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Convention on Biological Diversity

Subsidiary Body on Scientific, Technical and Technological Advice
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Item 4 of the provisional agenda*
Findings from the assessments by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services and the Intergovernmental Panel on Climate Change and their implications for the work undertaken under the Convention

Findings from the *Sixth Assessment Report of the Intergovernmental Panel on Climate Change* and their implications for the work undertaken under the Convention

Note by the Secretariat

I. Introduction

1. The Intergovernmental Panel on Climate Change (IPCC) publishes comprehensive scientific assessments every six to seven years. The *Fifth Assessment Report* was completed in 2014 and provided the main scientific input to the Paris Agreement. At its forty-first session, in February 2015, the Panel decided to produce a sixth assessment report. The contribution of IPCC Working Group I to the report[1] was released on 9 August 2021, that of Working Group II[2] on 28 February 2022 and that of Working Group III[3] on 4 April 2022. The Panel also published the following special reports on more specific issues during the sixth assessment cycle: *Global Warming of 1.5°C*,[4] in October 2018, *Climate Change and Land*,[5] in August 2019, and *Special Report on the Ocean and Cryosphere*

* CBD/SBSTTA/25/1/Rev.1.

[1] IPCC, *Climate Change 2021: The Physical Science Basis – Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge, Cambridge University Press, 2021). Available at www.ipcc.ch/report/sixth-assessment-report-working-group-i.

[2] IPCC, *Climate Change 2022: Impacts, Adaptation and Vulnerability – Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge, Cambridge University Press, 2022). Available at www.ipcc.ch/report/sixth-assessment-report-working-group-ii/.

[3] IPCC, *Climate Change 2022: Mitigation of Climate Change – Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge, Cambridge University Press, 2022). Available at www.ipcc.ch/report/sixth-assessment-report-working-group-3/.

[4] IPCC, *Global Warming of 1.5°C. An IPCC Special Report on the Impacts of Global Warming of 1.5°C Above Pre-industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty* (Cambridge, Cambridge University Press, 2018). Available at www.ipcc.ch/sr15/.

[5] IPCC, *Climate Change and Land: an IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems* (Cambridge, Cambridge University Press, 2019). Available at www.ipcc.ch/srccl/.

in a Changing Climate,[6] in September 2019. The *AR6 Synthesis Report: Climate Change 2023*[7] was adopted in March 2023.

2. As stated in the introduction to the summary for policymakers of the *AR6 Synthesis Report*, the report recognizes the interdependence of climate, ecosystems and biodiversity, and human societies; the value of diverse forms of knowledge; and the close linkages among climate change adaptation, mitigation, ecosystem health, human well-being and sustainable development, and it reflects the increasing diversity of actors involved in climate action.

3. In its decision 14/5, the Conference of the Parties to the Convention on Biological Diversity requested the Executive Secretary to consider the linkages and interdependencies between biodiversity and climate change in preparation for the post-2020 global biodiversity framework, informed by the reports and assessments of the Panel. In decision 15/19, the Conference of the Parties welcomed the cooperation between the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services and the Panel and took note of the report of the co-sponsored workshop on biodiversity and climate change, including the conclusions therein. At its twenty-third meeting, the Subsidiary Body on Scientific, Technical and Technological Advice welcomed the following special reports of the Panel: *Global Warming of 1.5°C: an IPCC Special Report on the Impacts of Global Warming of 1.5°C Above Pre-Industrial Levels, and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty*,[8] *IPCC Special Report on Climate change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems*[9] and *IPCC Special Report on the Ocean and Cryosphere in a Changing Climate*.[10] It also acknowledged the ongoing joint activities between the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services and the Panel on biodiversity and climate change, which the former acknowledged in the *Sixth Assessment Report*.[11]

4. Sections II to V below contain a brief overview of the findings of the *Sixth Assessment Report* that are relevant to the work undertaken under the Convention. Section VI is focused on the implications of those findings for that work, and section VII contains recommendations for the Subsidiary Body.

II. Climate change as a driver of biodiversity loss

5. Among the critical issues addressed in the report is the rate of biodiversity loss and the recognition of climate change as a significant driver of that decline, affecting ecosystems, species and their interactions in multifaceted ways.

A. Changing habitats and range shifts

6. It is reiterated in the report that climate change leads to shifting temperatures, altered precipitation patterns and extreme weather events, and that those changes disrupt ecosystems and force many species to adapt or relocate. However, not all species can keep pace with the rapid shifts, leading to the fragmentation and loss of habitats. Species with specialized environmental requirements are particularly vulnerable, and as their habitats disappear, their populations decline,

[6] IPCC, *Special Report on the Ocean and Cryosphere in a Changing Climate* (Cambridge, Cambridge University Press, 2019). Available at www.ipcc.ch/srocc/.
[7] IPCC, *Climate Change 2023: Synthesis Report. A Report of the Intergovernmental Panel on Climate Change. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (Geneva, 2023). Available at www.ipcc.ch/report/ar6/syr/.
[8] IPCC, *Global Warming of 1.5°C.*
[9] IPCC, *Climate Change and Land*.
[10] IPCC, *Special Report on the Ocean and Cryosphere in a Changing Climate*.
[11] IPCC, *Climate Change 2021: The Physical Science Basis*, sect. 1.2.2.6.

leading some to facing extinction. The report highlights the ongoing decline of numerous plant and animal populations due to such changes,[12] underscoring the detrimental impacts of climate change on biodiversity.

B. Ocean acidification and deoxygenation

7. The oceans play a crucial role in supporting biodiversity and providing a source of livelihood for people, including some of the most vulnerable. The report highlights how the increased carbon dioxide (CO_2) emissions are causing the oceans to absorb more CO_2, leading to ocean acidification and deoxygenation with ocean warming.[13] This phenomenon has severe consequences for marine life, in particular coral reefs. Corals, the foundation of reef ecosystems, are highly sensitive to changes in pH levels. As acidity rises, corals struggle to build their calcium carbonate skeletons, making them vulnerable to bleaching and killing them. The loss of coral reefs not only affects the species that depend upon them for survival but also disrupts the delicate balance of marine ecosystems. The *Sixth Assessment Report* highlights that habitat-forming coastal ecosystems, including many coral reefs, kelp forests and seagrass meadows, will undergo irreversible phase shifts as a result of marine heatwaves with global warming levels above 1.5°C and that they will be at high risk of such shifts during the current century, even in scenarios below 1.5°C that include periods of temperature overshoot above 1.5°C. Under certain scenarios, coral reefs are at risk of widespread decline, loss of structural integrity and transitioning to net erosion by mid-century, owing to the increasing intensity and frequency of marine heatwaves. As a result, without adaptation measures, the rate of sea level rise is highly likely to exceed that of reef growth by 2050.[14]

C. Species interactions and ecological disruptions

8. Biodiversity is not just about individual species but also the intricate web of interactions that they form within ecosystems. Climate change disrupts those interactions, which has complex ecological consequences. As species distributions shift and become desynchronized with the timing of critical life events, such as reproduction and migration, essential relationships, such as pollination and predation, can be disrupted. This can trigger cascading effects throughout ecosystems, affecting multiple species. The *Sixth Assessment Report* underscores that such disruptions are occurring at an unprecedented rate, leading to a loss of ecological resilience and exacerbating the global decline in biodiversity. In terrestrial ecosystems, it is estimated that 3 to 14 per cent of the species assessed will face a very high risk of extinction with global warming levels of 1.5°C, the upper end of the estimate range increases to 18 per cent with a rise of 2°C, 29 per cent with a rise of 3°C, 39 per cent with a rise of 4°C and 48 per cent with a rise of 5°C. In ocean and coastal ecosystems, the risk of biodiversity loss ranges from moderate to very high with global warming levels of 1.5°C; from moderate to very high with a rise of 2°C, but with more ecosystems at high and very high risk; and from high to very high across most ocean and coastal ecosystems with a rise of 3°C, depending on the ecosystem. A very high extinction risk for endemic species in biodiversity hotspots is projected to at least double with global warming levels of 1.5°C to 2°C and to increase at least tenfold if warming levels rise from 1.5°C to 3°C. If not successfully addressed, the combined and interactive effects of climate change, deforestation, forest degradation and forest fires are projected to lead to a reduction of more than 60 per cent of the area covered by forest as a result of a 2.5°C global warming level.[15]

D. Extinction risks and loss of genetic diversity

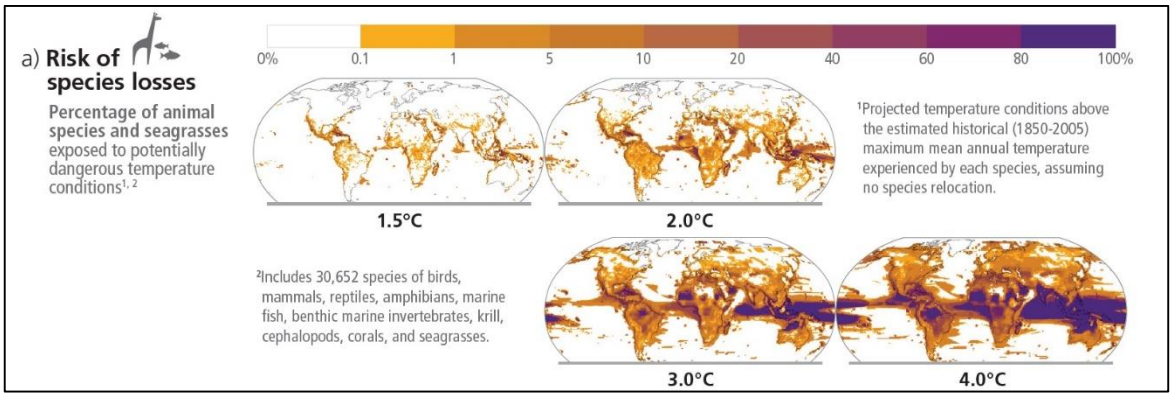
9. Climate change amplifies existing threats to species and can push vulnerable populations beyond their tipping points, increasing their risk of extinction. The *Sixth Assessment Report*

[12] IPCC, *Climate Change 2021: The Physical Science Basis*, sect. 2.3.4.3.2, and *Climate Change 2022: Impacts, Adaptation and Vulnerability*, sects. 2.4.2.3.3 and 2.4.2.7.
[13] IPCC, *Climate Change 2021: The Physical Science Basis*, sect. TS.2.4, and IPCC, *Climate Change 2022: Impacts, Adaptation and Vulnerability*, sect. 3.2.3.1.
[14] IPCC, *Climate Change 2022: Impacts, Adaptation and Vulnerability*, sect. TS.C.2.1.
[15] Ibid., sect. TS.C.2.1.

underlines that both terrestrial and marine species are experiencing higher extinction rates as a consequence of climate change (figure I).[16] In addition, the loss of genetic diversity within species further diminishes their ability to adapt to changing conditions,[17] making them more susceptible to diseases, environmental stresses and other disturbances. This cumulative effect is greatly contributing to the decline of global biodiversity.

Figure I

Projected risks and impacts of climate change on natural and human systems at various global warming levels relative to the 1850–1900 levels



Source: IPCC, *Climate Change 2023 Synthesis Report: Summary for Policymakers*, extract from figure SPM.3.
Note: Underpinning projections of temperature are from 21 Earth system models and without considering extreme events affecting such ecosystems as the Arctic.

E. Indigenous and local knowledge

10. The importance of engaging with indigenous peoples and local communities, recognizing how climate change can impact on their traditional livelihoods, cultures and practices, is mentioned multiple times in the *Sixth Assessment Report*. It is also noted therein how their traditional and local knowledge helps to understand the changes currently being observed, and offers means to adapt to such changes and to avoid maladaptation.[18] The report emphasizes the need to acknowledge and respect their knowledge, cultures and rights, and the need for their free, prior and informed consent to sharing that knowledge.[19]

III. Biodiversity in support of climate change mitigation

11. The *Sixth Assessment Report* emphasizes the critical role of biodiversity in combating climate change and highlights the importance of conserving natural ecosystems to achieve effective mitigation strategies.

Carbon sequestration

12. Natural ecosystems, such as forests, wetlands and oceans, act as vital carbon sinks, absorbing and storing substantial amounts of atmospheric CO_2. According to the *Sixth Assessment Report*, maintaining and restoring those ecosystems is crucial to mitigating climate change.

13. Natural ecosystems contribute to climate regulation by influencing local and regional weather patterns, precipitations and temperatures. Such services help to stabilize climate conditions, creating resilience to extreme weather events, such as droughts and floods. According to the report, the projected economic mitigation potential of agriculture, forestry and other land use options between

[16] Ibid., sect. TS.C.1.5.
[17] Ibid., sect. 2.4.2.8.
[18] IPCC, *Climate Change 2021: The Physical Science Basis*, sect. 1.3.2, and *Climate Change 2022: Impacts, Adaptation and Vulnerability*, sect. TS.B.7.2.
[19] IPCC, *Climate Change 2022: Impacts, Adaptation and Vulnerability*, sect. 1.4.1.

2020 and 2050, at costs below $100 per ton of CO_2 equivalent (tCO_2-eq), is 8 to 14 gigatons of CO_2 equivalent ($GtCO_2$-eq) per year. Between 30 and 50 per cent of this potential is available at less than $20 per tCO_2-eq and could be upscaled in the near-term future across most regions. The largest share of this economic potential, at 4.2–7.4 $GtCO_2$-eq per year, comes from the conservation, improved management and restoration of forests and other ecosystems (coastal wetlands, peatlands, savannas and grasslands), with reduced deforestation in tropical regions generating the highest total mitigation. Improved and sustainable crop and livestock management and carbon sequestration in agriculture (the latter including soil carbon management in croplands and grasslands, agroforestry and biochar) can bring about a reduction of 1.8–4.1 $GtCO_2$-eq per year.[20]

14. While biodiversity is essential for effective climate change mitigation, human activities have led to significant biodiversity loss. The report highlights that this loss undermines climate change mitigation efforts.[21] Key factors contributing to biodiversity decline include deforestation, habitat degradation, the overexploitation of resources, invasive species and climate change itself, which exacerbates the pressures on ecosystems through:

(a) *Feedback loops*. Biodiversity loss can trigger feedback loops that exacerbate climate change. For example, the degradation of forests reduces carbon sequestration capacity, leading to increased CO_2 concentrations in the atmosphere and further climate warming.[22] It is also noted in the report that CO_2 emissions from degrading peatlands contribute to climate change in a positive feedback loop (robust evidence, high agreement) where, at mid-latitudes, widespread anthropogenic disturbance has led to large historical greenhouse gas emissions and current legacy emissions of 0.15 petagrams of carbon (PgC) per year between 1990 and 2000, and about 80 million hectares of peatland have been converted to agriculture, equivalent to 72 PgC emissions between 1850 and 2010. On average, at the global scale, increases in greenhouse gas emissions from peatlands have primarily come from the compounded effects of land use change, drought and fire, with additional emissions from some thawing permafrost peatlands (robust evidence, high agreement);[23]

(b) *Ecosystem vulnerability*. Declines in biodiversity make ecosystems more vulnerable to the impacts of climate change, such as extreme weather events and temperature fluctuations, hindering their capacity to act as carbon sinks and regulators. The report emphasizes that future ecosystem vulnerability will strongly depend on developments in society, including demographic and economic change. Deforestation is projected to increase the threat to terrestrial ecosystems, as is the increase in the use of hard coastal protection of cities and settlements by the sea for coastal ecosystems.[24]

IV. Biodiversity in support of climate change adaptation and disaster risk reduction

15. The link between biodiversity and climate change adaptation has emerged as a critical aspect of understanding and addressing the challenges posed by global climate change. The *Sixth Assessment Report* highlights the intricate relationship between biodiversity and climate change adaptation, recognizing the interconnectedness of ecological systems and underscoring the urgent need for conservation and restoration efforts to enhance resilience to climate change.[25]

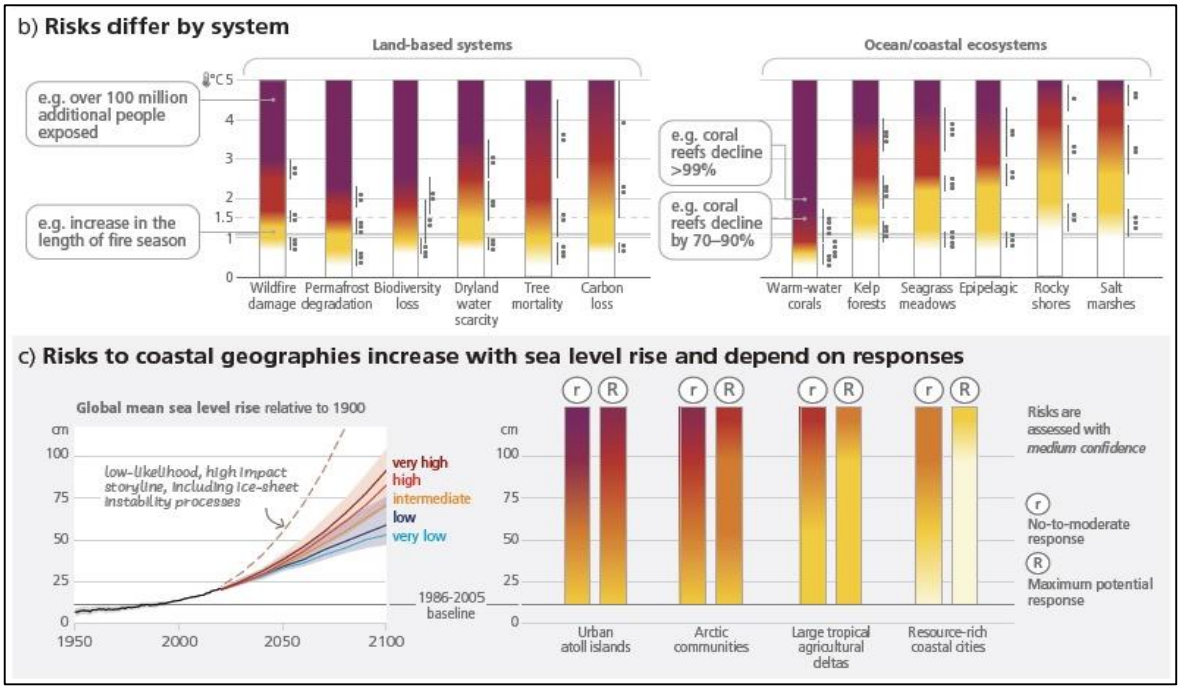
16. Biodiversity is the foundation of ecosystem resilience and stability. A diverse array of plant and animal species, as well as their genetic diversity, contributes to ecosystem health and functionality. The report emphasizes that ecosystems rich in biodiversity have a greater capacity to

[20] IPCC, *Climate Change 2022: Mitigation of Climate Change*, sect. C.9.1
[21] Ibid., sect. TS. 5.6.1.
[22] IPCC, *Climate Change 2022: Impacts, Adaptation and Vulnerability*, sect. 2.5.3.5.
[23] Ibid., sect. 2.4.3.8.
[24] Ibid., sect. TS.C.1.3.
[25] Ibid., sect. 1.2.1.

adapt to climate-driven disturbances.[26] They can maintain vital ecological functions, such as water regulation, carbon sequestration and disease control, which are essential for human well-being and the stability of the Earth's climate. While genetic diversity itself is not shown to be directly affected by climate change, it supports the adaptability of species to deal with climate-related threats.[27]

17. For example, mangrove forests and coral reefs act as natural barriers, protecting coastal communities from the destructive forces of storm surges and tsunamis.[28] The loss of biodiversity, in particular in those ecosystems, makes vulnerable communities even more exposed to climate-related hazards (figure II). Conserving and restoring biodiversity, therefore, become a crucial element in disaster risk reduction strategies.

Figure II
Subset of assessed climate outcomes and associated global and regional climate risks



Source: IPCC, *Climate Change 2023 Synthesis Report: Summary for Policymakers*, figure SPM.4.
Note: The burning embers (colour transitions) result from a literature-based expert elicitation. (b): selected global risks for land and ocean ecosystems, illustrating general increase of risk with global warming levels with low to no adaptation; (c): left: global mean sea level change in centimetres, relative to 1900. The historical changes (black) were observed by tide gauges before 1992 and altimeters thereafter. The future changes to 2100 (coloured lines and shading) are assessed consistently with observational constraints on the basis of an emulation of various models, and likely ranges are shown; right: assessment of the combined risks of coastal flooding, erosion and salinization for four illustrative coastal geographies in 2100, owing to changing mean and extreme sea levels, under two response scenarios, with respect to a baseline period of 1986–2005. The assessment does not account for changes in extreme sea level beyond those directly induced by mean sea level rise; risk levels could increase if other changes in extreme sea levels were considered (e.g. as a result of changes in cyclone intensity).

A. Ecosystem-based adaptation

18. Ecosystem-based adaptation is an approach that uses the inherent capacity of ecosystems to adapt to changing climatic conditions. The *Sixth Assessment Report* highlights that ecosystem-based

[26] Ibid., sect. 3.4.3.3.
[27] Ibid., sect. 2.4.2.8.
[28] Ibid., chap. 3.

adaptation measures, such as habitat restoration, afforestation and sustainable land management, can enhance the resilience of ecosystems, support climate change adaptation efforts and help to avoid maladaptation. Those nature-based solutions[29] and/or ecosystem-based approaches offer co-benefits by conserving biodiversity while simultaneously buffering communities against climate impacts.[30]

B. Feedback loops and tipping points

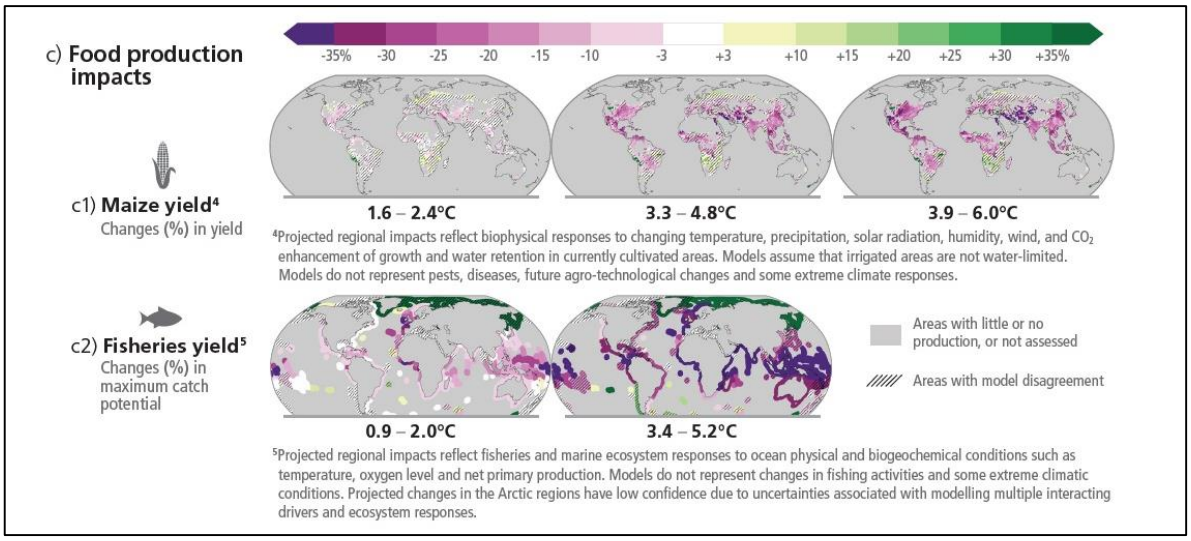
19. The *Sixth Assessment Report* outlines that biodiversity loss can lead to feedback loops[31] and tipping points[32] that exacerbate the impacts of climate change. For example, the loss of plant species in forests may hinder their ability to sequester carbon effectively, leading to increased greenhouse gas concentrations in the atmosphere. Such feedback loops can result in irreversible changes to ecosystems, undermine their ability to support ecosystem-based adaptation and further threaten biodiversity and human livelihoods.

C. Food security

20. Biodiversity plays a critical role in global food security. The *Sixth Assessment Report* highlights the impacts of climate change on our food systems and indicates that a diversified agricultural system, incorporating a range of crops and livestock breeds, can be more resilient to changing climatic conditions (figure III).[33]

Figure III

Projected risks and impacts of climate change on natural and human systems at various global warming levels relative to the 1850–1900 levels



Source: IPCC, *Climate Change 2023 Synthesis Report: Summary for Policymakers*, extract from figure SPM.3.

[29] The term "nature-based solutions" is used regularly throughout the final outputs of the *Sixth Assessment Report*, in particular in the contribution of Working Group II, which covers literature accepted for publication up to 11 October 2021. A footnote in the Working Group II report states that "The term 'Nature-based Solutions' is widely but not universally used in the scientific literature. The term is the subject of ongoing debate, with concerns that it may lead to the misunderstanding that [nature-based solutions] on its own can provide a global solution to climate change."

[30] IPCC, *Climate Change 2022: Impacts, Adaptation and Vulnerability*, sect. TS.D.4.1.

[31] Ibid., sect. 2.4.3.8.

[32] IPCC, *Climate Change 2021: The Physical Science Basis*, sect. 1.4.4.3.

[33] IPCC, *Climate Change 2022: Impacts, Adaptation and Vulnerability*, sect. TS.B.3.

D. Species migration and connectivity

21. Climate change is shifting the distribution and behaviour of species worldwide.[34] The *Sixth Assessment Report* emphasizes that maintaining ecological corridors and promoting landscape connectivity are crucial for enabling species to migrate and adapt to new conditions.[35] Such corridors facilitate the movement of flora and fauna and allow for gene flow, increasing their chances of survival and promoting overall ecosystem resilience.

E. Ecosystem-based disaster risk reduction

22. It is emphasized in the *Sixth Assessment Report* that biodiversity conservation is integral to effective disaster risk reduction strategies.[36] Ecosystem-based disaster risk reduction is aimed at minimizing the impacts of natural hazards on vulnerable communities through sustainable management and building the resilience of natural ecosystems:

(a) *Natural buffers*. Biodiversity-rich ecosystems act as natural buffers against natural disasters. Forests, for example, can reduce the impact of landslides, while healthy wetlands can help to mitigate the severity of floods;

(b) *Enhanced resilience*. Biodiversity contributes to the resilience of communities by providing a safety net of resources during and after disasters. Diverse agricultural systems, for example, can ensure food security during times of crisis.

V. Impacts of climate mitigation and adaptation measures on biodiversity

23. Safeguarding biodiversity and ecosystems is fundamental to climate-resilient development in the light of the threats that climate change poses to them and their roles in adaptation and mitigation. It is stated in the *Sixth Assessment Report* that maintaining the resilience of biodiversity and ecosystem services at a global scale depends on the effective and equitable conservation of approximately 30 to 50 per cent of Earth's land, freshwater and ocean areas, including currently near-natural ecosystems.[37]

24. The report underlines that ecosystem conservation and restoration can build the resilience of ecosystems, generate opportunities to restore ecosystem services with substantial co-benefits and provide for ecosystem-based adaptation that includes the protection and restoration of forests, grasslands, peatlands and other wetlands, blue carbon systems (mangroves, salt marshes and seagrass meadows) and agroecological farming practices.[38] While effective ecosystem-based adaptation reduces a range of climate change-related risks to people, biodiversity and ecosystem services, with multiple co-benefits, it is itself vulnerable to climate change impacts, with its effectiveness declining with increasing global warming.[39]

25. It is noted in the report that biodiversity and ecosystem resilience to climate change are reduced by maladaptive actions,[40] including fire suppression in naturally fire-adapted ecosystems or hard defences against flooding. Maladaptation can have an especially adverse impact on marginalized and vulnerable groups, such as indigenous peoples and local communities, reinforcing and entrenching existing inequities. The report specifically highlights that inclusive planning initiatives informed by

[34] IPCC, *Climate Change 2021: The Physical Science Basis*, sect. 12.3.1.1, and *Climate Change 2022: Impacts, Adaptation and Vulnerability*, sect. 3.3.2.
[35] IPCC, *Climate Change 2022: Impacts, Adaptation and Vulnerability*, sect. TS.C.11.1.
[36] Ibid., sect. 6.3.3.3.
[37] Ibid., sect. 2.6.7
[38] Ibid., sect. TS.D.4.1.
[39] Ibid., sect. TS.D.4.6.
[40] In the *Sixth Assessment Report*, maladaptive actions, or maladaptation, are defined as actions that may lead to increased risk of adverse climate-related outcomes, including through increased greenhouse gas emissions, increased or shifted vulnerability to climate change, more inequitable outcomes or diminished welfare, now or in the future.

cultural values and indigenous, local and scientific knowledge can help to prevent maladaptation.[41] It underlines that plantations of single-species forests in inappropriate areas, such as those that would not naturally support forests, or replacing native species on peat soils can have negative impacts on local biodiversity and create a range of problems regarding water supply, food supply, fire risk and greenhouse gas emissions.[42] It also notes that there can be negative impacts on ecological processes as a result of climate-related geoengineering and bioenergy with carbon capture and storage, as part of broader discussions on the feasibility and impact of such approaches.[43]

VI. Implications for the work undertaken under the Convention

26. There are numerous references to the Convention throughout the reports produced through the *Sixth Assessment Report* cycle, including technical series publications.[44] Most references are in relation to the Aichi Biodiversity Targets, owing to the time period within which the reports were produced and published. However, the *Sixth Assessment Report* underlines the need to address climate change to support the achievement of numerous international agreements, including under the Convention.

27. Both the threat that climate change poses to biodiversity and nature's contributions to people in addressing climate change and its impacts are recognized in the Kunming-Montreal Global Biodiversity Framework. Target 8 of the Framework calls for the minimization of the impact of climate change and ocean acidification on biodiversity and an increase in its resilience through mitigation, adaptation and disaster risk reduction actions, including through nature-based solutions and/or ecosystem-based approaches, while minimizing negative and fostering positive impacts of climate action on biodiversity. Target 11 is aimed at the restoration, maintenance and enhancement of nature's contributions to people, including ecosystem functions and services, such as the regulation of air, water and climate, soil health, pollination and the reduction of disease risk, as well as protection from natural hazards and disasters, through nature-based solutions and/or ecosystem-based approaches for the benefit of all people and nature. Target 19, which is focused on substantially and progressively increasing the level of financial resources from all sources, also recognizes the need to optimize the co-benefits and synergies of finance targeted at the biodiversity and climate crises. The interconnectivity and indivisibility of the Framework targets mean that addressing spatial planning (Target 1), ecosystem restoration (Target 2) and conservation (Target 3) directly supports climate change adaptation and mitigation, while other targets, such as Target 16, on sustainable consumption, provide indirect contributions to climate change action, thus addressing biodiversity loss.

28. The report makes it clear that climate change is a major driver of biodiversity loss worldwide (see sect. II). The impacts are multifaceted, affecting habitats, species interactions, genetic diversity and ecosystem dynamics. Urgent and collective action is required to address climate change and conserve biodiversity. This leads to two main conclusions:

(a) Since climate change is a major driver of biodiversity loss, it will not be possible to achieve the goals and mission of the Kunming-Montreal Global Biodiversity Framework without effective climate action in line with the United Nations Framework Convention on Climate Change and the Paris Agreement;

(b) Given the existing and inevitable impacts of climate change on biodiversity, it will be imperative to take such impacts into account when implementing various targets of the Framework. For example, such impacts need to be factored in land- and sea-use planning (Target 1), the design

[41] IPCC, *Climate Change 2022: Impacts, Adaptation and Vulnerability*, sect. 8.2.5.3.1.
[42] IPCC, *Climate Change 2022: Impacts, Adaptation and Vulnerability*, text box on "Nature-based solutions for climate change mitigation and adaptation", p. 303.
[43] IPCC, *Climate Change 2021: The Physical Science Basis*, sect. 5.6.2.2.
[44] CBD Technical Series No. 41, CBD Technical Series No. 42, CBD Technical Series No. 43, CBD Technical Series No. 84 and CBD Technical Series No. 93.

and location of protected areas and other area-based conservation measures (Target 3) and strategies to prevent and control invasive alien species (Target 6).

29. The report highlights the intertwined relationship between biodiversity conservation and climate change mitigation (see sect. III). Conserving and restoring biodiversity-rich ecosystems are paramount to combating climate change and building resilience to its impacts. Urgent and collaborative action is needed on a global scale to address biodiversity loss and implement effective conservation strategies. As shown in figure IV, under "mitigations options", reducing the loss of natural ecosystems is among the three most effective mitigation options in terms of potential magnitude and represents, after solar and wind power, the third highest contribution that is moderately cost-effective. Carbon sequestration in agriculture and ecosystem restoration are also among the mitigation options with the highest potential feasibility.

30. The report underlines the indispensable connection between biodiversity conservation and climate change. As the impacts of climate change continue to intensify, safeguarding biodiversity becomes a critical component of building resilient societies and ecosystems (see sect. IV). As shown in figure IV, under "climate responses and adaptation options", nature-based solutions and/or ecosystem-based approaches offer important adaptation options.

31. The report also emphasizes that the role of ecosystems in supporting climate change mitigation and adaptation must be considered through an appropriate understanding of both ecological and social parameters. Maladaptive actions, including the failure to use inclusive planning approaches or native species, can reduce resilience or even increase greenhouse gas emissions (see sect. V). Various guidance documents with regard to restoration,[45] biofuels,[46] forest-related mitigation[47] and geoengineering[48] have been prepared under the Convention.

[45] See UNEP/CBD/SBSTTA/20/12 for key considerations for optimizing the benefits and minimizing the negative impacts of ecosystem restoration on biodiversity, and UNEP/CBD/SBSTTA/20/INF/35 and UNEP/CBD/SBSTTA/20/INF/36 for additional guidance and tools for ecosystem restoration developed under the Convention and by partner organizations and initiatives. For further guidance on ecosystem restoration, see also decisions XI/16 and XII/19.

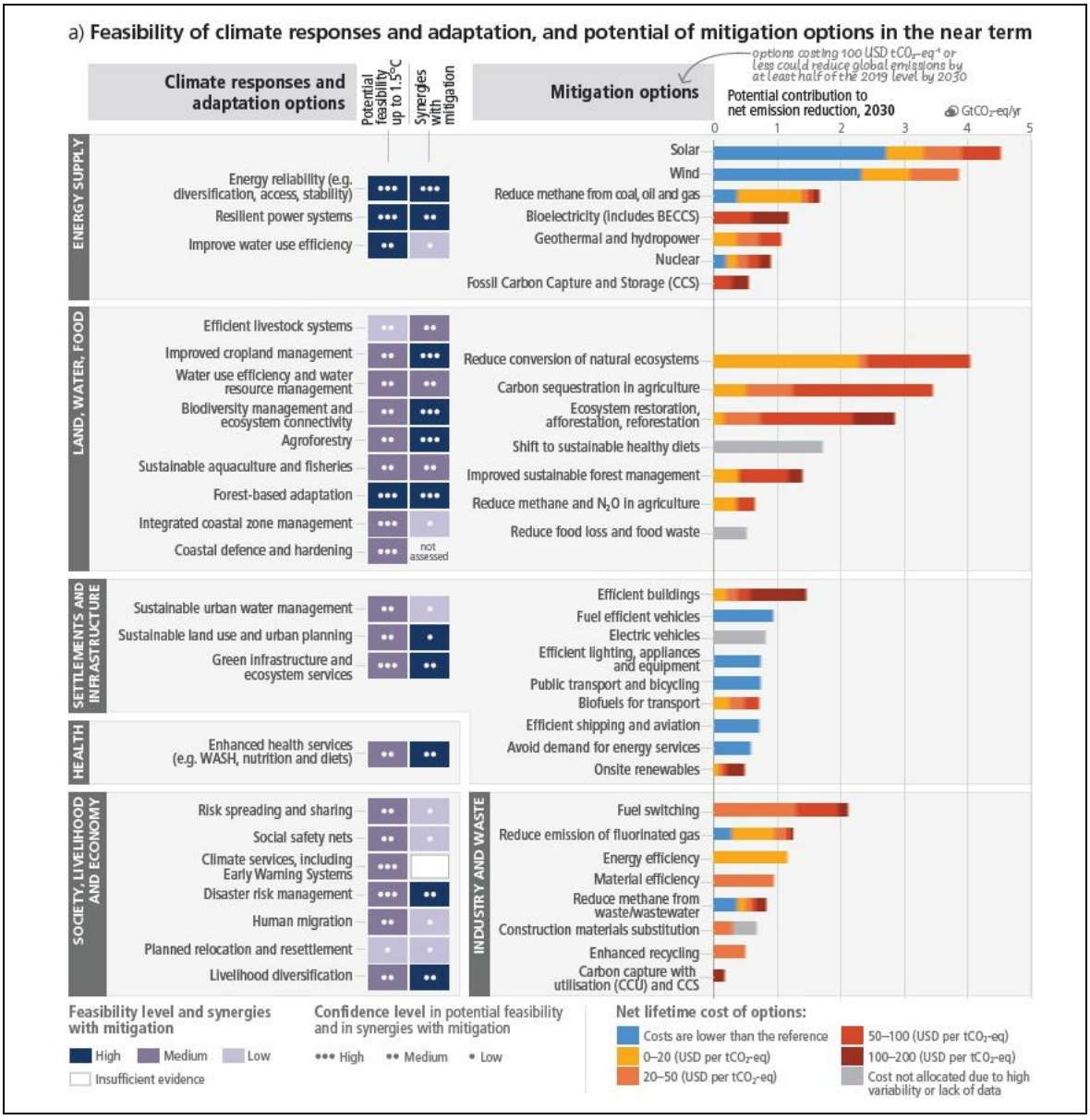
[46] Decision IX/2, decision X/37, and CBD Technical Series No. 65.

[47] CBD Technical Series No. 43, CBD Technical Series No. 59 and decisions XI/19 and IX/5.

[48] The possible impacts of geoengineering techniques on biodiversity and associated social, economic and cultural considerations, as well as the regulatory mechanisms for climate-related geoengineering, have been studied in detail in response to decision X/33, and the findings are published in CBD Technical Series No. 66 and its update CBD Technical Series 84.

Figure IV

Multiple opportunities for scaling up climate action across selected mitigation and adaptation options across various systems and approaches



Source: IPCC, *Climate Change 2023 Synthesis Report: Summary for Policymakers*, figure SPM.7.

Note: The left-hand side of the figure shows climate responses and adaptation options assessed for their multidimensional feasibility at global scale, in the near term and up to 1.5°C global warming. As literature above 1.5°C is limited, feasibility at higher warming levels may change, which is currently not possible to assess robustly. The right-hand side of the figure provides an overview of selected mitigation options and their estimated costs and potentials in 2030. The section on "Land, water, food" highlights the high feasibility and high potential contribution of approaches supported by the conservation and restoration of ecosystems.

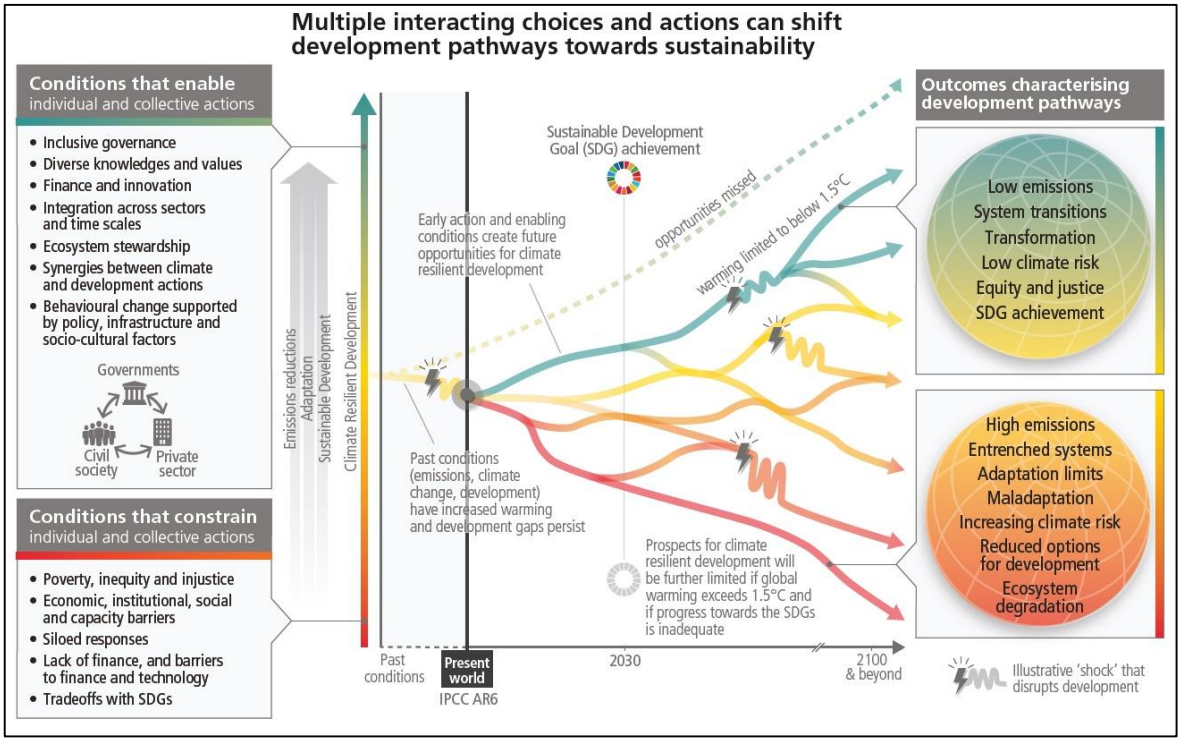
Policy implications and conservation strategies

32. The Framework calls for cooperation and synergies at all levels, and across the whole of government and the whole of society. Similar to the Framework, the *Sixth Assessment Report* underscores the urgency of addressing biodiversity loss to enhance climate change mitigation and adaptation efforts.

33. Policymakers must integrate climate and biodiversity agendas to avoid conflicting strategies, recognize the important interplay between the two agendas and ensure complementary efforts to support the achievement of sustainable development (Targets 8 and 11) (see figure V). This interconnection must be brought to the fore as Parties undertake revisions to their national biodiversity strategies and action plans.

34. Engaging indigenous peoples and local communities through their full and effective participation in decision-making is crucial. Traditional knowledge and practices hold valuable insights for conserving and restoring biodiversity and addressing climate change, and they must be respected and preserved with the free, prior and informed consent of the people concerned (Targets 21 and 22).

Figure V
Illustrative development pathways



Source: IPCC, *Climate Change 2023 Synthesis Report: Summary for Policymakers*, figure SPM.6.
Note: The illustrative development pathways (red to green) and associated outcomes (right panel) show that there is a rapidly narrowing window of opportunity to secure a liveable and sustainable future for all. Diverging pathways illustrate that interacting choices and actions made by various government, private sector and civil society actors can advance climate-resilient development, shift pathways towards sustainability and enable lower emissions and adaptation. Diverse knowledge and values include cultural values and indigenous, local and scientific knowledge. Climatic and non-climatic events, such as droughts, floods and pandemics, generate more severe shocks to pathways with lower climate-resilient development (red to yellow) than to those with higher climate-resilient development (green). There are limits to adaptation and adaptive capacity for some human and natural systems at a global warming level of 1.5°C, and losses and damages will increase with every increment of warming.

VII. Recommendations

35. The Subsidiary Body may wish to adopt conclusions along the following lines:

The Subsidiary Body on Scientific, Technical, and Technological Advice

1. *Takes note* of the findings from the *Sixth Assessment Report of the Intergovernmental Panel on Climate Change* and their implications for the work undertaken under the Convention;[1]

2. *Notes* that climate change is a significant driver of biodiversity loss, affecting ecosystems and species in multifaceted ways, thereby undermining their capacity to support climate change adaptation and mitigation efforts;

3. *Also notes* that nature-based solutions and/or ecosystem-based approaches provide co-benefits by conserving and restoring biodiversity while simultaneously buffering communities against the impacts of climate change;

4. *Recognizes* that biodiversity and ecosystem resilience to climate change are decreased by maladaptive actions;

5. *Also recognizes* the importance of climate actions by various actors, such as Governments, the private sector and civil society, and the value of diverse knowledge and values, including cultural values and indigenous, local and scientific knowledge.

[1] CBD/SBSTTA/25/9.