanced collaboration between ministries responsible for implementing the Rio conventions helps to foster integrated policymaking, leverages synergies, and avoids duplication of efforts. Aligning objectives and facilitating shared knowledge and resources can lead to efficient scaling up and out of nature-based solutions and/or ecosystem-based approaches (EEA, 2023).

89. To scale up these approaches, it helps to have an understanding of their impacts across multiple societal challenges. Measuring these impacts is complex, especially spread across ecosystem services, resilience and human wellbeing. The IUCN Global Standard for Nature-based Solutions offers one toolkit to understand impacts at different scales (IUCN, 2020).

4. Raising awareness and capacity building and strength

90. The *Voluntary Guidelines* focus on opportunities to raise awareness through existing networks, especially those associated with multilateral environmental agreements. Raising awareness and strengthening capacity are critical components for the successful design, implementation and scaling up of nature-based solutions and/or ecosystem-based approaches. It is essential to address concerns that have been raised about nature-based solutions and to enable actions that respect the rights of indigenous peoples and local communities and have strong financial, environmental and social integrity.

91. Awareness initiatives can help diverse stakeholders including local communities, practitioners and policymakers to understand the value of integrating nature into sustainable development and climate resilience strategies.

92. Capacity building equips practitioners with the technical knowledge, tools, and skills needed to plan, execute, and monitor nature-based solutions effectively, ensuring solutions are both scientifically sound and locally relevant. Some actions require a high level of technical knowledge, data and interpretation and financial planning to implement and scale up. For example, ecological engineering measures such as constructing wetland and the restoration of degraded habitats may require capacity building amongst practitioners.

93. Meanwhile, institutional strengthening enhances governance frameworks, fosters cross-sectoral collaboration, and ensures long-term support and scalability. Together, these elements create an enabling environment that empowers societies to harness the full potential of nature in addressing climate change, biodiversity loss, and social equity challenges.

94. Effective capacity building for the design and implementation of nature-based solutions and/or ecosystem-based approaches practices depends on a combination of participatory approaches, cross-sectoral collaboration, and tailored training tools. Community-led mapping, ecosystem service assessments and co-design methodologies can all help to ensure that strategies are context-specific and inclusive (Cabling *et al.*, 2024). Key tools will be context-dependent, but may include interactive workshops, scenario planning exercises and digital platforms for knowledge exchange, which enhance stakeholder engagement

and promote local ownership. Capacity building is further strengthened through multi-level governance structures, peer-to-peer learning, and integrating indigenous and local knowledge (Dushkova and Kuhlicke, 2024). These approaches foster long-term skills development, enabling communities and institutions to co-create resilient, adaptive solutions aligned with environmental and socio-economic goals.

95. When focused on climate change mitigation, a robust capacity building approach may be needed to enable practitioners and policymakers to tackle, measure and finance carbon emissions and removals, operating within safeguards and carbon accounting frameworks, tracking both carbon goals and social and environmental co-benefits. The [REDD+ Academy](#) is an online capacity building programme focused on jurisdictional REDD+. At landscape scale, the Endangered Landscapes and Seascapes Programme offers guidance on [estimating carbon benefits](#) of interventions and identifying whether to engage in [voluntary carbon markets](#).

96. Capacity building on financing is essential to bridge the gap between innovative ecological solutions and sustainable funding mechanisms. The *Toolbox on Financing Nature-based Solutions* offers some guidance for private and public sector decision-makers on structuring and building blended finance instruments. It includes case studies on de-risking, engaging beneficiaries and the use of guarantees (Brasil-Leigh *et al.*, 2024). Training on accessing existing finance may involve stakeholders such as governments, NGOs, communities, and private sector actors with the skills and tools to develop robust business cases, conduct cost-benefit analyses and navigate blended finance models. Training programmes often focus on enhancing understanding of financial instruments such as green bonds, climate funds, and payment for ecosystem services (PES), while fostering public-private partnerships to mobilize investment (UNEP, 2022c). Integrating financial understanding with ecological knowledge ensures that initiatives are not only environmentally effective but also economically viable and scalable.

97. IPBES (2024b) underscores that when the objective is to achieve systemic transformation, capacity will need to be built to shift societal norms, institutional practices and policy frameworks. By strengthening the capabilities of governments, civil society, and local communities, these capacity building efforts would ensure that biodiversity conservation is integrated into broader development strategies. This holistic approach helps ensure that biodiversity is safeguarded while advancing sustainable development objectives.

98. Annex II lists some relevant tools and guidance on raising awareness and building capacity.

E. Stepwise approach to design and implementation

Introduction

99. Since the publication of the *Voluntary Guidance* in 2019, there have been substantial developments in international policy and scientific understanding as it relates to nature-based solutions and/or ecosystem-based approaches. In a CBD context, the Kunming-Montreal Global Biodiversity Framework includes Targets 8 and 11, which call for: (i) minimizing climate and disaster risks to biodiversity, including through inclusive, nature-based approaches; and (ii) conserving and restoring ecosystems to deliver nature's contributions to people. These targets underscore the need for well-designed, context-specific ecosystem-based interventions that are both effective and equitable, with robust safeguards.

100. UNEA Resolution 5/5 defines nature-based solutions as '*actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services, resilience and biodiversity benefits*'. The adoption of this definition marked a pivotal advancement in global environmental policy, reinforcing the credibility and coherence of nature-based solutions and/or ecosystem-based approaches, alongside significant developments in REDD+ standards that enhanced safeguards, transparency, and alignment with climate and biodiversity goals (TNC, 2022).

101. The *Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6)* highlights that safeguarding high-integrity ecosystems is essential to achieving the 1.5°C target under the Paris Agreement, reinforcing the need for integrated approaches that deliver co-benefits for both biodiversity and

climate. *Working Group III* of AR6 summarizes scientific knowledge on climate change mitigation, including its issues, costs, synergies with adaptation measures, co-benefits, and links to sustainable development (IPCC, 2022). It highlights the importance of multi-objective policies and projects that target mitigation, combining accelerated mitigation actions with shifts in development pathways. The report emphasizes the policy, governance and institutional capacity, finance, behaviour and lifestyles, and innovation and technology as key enabling factors to accomplish such combined objectives.

102. Meanwhile, the *IPBES Transformative Change Assessment* highlights the need to address the underlying drivers of biodiversity loss in a way that respects certain principles (IPBES, 2024b). These are justice and equality, pluralism and inclusion, respectful and reciprocal human-nature relationships, and adaptive learning and action. To do so, attention should be paid to power asymmetries and governance tailored to the local and national context. A just distribution of the costs and benefits associated with biodiversity conservation and sustainable use will ensure inclusive outcomes. Socioeconomically marginalized populations who are disproportionately affected by biodiversity loss may contribute minimally to its drivers. These populations often maintain close interdependencies with ecosystems and play significant roles in biodiversity stewardship. Consequently, minimizing adverse social impacts and enhancing benefit-sharing mechanisms can support both ecological integrity and human well-being. Integrating socially responsive approaches into biodiversity strategies will help to achieve resilient, equitable and enduring conservation outcomes.

103. The steps below are intended to complement the existing *Voluntary Guidelines*, further developing the concepts introduced above and identifying specific additions that will be needed when working with a climate change mitigation objective.

Step A: Understanding the social-ecological system

Purpose

104. This step focuses on understanding the social-ecological system through the lens of climate change mitigation, adaptation and disaster risk reduction. The Kunming–Montreal Global Biodiversity Framework reaffirms the importance of context-specific, inclusive approaches that address multiple objectives while embedding climate action in complex human–nature systems. This step establishes the foundation for defining challenges and objectives within relevant ecological, social, and governance dynamics. By respecting the principles set out in the *IPBES Transformative Change Assessment* (IPBES, 2024b) and recognising the benefits of a just transition, initiatives can target the root causes of biodiversity loss and ensure that climate and nature action does not perpetuate inequities.

Outcomes

105. This step supports a holistic appraisal of the ecological characteristics and human relationships that shape the feasibility and potential of nature-based solutions and/or ecosystem-based approaches. It enables a deeper understanding of the systems that interventions aim to influence, helping to identify drivers of degradation and greenhouse gas emissions, as well as the livelihoods, rights, and knowledge systems of those who depend on or manage ecosystems. It also sets the stage for interventions that address the root causes of biodiversity loss, are aligned with the principles outlined by IPBES (2024b), and feed into system-wide change.

Key Actions

106. Undertake an in-depth diagnosis of the social-ecological system to define the opportunity and set realistic, equitable objectives. This requires early attention to power asymmetries, the distribution of benefits and responsibilities, and the institutions that can support or undermine the intended outcomes, including for transformative change (IPBES, 2024b; IPCC, 2022). Key areas of focus for climate change mitigation-focused initiatives include:

Mitigation potential

- Analyse the history of the target ecosystem, current degradation pressures, and the rate and drivers of greenhouse gas emissions from ecosystem loss or degradation. This will feed into an estimate of potential emissions reductions and removals from proposed activities (Step D)
- Assess the level of confidence in estimates of carbon stocks, losses and sequestration capacity.

Social context

- Assess the dependence of local jobs, industries, livelihoods, and cultures on natural and managed ecosystems. Assess the impacts of ecosystem loss or degradation.
- Identify barriers to ecosystem restoration.
- Elicit the aspirations of local populations, including indigenous peoples and local communities.

Market and non-market approaches

- Clarify existing policy or agreements on benefit-sharing, including any monetization of emission reductions and removals.
- Assess whether carbon rights are tied to land or sea tenure, how they are recognised in policy and practice, and whether there is pre-existing clarity on which stakeholders would benefit from monetization.
- Understand local attitudes toward payments for ecosystem services and other non-market approaches.

Stakeholders and rights-holders

- Understanding the social-ecological system requires identifying rights-holders (those with legal or customary rights to the ecosystem) and stakeholders (those who may influence or be affected by its management). This may include indigenous peoples and local communities, private sector actors and multiple levels of government. Participatory mapping exercises can help to uncover overlapping claims, potential conflicts and synergies.

107. The IPBES Transformative Change Assessment (IPBES, 2024b), Values Assessment (IPBES, 2022) and IPCC AR6 stress the importance of inclusive governance and recognition of diverse worldviews. Inclusive governance is tailored to local realities, addresses historical injustices, and embraces plural forms of knowledge and authority. Early engagement with stakeholders and rights-holders is essential not only to inform the diagnosis but also to co-define mitigation objectives in ways that reflect shared priorities and negotiated trade-offs.

108. Annex II profiles a suite of tools for addressing participation, rights and equity across the stepwise approach.

Step B: Assessing vulnerabilities and risks**Purpose**

109. This step examines the vulnerability of nature and people to the risks posed by climate change and other hazards, as discussed in the *Voluntary Guidelines*. In a mitigation context, this includes assessing the risk of reversals, where carbon benefits achieved by interventions may be lost due to future climate impacts, degradation, or governance failures. The assessment may also reflect how different communities and ecosystems experience vulnerability and incorporate traditional knowledge into risk identification.

Outcomes

110. A nuanced understanding of vulnerabilities and risks enables practitioners to design more robust, equitable, and long-lasting ecosystem-based mitigation actions. In a climate change mitigation context, the focus is on risk of reversals of the mitigation achieved.

Key Actions

111. Risk assessment should consider both social and ecological vulnerabilities. On the ecological side, practitioners need to assess the likelihood that restored or protected ecosystems may be damaged by future climate impacts. Social vulnerability analysis should identify groups that are particularly exposed or marginalized, ensuring that responses are sensitive to existing inequalities and structural disadvantages.

112. Engaging early with indigenous peoples and local communities, with full respect for knowledge sovereignty, can strengthen assessments and reveal place-based strategies for managing risk. These processes help illuminate existing vulnerabilities and inform context-specific approaches to resilience and adaptation. Understanding the landscape of social and ecological risk is essential for shaping effective responses. This includes identifying areas of high climate exposure, degraded ecosystems with limited adaptive capacity, and communities facing systemic barriers to participation, access, or decision-making.

113. Tools and resources for assessing vulnerabilities and risk include the [IPCC AR6 Working Group II report](#), [national climate projections](#), [UNDP Vulnerability Assessment Tools](#), participatory risk assessment approaches that integrate traditional knowledge (as outlined in [IPCC WGII Chapter 1](#) and [IPCC, 2022, Chapter 12](#)), and safeguard screening tools designed to identify social and environmental risks and mitigation needs (frameworks referenced in section 2.2.4 above; see also [Climate Focus, 2022](#)), and Free, Prior and Informed Consent protocols, which ensure meaningful participation and rights-based decision-making (Annex II).

Step C: Identifying options for nature-based solutions and/or ecosystem-based approaches**Purpose**

114. The goal of Step C is to identify potential nature-based solutions and/or ecosystem-based approaches that are contextually appropriate and ecologically feasible. This step builds on the understanding of the social-ecological system and vulnerabilities to explore suitable interventions. Climate change mitigation-focused options should also be capable of delivering co-benefits for biodiversity and people. The options identified will ideally be effective, equitable and scalable.

Outcomes

115. Practitioners identify a range of feasible and desirable options that align with local goals and national targets, including those under the Kunming-Montreal Global Biodiversity Framework (Targets 8 and 11). These options are informed by global databases, case studies and participatory engagement. They serve as the starting point for more detailed appraisal and prioritisation.

Key Actions

116. With a climate change mitigation focus, a series of steps to identify options could be:

Identify broad options based on existing analysis

117. In Step A, information about carbon storage, loss and removals by ecosystems is gathered. This step should consider options for action that will protect stored carbon, reduce losses and/or enhance removals. Various reports and platforms explore the potential of different nature-based solutions and/or ecosystem-based approaches, often drawing on the same global analyses to quantify the scope for reduced carbon emissions or increased removals.

Explore specific options undertaken in other similar geographies

118. As noted previously, there are many compilations of relevant case studies, sometimes hosted on platforms that allow filtering by categories such as location, primary objectives and ecosystem type.

Analyzing successful case studies implemented in similar conditions (geographical, socio-political or ecological) may help to identify solutions that have not yet been envisaged in a local context. A review of 64 case study compilations has been undertaken as part of the Nature-based Solutions intergovernmental consultations (Valverde and Egbuwalo, 2023).

119. The IPBES Transformative Change Assessment identifies multiple strategies with high transformative potential. Options that address root causes of degradation, engage multiple sectors and promote integrated benefits across the biodiversity-climate-health nexus are particularly valuable. For example, urban interventions, such as green roofs and corridors, can offer mitigation, adaptation and health benefits simultaneously (IPCC AR6 WGIII, Ch. 12; EEA, 2023).

Work with stakeholders to identify favoured options

120. Participatory work with the multistakeholder group anticipated in the *Voluntary Guidelines* will help to make sure that interventions are rooted in local concerns and aspirations. Locally owned actions often have a better chance of delivering long-term benefits for nature and people.

121. Multiple sources can be used to identify potential options for action: global analyses and geospatial platforms such as Naturebase; national-level guidance such as the Guide for Including Nature in Nationally Determined Contributions; and databases of case studies, such as those curated by the Nature-based Solutions Initiative (NbSI, n.d.), Oppla, Panorama, and others. It is also essential to engage local stakeholders to ensure that interventions respond to social priorities, build on local knowledge, and have long-term support.

Table 4: Step C Toolbox - Identifying options for nature-based solutions and/or ecosystem-based approaches

Tool/Resource	Purpose	Reference or Link
Naturebase platform	Geospatial tool to model climate mitigation and co-benefits	Nature Base
Nature based Solution Triple Win Toolkit	Database of case studies.	JNCC Nature-Based Solution Triple Win Toolkit
Oppla	Ranging from practical examples to research efforts	Oppla Case Study Finder
Participatory design workshops	Identifying socially and culturally acceptable options	IIED Locally Led Adaptation Principles
IPBES Transformative Change strategies	Guidance for system-level change	IPBES (2024b)

Step D: Prioritizing, appraising and selection of options

Purpose

122. Step D aims to prioritize and select among the identified nature-based solutions and/or ecosystem-based approaches by evaluating their relative feasibility and anticipated social and environmental benefits including for biodiversity, climate change adaptation, mitigation and disaster risk reduction. This includes the use of appraisal tools, participatory processes and transparent decision-making criteria.

Outcomes

123. A shortlist of actionable, high-integrity interventions that are well matched to the local context and global objectives. The set of selected options will be robust in terms of additionality, permanence, equity and contribution to long-term nature and climate targets.

Key Actions

124. Additional criteria should be considered when appraising options with a climate change mitigation objective. Mitigation options can be prioritized using the mitigation hierarchy, mitigation potential, co-

benefit potential, resilience to climate change and capacity to implement over the long term (including any governance issues).

125. If there is a choice between protection of threatened intact ecosystems and restoration of lost or degraded ecosystems, the mitigation hierarchy would prioritize protection. Relatively simple methods can be used to derive a first estimate of mitigation potential for many options. The IPCC distinguishes Tier 1 data and methods (default global values), Tier 2 (country-specific), and Tier 3 (more detailed models, more local data) in its framework for estimating potential emissions reductions or removals. Spatial prioritization using geospatial analysis can help to identify suitable locations and can consider co-benefit potential alongside mitigation potential. Ideally decisions will also consider trade-offs and synergies across the biodiversity–climate–health nexus (IPBES, 2024a). Our understanding of ecosystem resilience to climate change (Step B) is a factor in assessing the long-term viability of each option in delivering mitigation benefits. Capacity to implement will depend upon existing skills and knowledge, training opportunities and access to the enabling environment, financial and other resources needed to enable implementation through time.

126. A full evaluation of options may encompass ecological thresholds, opportunity costs, institutional capacity and risks of leakage or reversal. Siloed planning should be avoided by incorporating cross-sectoral perspectives.

127. Table 5 suggests some tools and resources that may be useful during this step, while Annex II lists tools suitable for assessing climate change mitigation potential of different options.

Table 5: Step D Toolbox - Prioritizing, appraising and selection of options

Tool/Resource	Purpose	Reference or Link
IPCC Tiers (1–3)	Carbon accounting for mitigation potential	Annex II; 2019 Refinement to the 2006 IPCC guidelines
Mitigation hierarchy	Prioritize amongst actions to reduce negative and increase positive impact	UNEP (2021); TNC (2023)
UN-REDD GIS tutorials	Build capacity to use spatial analysis tools for REDD+ planning, ecosystem service assessment and biodiversity conservation.	https://bit.ly/gistools-redd
Multi-criteria analysis tools	Evaluate interventions across multiple dimensions	ROAM ; SEI Toolkits

Step E: Project design, implementation and scaling up

Purpose

128. This step focuses on the design, operationalization, and scaling of selected nature-based solutions and/or ecosystem-based approaches for mitigation that deliver verifiable carbon benefits, and biodiversity and social co-benefits. Emphasis is placed on stakeholder inclusion, integration of safeguards and the technical rigour required for credible mitigation outcomes. One clear pathway to scaling up is the inclusion of nature-based solutions and/or ecosystem-based approaches within National Biodiversity Strategies and Action Plans (NBSAPs), Nationally Determined Contributions (NDCs) and National Adaptation Plans (NAPs). This will promote coherence across biodiversity and climate goals, alignment with broader development priorities and integration into Monitoring, Reporting and Verification (MRV) systems.

Outcomes

129. Projects or initiatives emerging from this step will be fully prepared for implementation. They will have clearly defined boundaries, activities and governance structures that align with national biodiversity and climate strategies. Scaling up implies the integration of nature-based solutions and/or ecosystem-based

approaches into national biodiversity and climate strategies and action plans, as well as broader development planning.

130. Mitigation-focused efforts should be capable of delivering long-term, verifiable carbon benefits demonstrated through robust baselines and an MRV framework that addresses additionality, permanence and leakage. Where regional or national carbon accounting systems exist, project-scale initiatives should be designed to be compatible with these, contributing data where this is feasible. At the same time, these initiatives should be proactively designed to deliver multiple co-benefits. As well as biodiversity conservation and ecosystem resilience these may include social outcomes such as gender equity, the empowerment of indigenous peoples and local communities and the incorporation of diverse values and knowledge systems.

Key Actions

Design

131. Effective implementation of nature-based solutions and/or ecosystem-based approaches requires robust design, governance and monitoring frameworks. Key actions for ecosystem-based mitigation projects or initiatives include establishing clear boundaries for the project or initiative, baseline and carbon accounting frameworks and M&E frameworks for carbon and non-carbon benefits to people and nature. Developing counterfactual scenarios helps to assess additionality and avoid double counting. MRV frameworks should be aligned with IPCC guidelines and international standards.

132. The integration of safeguards is essential to ensure credible mitigation outcomes (Table 1). Project implementation should address additionality to confirm that emissions reductions go beyond business-as-usual, plan for permanence by prioritizing long-lived ecosystems and native regeneration and minimise leakage by identifying and mitigating potential harm to the environment. As an example, New Zealand promotes native regeneration over exotic plantations for permanence and biodiversity goals (UNDP, 2021).

133. Project and initiative designs should explicitly include spatial planning, nesting within national systems where appropriate. Tools such as scenario modelling, spatial analysis, and benefit-sharing frameworks should be adapted to context. Co-management with indigenous peoples and local communities will strengthen resilience and legitimacy, while incorporating traditional knowledge can enhance the ability to respond to changing conditions.

134. Moreover, robust monitoring and evaluation at all stages is essential for project success and effective outcomes. Inclusive governance structures must ensure the active participation of key stakeholders and clear pathways should be established for adaptive management. Lessons learned from these activities should inform replication and scaling, ensuring that projects and initiatives remain resilient, deliver credible outcomes and generate multiple benefits. These outcomes will help to make the case for fully integrating nature-based solutions and/or ecosystem-based approaches into national and international climate and development frameworks.

Baselines and Scenarios

135. Credible carbon accounting requires a robust baseline and well-articulated counterfactual scenarios. The baseline establishes the expected trajectory of carbon emissions or removals in the absence of intervention and serves as the reference point against which mitigation performance is assessed. Scenario development—based on spatial data, ecological models, and stakeholder-informed land-use trajectories—enables planners to compare options and assess sensitivity to future socio-economic and climatic conditions. In Cispatá Bay, Colombia, for instance, baseline and scenario modelling for a mangrove restoration initiative has integrated satellite imagery, local ecological knowledge, and hydrological modelling to forecast sequestration potential and co-benefits under alternative management strategies (NbSI, 2023). Using IPCC Tier 2 or 3 methodologies, where possible, improves the accuracy of carbon estimates and enhances confidence in reported outcomes.

Scale, Leakage, and Jurisdictional Approaches

* CBD/SBSTTA/27/1.

136. A first step to scaling up is to quantify the jurisdictional potential for contribution to benefits including climate change adaptation, mitigation and disaster risk reduction, often through spatial analysis and planning.

137. The spatial and institutional scale of climate change mitigation efforts is critical to managing risks and maximizing synergies. Site-level interventions can deliver measurable benefits but may be vulnerable to leakage, fragmentation or governance gaps. In contrast, jurisdictional approaches - such as those under REDD+ - offer a pathway to scale up and coordinate action across landscapes. This enables more effective leakage management and overall effectiveness. Nesting project-level interventions within jurisdictional accounting systems facilitates harmonized baselines, safeguards monitoring, and benefit-sharing, while reducing the likelihood of emissions displacement. Colombia's nested REDD+ model and Honduras' unified national safeguards framework offer some examples of how such integration can be achieved, with lessons on institutional coherence and accountability (UN-REDD Programme, 2021). Jurisdictional programmes also allow for more systematic spatial planning, ensuring that interventions are sited where they can deliver both high mitigation value and social-ecological co-benefits.

138. A transition from pilot projects to large-scale initiatives may benefit from toolkits tailored to ecosystem types, planning levels or user groups. Co-created modules could cover design templates, safeguard protocols and participatory M&E, translating generic standards into accessible guidance across languages and contexts.

139. Table 6 suggests some resources relevant to design, implementation and scaling up. Annex II includes a list of tools and guidance on scaling up by integrating nature into NDCs and NAPs.

Table 6: Step E Toolbox - Project design and implementation and scaling up

Tool/Resource	Purpose	Reference or Link
Scenario modelling tools	Develop baselines and counterfactuals	Annex II; NbSI (2023) for case study
Mitigation safeguard frameworks	Address additionality, permanence, leakage	UNFCCC REDD+; ICVCM; Gold Standard
Project Finance for Permanence	Link finance to long-term protection	Bhutan for Life (2024)
Jurisdictional accounting systems	Coordinate across scales and reduce leakage	UNDP (2021); UN-REDD Programme
Adaptive co-management models	Support the participation of indigenous peoples and local communities and local stewardship	Seddon et al. (2020); IPBES (2024a)

Step F: Effective monitoring and evaluation mechanisms

Purpose

140. This step ensures that nature-based solutions and/or ecosystem-based approaches deliver measurable and enduring benefits. Monitoring and Evaluation (M&E) frameworks will need to encompass these multiple benefits, as well as track any negative impacts. This includes tracking emissions reductions or removals, benefits for biodiversity and people and the integrity of safeguards.

Outcomes

141. Transparent and adaptive M&E systems that align with international reporting frameworks and enable continuous improvement. The results will demonstrate that successful nature-based solutions and/or ecosystem-based approaches can deliver cost-effective, long-term, resilient benefits across multiple objectives.

Key Actions

142. To strengthen M&E, Parties and stakeholders can invest in institutional capacities and inclusive governance structures. They can adopt integrated indicator frameworks that reflect biocultural and scientific knowledge systems, aligning the metrics with national and global reporting platforms. Finally, they can promote participatory processes that empower indigenous peoples and local communities in the design, implementation, and interpretation of M&E tools.

143. Effective M&E systems often use a combination of quantitative and qualitative indicators, that may incorporate both scientific metrics and biocultural indicators. These may include indicators that reflect the knowledge systems of indigenous peoples and local communities and track changes in ecological function, cultural integrity and community resilience. Tools will ideally be cost-effective, scalable and designed to reflect evolving socio-ecological realities. Metrics should align as much as possible with national and global systems (e.g. NBSAPs and national reports to the CBD, NDCs, Biennial Transparency Reports).

144. Projects or initiatives seeking results-based payments for greenhouse gas emissions reductions and removals must meet stringent monitoring standards. Multiple carbon-focused standards and protocols are available, though they do not cover all types of nature-based solutions and/or ecosystem-based approaches. They typically include guidance for credible baselines, MRV systems and third-party validation.

145. REDD+ Safeguard Information Systems may provide a useful model for benefits beyond carbon of mitigation-focused actions. Governments that deploy REDD+ actions develop these systems to transparently communicate how the Cancun safeguards are being addressed and respected. They must also provide summaries of information to the UNFCCC on the status of their country approach to safeguards. Both may detail the multiple benefits of actions to retain and restore forests.

146. Annex II includes a list of tools and guidance on the monitoring of multiple benefits, while Table 7 offers some example indicators for different potential benefits.

Table 7: Step F Toolbox - Monitoring and Evaluation

Metric Category	Example Indicators	Reference or Link
Carbon metrics	Tonnes CO ₂ e sequestered/avoided emissions; permanence; leakage	IPCC GPG LULUCF; VCS; Gold Standard
Biodiversity metrics	Habitat restored; indicator species presence	KMGBF Monitoring Framework
Socio-economic metrics	Cost efficiency; benefit sharing; equity	UN-REDD; IIED; IPBES, 2024b
Resilience metrics	Adaptive capacity; early warning indicators	IPBES, 2024a; UNDRR
Governance indicators	Participation; FPIC; transparency	UNDRIP; UNFCCC Safeguards; ICVCM Core Carbon Principles

Annex I

Sectoral contributions

Sectoral contributions of nature-based solutions and/or ecosystem-based approaches to global frameworks

Sector/Issue	Nature-based solutions and/or ecosystem-based approaches	Relevant KMGBF Targets	Relevant SDGs	Key International Frameworks & Provisions
Climate change mitigation	Reduced emissions from avoided ecosystem loss and degradation; and ongoing carbon sequestration by forests, peatlands, wetlands, mangroves	2, 8, 10	13, 15	Paris Agreement, Art. 5.1 (sinks & reservoirs); UNEA Res. 5/5, para. 3; IPCC AR6, Ch. 5
Climate change adaptation	Ecosystem buffers for climate variability (e.g. floodplains, forests); microclimate regulation	8, 11, 1	13, 6, 11	Paris Agreement, Art. 7.1 (adaptation goal); UNFCCC Decision 1/CP.21, para. 43 (ecosystem-based adaptation)
Disaster risk reduction	Natural coastal barriers (e.g. mangroves), landslide buffers, ecosystem flood retention	8, 11, 12	11, 13, 3	Sendai Framework, Priority 3; CBD Technical Series No. 93, Sections II & IV
Food security & agriculture	Regenerative agriculture, agroecology, crop resilience, pollinator support, integrated land management	10, 2, 11	2, 12, 15	FAO Agroecology Guidelines (2019), Pillars 1–3; UNEA 5/5, para. 5(a); KMGBF, Target 10
Water security	Watershed restoration, riparian buffers, wetland rehabilitation, water purification	1, 2, 11	6, 13	Ramsar Convention, Art. 3.1; SDG 6 Targets (6.6: protect water-related ecosystems)
Urban resilience	Green spaces, urban forests, bioswales, heat reduction, flood buffering	12, 1, 11	11, 3, 13	New Urban Agenda, para. 65–67; UNEP NbS Guidelines, Section III
Health & well-being	Improved air/water quality, reduced disease vectors, mental health through green space access	11, 12, 10	3, 6, 11	WHO Biodiversity & Health Guidance, Ch. 2; One Health Joint Plan of Action, Pillar 1
Economic development	Green jobs, restoration economies, sustainable tourism, nature-positive value chains	8, 10, 20	8, 9, 12	ILO Just Transitions Guidelines, Sec. 2.2; UNEA 5/5, para. 6(a); LEAF Coalition
Equity & governance	Community stewardship, indigenous governance, gender-responsive design, rights-based nature-based solutions	22, 8, 11	5, 10, 16	UNGPs, Pillars I–III; OHCHR (2023) Key Message 3; KMGBF, Target 22

Annex II

Tools and guidance

Selected tools and guidance on nature-based solutions and/or ecosystem-based approaches for climate change mitigation and adaptation

Tool and/or guidance	Description
Participation, rights and equity across the stepwise approach	
Participatory Assessment of Climate and Disaster Risk tool (Brot für die Welt, HEKS/EPER)	A toolkit of seven modules for participatory risk assessment and community-led planning. It covers both climate change and disaster risks, with the end product being a community adaptation plan. It integrates nature-based solutions and/or ecosystem-based approaches without using this language.
FPIC Guidelines (UN-REDD Programme)	Prepared for country teams working on REDD+ (reducing emissions from deforestation and forest degradation, ‘plus’ the conservation, sustainable management and restoration of forest carbon stocks). Sets out the requirements and process for FPIC of indigenous peoples. Also advocates analysis to identify other forest-dependent communities who also have the right to FPIC.
Mo’ otz Kuxtal Voluntary Guidelines (CBD)	Guidelines focused on FPIC for the access of traditional knowledge and practices. Also covers fair and equitable benefit-sharing when knowledge is used and preventing illegal appropriation of traditional knowledge.
Principles for just and equitable nature-based solutions (SEI)	Details five principles for social justice and equity in nature-based solutions, focused on the conceptualization and design stage.
Guidelines for co-creation and co-governance of nature-based solutions (EC DGRI)	Sets out a detailed approach to working with local communities and other actors to design nature-based solutions. Includes ‘building blocks of a successful co-creation process’ and an annex of practical methods for engagement. Draws on case studies from several European projects.
Human rights guide for working with indigenous peoples and Local Communities (TNC)	Features six modules on working with indigenous peoples and local communities, prepared for conservation practitioners. Includes templates and checklists. Features a narrative case study for Wenland, a fictitious European country, to bring the guide to life.
The First Nations Principles of OCAP (FNIGC / CGIPN)	This resource guide and short course outline principles on indigenous (First Nations) data – “Ownership, Control, Access and Possession”. Proposes approaches for collection, protection, use and sharing of data.
Key messages on business and climate change (OHCHR)	Explores the UN Guiding Principles on Business and Human Rights in a climate change context, detailing the responsibilities of states and of businesses. It advocates for ambitious climate action, transparent disclosure of climate impacts, meaningful participation in climate-related decisions, FPIC and other rights-based measures.
Scaling up: integrating nature into Nationally Determined Contributions (NDCs) and National Adaptation Plans (NAPs)	
A Guide for Including Nature in Nationally Determined Contributions: 2nd Edition (Nature4Climate)	Designed for country teams aiming to embed nature-based solutions and/or ecosystem-based approaches into their NDCs. Outlines practical steps to do so, at the same time increasing national ambition for climate action. It provides recommendations on how to align climate actions with biodiversity conservation, health and the broader sustainable development agenda. It covers the NDC readiness phase, target-setting and implementation. It includes case studies, examples of policies and measures and links to further relevant resources, including on wider NDC development.
Natural Climate Solutions Handbook: A Technical Guide for Assessing Nature-Based Mitigation Opportunities in Countries (TNC)	Offers a practical guide to assessing potential ‘natural climate solutions’ at country scale, including advice on establishing baselines, assessing uncertainty of mitigation potential and developing marginal abatement cost curves. Includes five country case studies.

Considerations for integrating Nature-based Solutions into Nationally Determined Contributions: Illustrating the potential through REDD+ (UNDP)	Discusses considerations for the integration of nature into NDCs, focusing on lessons from REDD+ as a mitigation measure. It covers the UNFCCC policy context, carbon accounting, safeguards, multiple benefits, access to finance and the need for interministerial coordination. It aims to help countries to determine whether their REDD+ experience can be built upon to cover the broader land-use, forests and agriculture sector in NDCs.
E-Course: Bringing Nature into National Adaptation Planning (UNEP)	A short online course on the benefits of integrating nature-based solutions into NAPs, and the risks of not doing so. Includes an interactive landscape that illustrates the role of nature in climate change adaptation.
Building Resilience with Nature: Maximizing Ecosystem-based Adaptation through National Adaptation Plan processes (IISD)	Reviews 19 NAPs to learn lessons on integrating ecosystem-based adaptation. On this basis, offers guiding principles and recommendations. Includes relevant tools and resources.
Guidelines for Integrating Ecosystem-based Adaptation into National Adaptation Plans: Supplement to the UNFCCC NAP Technical Guidelines (UNEP)	A further resource on integrating ecosystem-based adaptation into NAPs. Also offers guidance on mainstreaming ecosystem-based adaptation into other plans and policies.
Land-based measures to mitigate climate change: Potential and feasibility by country (<i>Global Change Biology</i>)	Provides initial estimates for 200 countries of the climate change mitigation potential and cost-effectiveness of different actions, ranging from the protection, restoration and sustainable management of ecosystems through to demand-side measures such as reduction in food waste, clean cookstoves and dietary shifts. As such, the paper and its supplementary material can offer an initial guide to opportunities for incorporating nature-based solutions and/or ecosystem-based approaches into national mitigation strategies and commitments made in NDCs.
VCM Access Strategy Toolkit (VCMi)	“Considerations for host countries when engaging in high-integrity voluntary carbon market”. Guides country teams in their thinking around whether or not to engage with voluntary carbon markets, including role within NDCs and legal / institutional frameworks needed.
The Exponential Roadmap for Natural Climate Solutions (Conservation International)	Proposes a bold plan to reach net-zero land sector emissions by 2030 and 5 GtCO ₂ e of net negative emissions by 2040, doubling to 10 GtCO ₂ e by 2050. Ranks and visualizes mitigation opportunities across countries.
Nature-based Solutions Evidence Platform (Conservation International and Nature-based Solutions Initiative)	Designed to support decision-making by providing robust, accessible evidence on the effectiveness of nature-based solutions for climate change adaptation. Compiles peer-reviewed studies, case examples and data that demonstrate potential benefits for both people and nature.
Understanding the scaling potential of Nature-based Solutions	Offers an assessment framework on the scaling potential of nature-based solutions for climate change adaptation and ecosystem restoration. Applies this framework to several European case studies.
Raising awareness and building capacity on nature-based solutions and/or ecosystem-based approaches	
Nature-based Solutions for Sustainable Development – micro-course (UNDP)	A short online course introducing nature-based solutions concepts and their potential contribution to NDCs and national water plans.
Ecosystem-based Adaptation: Working with nature to adapt to a changing climate (SDG Academy)	A short online course on ecosystem-based adaptation, focused on design and implementation of initiatives, especially in sectors other than conservation. It covers principles, risk assessment, monitoring and governance.
IUCN Global Standard for Nature-based Solutions (IUCN)	The Standard includes 8 criteria and 28 indicators intended to help in the design and implementation of nature-based solutions. It is accompanied by Guidance and a self-verification toolkit . It is currently under revision, with a revised version expected ahead of SBSTTA 27.
Possible ways to foster the uptake of knowledge on Nature-based Solutions (biodiversa+)	Discusses approaches for mainstreaming nature-based solutions and/or drawing on scientific knowledge, through a common taxonomy, definition and metrics, knowledge sharing, collaboration and capacity building.

Assessing climate change mitigation potential	
EX-ACT - the Environmental eXternalities Accounting Tool (FAO)	Focuses on estimating mitigation potential of actions in the Agriculture, Forestry and Other Land Use (AFOLU) sector. Follows IPCC guidance and integrates IPCC default values on emissions and removals. Can be customized to integrate actions in addition to those already included, or more detailed local information on mitigation potential.
naturebase	Geospatial platform that models twenty 'natural climate solutions' at a national to subnational scale, estimating the climate change mitigation benefit and selected ecosystem service benefits. Incorporates a screening tool for human rights due diligence.
NbS Benefits Explorer	Aims to inform those intending to invest in nature-based solutions. Includes an interactive tool that develops a quantitative and monetary valuation of benefits of actions to protect, restore and manage ecosystems.
Blue Carbon Manual (CI/UNESCO/IUCN)	Outlines "methods for assessing carbon stocks and emissions factors in mangroves, tidal salt marshes and seagrass meadows".
Blue Carbon Explorer (TNC)	Supports prioritization for restoration or protection in mangroves and other coastal wetlands. Draws on remotely sensed spatial data to explore changes in ecosystem condition. Designed for use in the Caribbean, Indonesia and Papua New Guinea but also includes global data.
Monitoring across multiple benefits	
Evaluating the impact of nature-based solutions – a handbook for practitioners (EC DGRI)	Brings together methods and indicators on M&E for nature-based solutions, compiling these across multiple European projects.
Planning, Designing and Monitoring of Nature-based Solutions: guidelines to urban transformations (Instituto Humboldt)	Offers a planning, design and monitoring framework for urban nature-based solutions, with case studies.
Good Practice Guidance for Land Use, Land Use Change and Forestry (IPCC)	Provides formal guidance on the monitoring of carbon stocks and greenhouse gas emissions and is intended for use in national inventories. Together with its refinements and supplements, this guidance is a key reference drawn upon by other methodologies.
Carbon Standards for Natural Climate Solutions (NCS) Credits (WBCSD)	Through a collection of factsheets, documents the approach and uptake of different carbon standards. Includes their requirements on additionality, permanence, leakage and multiple ('core') benefits.
Guidebook for Monitoring and Evaluating Ecosystem-based Adaptation Interventions (GIZ)	Covers the design and implementation of M&E for ecosystem-based adaptation. Includes approaches to develop a results framework, indicators, and baseline, to operationalize the M&E system and to communicate the results.

Annex III

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