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REPORT ON ISSUE IN PROGRESS: BIODIVERSITY AND CLIMATE CHANGE

I. INTRODUCTION

A. *Integration of the conservation and sustainable use of biodiversity into climate change mitigation and adaptation activities*

1. The Conference of the Parties has, at its past few meetings, adopted several comprehensive decisions relating to the integration of the conservation and sustainable use of biodiversity into climate change mitigation and adaptation activities, and for the integration of climate change concerns into the implementation of the Convention at national level. The Conference of Parties, through decisions IX/16, X/33, and XI/21, has requested Parties, other Governments and relevant organizations, *inter alia*,

(a) To identify regions, ecosystems and components of biodiversity that are vulnerable to climate change; and assess the threats and impacts of climate change;

(b) To integrate climate change concerns into national biodiversity strategies and action Plans (NBSAPs);

(c) To take appropriate actions to address and reduce the impacts of climate change, and climate change mitigation and adaptation activities, on biodiversity and biodiversity-based livelihoods, including implementation of ecosystem-based approaches to climate change mitigation and adaptation;

(d) To monitor the impacts of climate change on biodiversity and biodiversity-based livelihoods; and

(e) To enhance synergies among the Rio conventions.

2. The following Aichi Biodiversity Targets are particularly relevant to the adaptation to and mitigation of climate change:

(a) *Aichi Biodiversity Target 10*: By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning;

(b) *Aichi Biodiversity Target 15*: By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including

* UNEP/CBD/SBSTTA/18/1.

restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification;

(c) *Aichi Biodiversity Target 5*: By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.

B. Application of relevant safeguards for biodiversity with regard to policy approaches and positive incentives on issues relating to reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries

3. In paragraph 16 (a) of decision XI/19, the Conference of the Parties requested the Executive Secretary to enhance collaboration with the Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC), other members of the Collaborative Partnership on Forests, and others to further support Parties in promoting REDD+¹ activities to achieve the objectives of the Convention.

4. The Conference of the Parties requested the Executive Secretary to compile information relevant to the application of safeguards for biodiversity, and make the compilation widely available, including through the clearing-house mechanism (decision XI/19, paragraph 16 (b)). In paragraph 8 of the same decision, the Conference of the Parties noted that safeguards may enhance benefits for biodiversity and for indigenous and local communities, and invited developing countries to share their experiences and lessons learned when planning and implementing these activities.

5. REDD+ activities have the potential to contribute to the achievement of a range of Aichi Biodiversity Targets as far as they support biodiversity conservation (Aichi Biodiversity Targets 11 and 12), water regulation (Aichi Biodiversity Target 14), soil conservation (Aichi Biodiversity Target 15) and the provision of non-timber forest products (Aichi Biodiversity Targets 7 and 18).

6. The Executive Secretary was also requested to compile information from Parties on initiatives and experiences regarding paragraph 67 of UNFCCC decision 2/CP.17 (on non-market-based approaches, such as joint mitigation and adaptation approaches for the integral and sustainable management of forests) with regard to its possible contribution to the objectives of the Convention on Biological Diversity (decision XI/19, paragraph 17).

C. Climate-related geoengineering

7. The Conference of the Parties, at its eleventh meeting, adopted decision XI/20 on climate-related geoengineering. In paragraph 1 of this decision, the Conference of the Parties reaffirmed its guidance on climate-related geoengineering contained in subparagraph 8 (w) of decision X/33, and in paragraph 9 of decision XI/20 it invited Parties to report on measures undertaken in accordance with this subparagraph.

8. In paragraph 2 of decision XI/20, the Conference of the Parties took note of the report on the impacts of climate related geoengineering on biological diversity (UNEP/CBD/SBSTTA/16/INF/28), the study on the regulatory framework for climate-related geoengineering relevant to the Convention on Biological Diversity (UNEP/CBD/SBSTTA/16/INF/29) and the overview of the views and experiences of indigenous and local communities and stakeholders (UNEP/CBD/SBSTTA/16/INF/30). The Executive Secretary was requested to prepare an update on the potential impacts of geoengineering techniques on biodiversity, and on the regulatory framework of climate-related geoengineering relevant to the Convention, drawing upon all relevant scientific reports such as the Fifth Assessment Report of the Intergovernmental Panel on Climate Change and discussions under the Environment Management Group

¹ REDD+ is used as a shorthand for “reducing emissions from deforestation and forest degradation, conservation of forest carbon stocks, sustainable management of forests and enhancement of forest carbon stocks in developing countries”, consistent with paragraph 70 of decision 1/CP.16 of the United Nations Framework Convention on Climate Change (UNFCCC). The acronym REDD+ is used for convenience only, without any attempt to pre-empt ongoing or future negotiations under the UNFCCC.

as well as an overview of the further views of Parties, other Governments, indigenous and local communities and other stakeholders on the potential impacts of geoengineering on biodiversity, and associated social, economic and cultural impacts, taking into account gender considerations, and building on the overview of the views and experiences of indigenous and local communities (decision XI/20, paragraphs 16 (a) and (b)).

9. The purpose of this note is to provide a report on issues relating to biodiversity and climate change linkages. The note is organized in three sections. Section II of the note provides a progress report on the integration of the conservation and sustainable use of biodiversity into climate-change mitigation and adaptation activities (agenda item 9.1). Section III of the note provides a progress report on the application of relevant safeguards for biodiversity with regard to policy approaches and positive incentives on issues relating to reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and the enhancement of forest carbon stocks in developing countries (agenda item 9.2). The final section (section IV) of the note provides a progress report on activities related to climate-related geoengineering (agenda item 9.3).

II. INTEGRATION OF THE CONSERVATION AND SUSTAINABLE USE OF BIODIVERSITY INTO CLIMATE-CHANGE MITIGATION AND ADAPTATION ACTIVITIES (ITEM 9.1)

10. This section of the note provides a review of progress made with the integration of the conservation and sustainable use of biodiversity into climate change mitigation and adaptation activities, as well as the integration of climate change into implementation of the Convention at national level, as requested by decisions IX/16, X/33 and XI/21, and the Strategic Plan for Biodiversity 2011-2020. It provides highlights of the findings of the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report relating to the impacts of climate change on ecosystems. The section further provides an overview of the activities of the Executive Secretary in supporting Parties to implement these decisions and to achieve the climate-related Aichi Biodiversity Targets. Finally, it also provides an overview of progress made by Parties as described in their fifth national reports and their revised and updated national biodiversity strategies and action plans (NBSAPs).

A. *Highlights of the global findings on the impacts of climate change on ecosystems*

11. Findings from the IPCC Fifth Assessment Report (AR5) Working Group II (WGII) on Impacts, Adaptation, and Vulnerability suggest that recent changes in climate have caused impacts on natural and human systems on all continents and oceans, with climate change impacts being the strongest and most comprehensive for natural systems.²

12. According to the AR5 WGII report, climate change is projected to be a major stressor for *terrestrial and freshwater ecosystems*. Furthermore, climate change will exacerbate other stressors on biodiversity such as land-use change, pollution and invasive and alien species. Changes in freshwater temperatures are predicted to lead to changes in freshwater species distribution and water quality, especially where there are high levels of nutrient loading. The capacity of many species to respond to climate change will be constrained by factors not related to climate change, such as competition from alien invasive species and habitat fragmentation. In addition, according to the report, many terrestrial species of plant and animal have shifted their ranges, altered their seasonal activities and experienced changes in abundance in response to climate change. Although shifts in range are an adaptation for many species, it is projected that a large number of species will be unable to do so fast enough during this century.

13. Findings from the WGII report also suggest that those species with spatially restricted populations (e.g. those confined to small and isolated habitats) will experience reductions in population size, vigour and viability. As climate change interacts with other stressors on ecosystems, it is projected

² IPCC WGII 2014 Summary for Policymakers; confidence levels for the statements are provided in the original reports.

that a large proportion of terrestrial and freshwater species will face increased extinction risk. The storage of carbon in terrestrial ecosystems, over decadal timescales, is partially offset by the release of carbon through habitat conversion and degradation. In some regions, tree death has been attributed to climate change.

14. The report highlights the risk of abrupt, irreversible regional-scale changes in composition, structure and functioning of terrestrial and freshwater ecosystems, particularly in the Amazon and the Arctic. The report states that risks of impacts to terrestrial and freshwater ecosystems can be reduced, and that the adaptive capacity of ecosystems can be improved by management actions, though for some ecosystems loss of species and ecosystem services is inevitable. It warns that some mitigation and adaptation responses can have negative impacts on terrestrial and freshwater ecosystems.

15. For *coastal ecosystems*, the AR5 WGII report shows that although climate change impacts are difficult to isolate from other human related drivers of change, these ecosystems are sensitive to three climate-related pressures, namely sea level rise, increasing ocean temperatures and ocean acidity. Information also reveals that coastal ecosystems are susceptible to increased submergence, flooding and erosion due to sea level rise. It is predicted that ocean acidification and rising ocean temperatures will negatively impact coastal ecosystems with coral reefs being the most vulnerable marine ecosystems, and temperate seagrass and kelp ecosystems facing declines. Humans are expected to further exacerbate the pressures on coastal ecosystems through excess nutrient loading, reduced sediment delivery and changes in run-off.

16. The AR5 WGII report mentions that *marine ecosystems* continue to respond to changes in the climate, and will continue to do so. Ocean temperature increases have resulted in large-scale distribution shifts of species, and have caused changes in ecosystem composition. Many fish and invertebrate species have shifted poleward. Species most vulnerable to ocean warming are those in the polar regions and those tropical species living close to their upper thermal limits. Warm water corals have responded to ocean warming with species replacement, bleaching and decreased coral cover resulting in habitat loss.

17. It is projected that further warming of 1°C or more will result in large, irreversible shifts in spatial distribution of species and seasonal timing of their activities, with implications for species composition and ecosystem goods and services. These species shifts would lead to increases in species richness at mid and high latitudes and a decrease at tropical latitudes with consequences for food security. The report suggests an increase in net primary production (NPP) at high latitudes, which would be offset by a decrease in NPP at temperate and tropical latitudes. The report further suggests that the hypoxic and anoxic regions will expand, particularly if combined with eutrophication, and will favour anaerobic microbes at the expense of oxygen dependent organisms. Local adaptation or reduction in human activities may not be enough to compensate for global-scale effects on marine ecosystems.

18. The fourth edition of the Global Biodiversity Outlook will provide a mid-term review of progress towards the Aichi Biodiversity Targets. It will consider the findings of the IPCC AR5 Working Groups, in particular for assessing progress towards the achievement of Aichi Biodiversity Target 10 to minimize, by 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification, so as to maintain their integrity and functioning.

B. Activities of the Executive Secretary in supporting Parties to implement decisions of the Conference of the Parties related to biodiversity and climate change and to achieve related Aichi Biodiversity Targets

19. In response to paragraph 9 of decision X/33, the Secretariat has engaged with relevant international organizations and processes to contribute to a better understanding of the role and contribution of biodiversity and ecosystem services in adapting to and mitigating climate change, and the importance of reducing the impacts of climate change and climate change mitigation and adaptation activities on biodiversity and biodiversity based livelihoods.

20. In line with paragraph 9 (e) of decision X/33, the Secretariat collaborated with relevant international organizations and processes, in particular with the United Nations Framework Convention on Climate Change (UNFCCC), to strengthen the capacity of Parties to implement decisions IX/16, X/33, and XI/21 and to contribute to achieving the Aichi Biodiversity Targets. The activities undertaken by the Secretariat contributed to strengthening the capacity of Parties in integrating the conservation and sustainable use of biodiversity into climate change activities, as well as the integration of climate change into NBSAPs and other biodiversity policies and programmes, thereby enhancing synergies at the national level. Activities undertaken include the following:

(a) Support of national focal points to the Convention on Biological Diversity to attend the UNFCCC Least Developed Countries Expert Group (LEG) training workshops on national adaptation planning³ for Anglophone and Francophone Africa, and for Asia;

(b) Support of the participation of national focal points to the Convention on Biological Diversity in a technical workshop organized by the Secretariat of the UNFCCC on ecosystem-based approaches to adaptation under the Nairobi Work Programme, from 21 to 23 March 2013, in Dar es Salaam, United Republic of Tanzania;

(c) Organization of a workshop for Anglophone Africa on the “Integration of Climate Change and Ecosystem-based Adaptation in National Biodiversity Planning Processes” from 24 to 27 March 2013, in Dar es Salaam, United Republic of Tanzania. The workshop focused on identifying climate change impacts and vulnerability and addressed ecosystem-based approaches to climate change adaptation under the Convention and related issues;

(d) Organization of a capacity-building workshop for countries in the pilot partnership on the implementation of synergies at the national level. The workshop was held in Hanoi, Viet Nam from 29 October to 2 November 2012.

21. In addition, the Secretariat has been in discussions with United Nations Environment Programme (UNEP) Ecosystem Based Adaptation (EBA) Flagship Programme within the Climate Change Adaptation Unit on ways and means to support Parties to implement actions to achieve Aichi Biodiversity Targets 10 and 15, and decisions IX/16, X/33 and XI/21. The Secretariat, in line with paragraph 9 (e) of decision X/33, will also collaborate with other partners with relevant capacity and experience on vulnerability assessments, climate change monitoring, and ecosystem-based approaches to climate change mitigation and adaptation.

C. Progress made by Parties

22. This subsection provides an overview of the progress made by Parties in identifying, monitoring and assessing, as requested by decisions IX/16, X/33 and XI/21, the threats and impacts of climate change on biodiversity and biodiversity-based livelihoods. It highlights the experiences of Parties as presented in their fifth national reports. This section will also discuss the progress made by Parties in the integration of climate change concerns into NBSAPs. The section ends with a brief discussion of actions taken by countries to address the impacts of climate change.

1. Identification, monitoring and assessment of threats and impacts of climate change on biodiversity and biodiversity-based livelihoods

23. A number of Parties have, in their fifth national reports, identified climate change as a major or key threat to biodiversity and ecosystem services. They have identified, in varying degrees of detail, vulnerable regions, ecosystems and components of biodiversity, the risks and consequences for ecosystem services and human well-being, threats and likely impacts of climate change and the contribution of biodiversity to climate change mitigation and adaptation.

³ The workshop for Francophone Africa was held 18 to 22 March 2013 in Lome, Togo; the workshop for Anglophone Africa was held 26 July to 2 August 2013 in Kigali, Rwanda; and the workshop for Asia was held 17 to 25 August 2013 in Siem Reap, Cambodia.

24. There has been some progress, according to Parties' fifth national reports, on the identification of vulnerable components of biodiversity, and risks and consequences for ecosystem services and human well-being. For example, Japan has described climate change as one of four crises impacting on biodiversity and has identified some ecosystems that are vulnerable to climate change including forest, mountain, marine, coastal and island ecosystems. South Africa has undertaken vulnerability assessments for all biomes in the country and has identified terrestrial, river, coastal, inshore and offshore ecosystems as vulnerable to climate change. Uganda has also identified components of biodiversity that are vulnerable to climate change such as mountain ecosystems.

25. Identification of threats and impacts of climate change has been reported by some Parties. For example, Japan's fifth national report has identified several threats and impacts of climate change, including increases in coral bleaching and the possibility of the disappearance of coral reefs from areas surrounding Japan. Rwanda reports that wetlands and water bodies (small lakes) at the summit of volcanic mountains are drying up due to climate change and that some species have migrated to higher altitudes in search of suitable habitats as a result of climate change. Niger's fifth national report highlights forest degradation, reduction in the area covered by forests, decreases in fish production, the extinction of some species and degradation of wildlife habitats as a result of climate change and other pressures on biodiversity, including poor management of natural resources.

26. Some Parties have reported on the monitoring of threats and impacts of climate change in their fifth national reports. For example Japan, Somalia, South Africa and Uganda report on results of climate change monitoring activities.

27. The assessment of the fifth national reports by the Secretariat shows that only a third of countries have clearly identified vulnerable components of biodiversity and the risks and consequences of climate change for ecosystem services. Most Parties have only identified that climate change is a threat that is expected to, or is already impacting on biodiversity. In order to identify priority actions for addressing climate change and to use limited resources effectively, there is a need to understand which components of biodiversity and ecosystem services are most at risk from climate change, and what the threats and impacts of climate change on biodiversity are.

2. *Integration of climate change concerns into revised and updated NBSAPs: national targets, objectives, priority actions and similar elements*

28. In preparation for the production of the fourth edition of the Global Biodiversity Outlook, the Secretariat carried out an assessment of national targets and actions towards achieving those targets based on an examination of the NBSAPs from the following countries: Australia, Belarus, Belgium, Colombia, Democratic People's Republic of Korea, Dominican Republic, El Salvador, England, European Union, Finland, France, Ireland, Japan, Malta, Myanmar, Serbia, Spain, Suriname, Switzerland, Timor-Leste, Tuvalu and Venezuela. In addition, the assessment considered the set of national targets developed by Brazil. This assessment will be further updated and refined to account for additional NBSAPs and, as such, these initial findings should be considered as preliminary. This assessment focuses on the national targets, objectives, priority actions and similar elements included in the NBSAPs in relation to the international commitments made through the Aichi Biodiversity Targets. This subsection discusses Aichi Biodiversity Target 10 and the aspects of Aichi Biodiversity Target 15 related to carbon stocks and climate change mitigation and adaptation. The aspects of Aichi Biodiversity Target 15 related to ecosystem restoration and combating desertification are discussed in the document on ecosystem conservation restoration (UNEP/SBSTTA/18/14).

29. At the time of writing, out of the NBSAPs received since the tenth meeting of the Conference of the Parties, almost all have either directly or indirectly referred to Aichi Biodiversity Target 5 in their national targets. For example, from the nine Parties⁴ that have targets on reducing habitat loss,

⁴ Democratic People's Republic of Korea, Dominican Republic, Finland, France, Japan, Malta, Switzerland, Timor-Leste and United Kingdom of Great Britain and Northern Ireland.

Timor-Leste's NBSAP recognizes that "human activities and the unsustainable use of natural resources are the main causes of biodiversity loss in Timor-Leste" and has pledged "to identify strategies and incentives to more sustainably use these resources" as well as to "mainstreaming biodiversity into sectoral plans and programmes to address the underlying causes of biodiversity loss."⁵ Further, the Dominican Republic recognizes that the main loss of biodiversity and habitats comes from the exploitation of natural resources and pledged that by 2016, the rate of loss of natural habitats is reduced by 25% and degradation and fragmentation is also slowed.⁶

30. Relatively few Parties have established national targets, or similar elements, related to Aichi Biodiversity Target 10 (note, however that a number of NBSAPs examined are from countries which do not have coral reefs). Many Parties note in their NBSAP the growing role of climate change as a main driver of biodiversity loss. Those national targets that have been established are generally in line with the Aichi Biodiversity Target. However, there tends to be a general emphasis on building resilience (adapting) to climate change. Few national targets explicitly refer to reducing anthropogenic pressures on coral reefs. Similarly, few national targets explicitly refer to reducing anthropogenic pressures on ecosystems that are vulnerable to climate change. Some examples that are counter to this trend are Finland and Brazil, which have both established national targets that refer to reducing anthropogenic pressures on vulnerable ecosystems. Niger's national strategic goal 5 provides an example of a national target relevant to Aichi Biodiversity Targets 10 and 15. It seeks to strengthen adaptive capacity and mitigation of the effects climate change and aims to reduce air pollution, emissions of greenhouse gases, waste, and pollution from industrial processes and agricultural activities.

31. Most of the NBSAPs examined contain national targets or similar commitments that are relevant to Aichi Biodiversity Target 15. The majority of national targets refer to undertaking restoration activities, while only a few of the national targets related to this goal explicitly refer to carbon stocks or climate change mitigation or adaptation.

3. *Activities to address the impacts of climate change*

32. Parties, through their fifth national reports, point to a variety of actions to address the impacts of climate change ranging from the creation of policies to address the impacts of climate change on biodiversity and ecosystem services, creation or adjustment of institutional arrangements for climate change mitigation and adaptation, and the introduction of ecosystem-based approaches to climate change mitigation and adaptation.

33. The development of a policy or strategy is usually an important starting point in a country's efforts to address the impacts of climate change. Many Parties have reported on the adoption of policies for addressing climate change mitigation and adaptation, and the inclusion of climate change related aspects in biodiversity-related policies and NBSAPs. For example, Niger has adopted, for its NBSAP, a mission to "undertake effective and concrete actions to increase ecosystem resilience to the adverse effects of climate change and improve the management of biodiversity to ensure that by 2020, its loss has been reduced." Beyond the mission, climate change is strongly represented in Niger's NBSAP in recognition of the negative impacts that climate change is expected to have on the country's biodiversity and human well-being.

34. Uganda reports that ecosystem resilience and the importance of biodiversity and ecosystem services have been integrated into the country's climate change policy. South Africa's fifth national report highlights the integration of ecosystem-based approaches to adaptation in the country's National Strategy for Sustainable Development and Action Plan (NSSDAP) of 2011. Furthermore, the country's National Climate Change Response White Paper of 2011 recognizes the role of healthy ecosystems in responding

⁵ Timor-Leste's national biodiversity strategy and action plan (2011-2020); available at <http://www.cbd.int/doc/world/tl/tl-nbsap-01-en.pdf>.

⁶ Dominican Republic's "Estrategia Nacional de Conservación y uso Sostenible de la Biodiversidad: Plan de Acción 2011-2020": available at <http://www.cbd.int/doc/world/do/do-nbsap-01-es.pdf>.

to climate change risks, and the role of ecosystem conservation, rehabilitation and restoration in improving resilience to, and reducing the impacts of, climate change.

35. Saint Lucia has also included a focus on climate change and climate variability in its revised NBSAP.

36. A few countries are planning and implementing programmes and projects for ecosystem-based approaches to climate change mitigation, with the most common being the reduction of emissions from deforestation and forest degradation, the conservation and sustainable management of forests and the enhancement of forest carbon stocks (REDD+). Benin's fifth national report discusses the country's plans regarding the implementation of REDD+ projects.

37. Niger's fifth national report makes mention of a project titled "Biocarbon" which resulted in planting 8,000 hectares with *Acacia seyal* and *Acacia senegal*. The country has worked to enhance carbon sinks and improve ecosystem resilience through reforestation and natural regeneration. Japan reports that initiatives for nature restoration, appropriate forest operations, and the establishment of green corridors are being advanced nationwide and that forest restoration has been carried out in 24 locations over 480,000 ha thus contributing to ecosystem resilience and climate mitigation.

38. The Solomon Islands has planned to restore 1,050 ha of logged areas and has seen an increase in mangrove restoration. The country hopes that REDD+ projects will provide incentives for villagers to conserve forests instead of resorting to logging.

39. In addition to REDD+ projects, some countries are planning and implementing programmes and projects using ecosystem-based approaches to climate change adaptation. In Uganda, ecosystem-based adaptation projects are currently being implemented in the Mt. Elgon and Mt. Rwenzori regions focusing on biodiversity and ecosystem services through management, conservation and restoration. South Africa is in the process of developing response strategies and adaptation plans for all biomes in the country and has implemented a few adaptation projects that are funded by the Adaptation Fund of the UNFCCC. Rwanda is implementing a project titled "Landscape Approach to Forest Restoration and Conservation (LAFREC)" that promotes a landscape approach to biodiversity conservation and sustainable use, climate change adaptation, and combating land degradation.

40. The assessment by the Secretariat of the fifth national reports received thus far suggests that in many countries, biodiversity and ecosystem services are not significantly integrated into climate change mitigation and adaptation policies and strategies. However, because most these reports do not explicitly discuss the integration of biodiversity and ecosystem services into climate change policies and strategies, it is difficult to say this with any certainty.

41. The fifth national reports show that many Parties are developing and implementing ecosystem-based approaches to mitigation, with a current focus on forests and REDD+. To what extent mitigation approaches address the magnitude and processes related to degradation is however still unclear. The reports suggest that Parties have not considered the opportunities for mitigation presented by other biome types, particularly peatlands and grasslands, and in soils.

III. APPLICATION OF RELEVANT SAFEGUARDS FOR BIODIVERSITY WITH REGARD TO POLICY APPROACHES AND POSITIVE INCENTIVES ON ISSUES RELATING TO REDUCING EMISSIONS FROM DEFORESTATION AND FOREST DEGRADATION AND THE ROLE OF CONSERVATION, SUSTAINABLE MANAGEMENT OF FORESTS AND ENHANCEMENT OF FOREST CARBON STOCKS IN DEVELOPING COUNTRIES (ITEM 9.2)

42. This section contains a summary of information relevant to the application of safeguards for biodiversity (subsection A), as well as information on benefits for biodiversity and for indigenous and local communities achieved through implementing REDD+ activities and on initiatives and experiences regarding non-market-based approaches as referred to in paragraph 67 of UNFCCC decision 2/CP.17

(subsection B below). A concluding section on further developments, research and capacity building needs is contained in subsection C.

43. Further advice on issues included in paragraph 9 (h) of decision X/33, as requested in paragraph 18 of decision XI/19, will be addressed at a meeting of the Subsidiary Body prior to the thirteenth meeting of the Conference of the Parties.

44. The findings presented in this section are mainly based on views submitted by Governments and organizations in response to notification 2013-113 (ref. no. SCBD/SAM/DC/CS/ac/82980) of 11 December 2013 and available peer-reviewed literature. However, some relevant input from capacity-building workshops on ecosystem conservation and restoration, focusing on practical experiences to achieve Aichi Biodiversity Targets 5, 11, and 15,⁷ has been considered. Further information on the outcomes of these workshops, which, among others, addressed different spatial planning and policy tools as well as economic instruments to halt deforestation and forest degradation, is contained in document UNEP/CBD/SBSTTA/18/14.

A. *Background*

45. The Conference of the Parties to the UNFCCC established, in decision 1/CP.16, a mechanism to promote reducing emissions from deforestation and forest degradation, conservation of forest carbon stocks, sustainable management of forests and enhancement of forest carbon stocks in developing countries (REDD+). The REDD+ mechanism focuses, above all, on mitigating climate change by reducing greenhouse gas emissions and increasing forest carbon sequestration. However, according to paragraph 69 of decision 1/CP.16, in conjunction with its appendix I, REDD+ actions should, *inter alia*, also be consistent with the objective of environmental integrity and take into account the multiple functions of forests and other ecosystems. Hence, appendix I of decision 1/CP.16 contains a list of safeguards (hereinafter referred to as the “Cancun safeguards”) that should be supported and promoted (paragraph 69), considered by developing countries when developing their national strategies (paragraph 72) and reported on through a Safeguard Information System, by all countries aiming to participate in REDD+ activities (paragraph 71 (d)).

46. A number of these safeguards are directly relevant to the Convention on Biological Diversity:

- Safeguard (a): actions complement or are consistent with the objectives of national forest programmes and relevant international conventions and agreements;
- Safeguard (c): respect for the knowledge and rights of indigenous peoples and members of local communities, by taking into account relevant international obligations, national circumstances and laws, and noting that the United Nations General Assembly has adopted the United Nations Declaration on the Rights of Indigenous Peoples;
- Safeguard (d): the full and effective participation of relevant stakeholders, in particular indigenous and local communities; and
- Safeguard (e): actions are consistent with the conservation of natural forests and biological diversity, ensuring that REDD+ activities are not used for the conversion of natural forests but are instead used to incentivize the protection and conservation of natural forests and their ecosystem services, and to enhance other social and environmental benefits.

47. Decision 12/CP.17 of the Conference of the Parties to the UNFCCC provides guidance on systems for providing information on how all the safeguards referred to in decision 1/CP.16, appendix I are being addressed and respected. At its nineteenth session, the Conference of the Parties to the UNFCCC completed its guidance necessary to operationalize the REDD+ mechanism with a set of decisions, including decision 12/CP.19 on the timing and the frequency of presentations of the summary of information on how all the safeguards referred to in decision 1/CP.16, appendix I, are being addressed

⁷ Thus far three workshops have been held: Fiji (November 2013); Jordan (January 2014) and Brazil (March 2014).

and respected. The development of systems for providing information on safeguards will be further considered at the forty-first meeting of the Subsidiary Body on Scientific and Technical Advice of the UNFCCC in December 2014.⁸

48. The Conference of the Parties to the Convention on Biological Diversity has acknowledged the potential for synergies between REDD+ activities and the implementation of the Strategic Plan for Biodiversity 2011-2020 and its Aichi Biodiversity Targets. In decision XI/19, it urged Parties, other Governments, and relevant organizations to fully implement the relevant provisions and decisions of the Convention and the UNFCCC in a coherent and mutually supportive way. The Conference of the Parties in decision XI/19 also invited Parties to strengthen their efforts to provide benefits for biodiversity and for indigenous and local communities and achieve the objectives of the Convention through REDD+ activities by building synergies between national biodiversity strategies and action plans, and national strategies or action plans as referred to in paragraphs 71 (a) and 72 of the UNFCCC decision 1/CP.16.

49. At its eleventh meeting, the Conference of the Parties took note of the annex to decision XI/19, which contains further guidance in applying the safeguards contained in appendix I to UNFCCC decision 1/CP.16. Developing country Parties were invited to consider the information in the annex when planning and implementing REDD+ activities. Parties, other Governments, and organizations were also invited to consider the information in the annex when preparing national reports and other submissions on progress towards achieving the Aichi Biodiversity Targets, and, where applicable, for other relevant submissions under other processes.

50. Regarding non-market-based approaches, the Conference of the Parties to the UNFCCC, in paragraph 67 of decision 2/CP.17, noted that these approaches, such as joint mitigation and adaptation approaches for the integral and sustainable management of forests, could be developed, as a non-market alternative, that supports and strengthens governance, the application of safeguards as referred to in decision 1/CP.16, and the multiple functions of forests. Further to this, the Subsidiary Body on Scientific and Technical Advice of the UNFCCC, at its thirty-eighth session, requested inputs on methodological guidance from UNFCCC Parties and admitted observer organizations.⁹ An expert in-session meeting on the issue will be organized in June 2014, during the fortieth meeting of the Subsidiary Body on Scientific and Technical Advice of the UNFCCC.

B. Experiences and lessons learned with regard to the application of safeguards

51. The Executive Secretary issued notification 2013-113 (Ref. no. SCBD/SAM/DC/CS/ac/82980; 11 December 2013), inviting Governments and relevant organizations to submit information related to the requests contained in paragraphs 8, 16 (b) and 17 of decision XI/19. Eleven submissions have been received in response to this notification: six from Governments (Armenia, Ecuador, Germany, Namibia, Norway, and the United Kingdom of Great Britain and Northern Ireland) and five from organizations (Organisation for Economic Co-operation and Development (OECD), UNFCCC Secretariat, UNEP World Conservation Monitoring Centre (UNEP-WCMC), WWF, and International Union for Conservation of Nature (IUCN)). Submissions from these organizations highlight relevant actions taken by several developing countries.

1. Experiences and lessons learned with regard to the application of safeguards for biodiversity when planning and implementing REDD+ activities

52. The submissions show that most countries are still only at the beginning stages in the design of safeguards systems for REDD+ activities. The design of safeguards systems is frequently built on existing frameworks and initiatives and aligned with existing requirements in national laws and policies. As for the countries that have moved beyond the readiness phase, many focus on identifying and developing principles and criteria that help to align their activities with the Cancun safeguards framework.

⁸ FCCC/SBSTA/2013/3, paragraphs 28-33.

⁹ http://unfccc.int/cooperation_support/market_and_non-market_mechanisms/items/7712.php

53. While the submissions received did not specifically refer to the annex to decision XI/19, which contains specific guidance for applying the safeguards contained in appendix I to UNFCCC decision 1/CP.16, they provided a range of examples for approaches, tools and measures to address potential risks for biodiversity which the implementation of REDD+ activities may entail. Risks for biodiversity mentioned in the submissions include the conversion of natural forests to plantations or other uses with lower biodiversity value; the displacement of deforestation and forest degradation to areas of lower carbon value and high biodiversity value, including inter-ecosystem leakage; increased pressure on non-forest ecosystems with high biodiversity value; and afforestation of non-forested areas of high biodiversity value. The submissions also referred to potential social, economic and cultural impacts, such as the loss of traditional territories and restriction of land and resource rights resulting from displacement and relocation of indigenous peoples and forest dependent communities; or the loss of ecological knowledge and rural livelihoods.

54. The submissions illustrate that national circumstances and conditions require specific approaches. However, most frameworks for the implementation of safeguards for REDD+ are found to include at least some common procedural elements including:

- (a) Setting overarching policies, standards, principles or criteria to define and meet social and environmental objectives, including the development and validation of safeguards with indigenous and local communities, based on their traditional value and governance systems;
- (b) Undertaking preliminary studies and assessments of the potential societal and environmental risks and benefits of REDD+;
- (c) Analysing existing safeguards, including those contained in the relevant legal framework, and identifying gaps;
- (d) Convening multi-stakeholder consultations at the national or subnational level;
- (e) Ensuring a transparent, participatory, and socially-inclusive approach with respect for gender considerations;
- (f) Institutionalizing a process to monitor the application of safeguards, including risks, impacts and co-benefits of REDD+ activities for biodiversity;
- (g) Establishing appropriate elements for reporting on the application of safeguards through a Safeguard Information System.

55. In addition, submissions highlighted a number of tools and measures that have been found useful for the application of safeguards for biodiversity when planning and implementing REDD+ activities:

- (a) Use of participatory forest monitoring or satellite monitoring systems;
- (b) Use of interim indicators;
- (c) Calculation of goals for a reduction in deforestation in gross rather than net deforestation, as the latter could allow deforestation of high-biodiversity natural forests through increased regrowth and single-species plantations;
- (d) Identification and prioritization of sites with high biodiversity value;
- (e) Participatory land-use planning that addresses agricultural impacts, extractive industries, forest management and other activities that can foster forest protection and limit forest loss;
- (f) Awareness-raising on the potential for REDD+ to deliver multiple benefits, including the use of appropriate communication methods to broaden acceptance for REDD+ actions and conservation objectives;
- (g) Capacity-building measures, including on field based training in carbon accounting, participatory mapping techniques and free, prior and informed consent (FPIC) procedures;

(h) Promotion of the use of native species for forest enrichment and restoration in the framework of REDD+;

(i) Ensuring no direct or indirect incentives for the conversion of low carbon natural forests into forest plantations, including the exclusion of the conversion of natural forests into plantations from compensation; and

(j) Integration of national targets under the national biodiversity strategy and action plan (NBSAP) into the implementation of REDD+ plans.

56. Parties and organizations also highlighted a number of specific tools, such as the Guidelines for Free, Prior and Informed Consent developed by the World Wildlife Fund,¹⁰ the Sourcebook for Biodiversity Monitoring for REDD+ which is being developed by Germany and the Zoological Society of London, the Carbon and Biodiversity Demonstration Atlas, interactive maps,¹¹ the Interactive Carbon Calculator,¹² and the Multiple Benefits Toolbox¹³ developed by the UNEP World Conservation Monitoring Centre (UNEP-WCMC), and the Integrated Biodiversity Assessment Tool (IBAT) which provides information on globally recognized biodiversity rich areas and legally protected areas through interactive mapping tools.¹⁴

57. By identifying the location of ecologically representative networks of protected areas, the protected areas gap analyses under the Convention completed by over 20 developing countries can also provide useful underlying spatial data. Most of the countries that have completed the gap analyses are also pilot countries within the Forest Carbon Partnership Facility and United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (UN-REDD Programme).

2. Benefits for biodiversity and for indigenous and local communities achieved through implementing REDD+ activities

58. As the implementation of REDD+ activities is still at an early stage, no comprehensive information is available on benefits for biodiversity and for indigenous and local communities achieved through the implementation of REDD+ activities. The submissions by Parties and observer organizations as well as available peer-reviewed literature focused on tools and mechanisms to implement REDD+ safeguards in a way that will lead to multiple co-benefits of REDD+ activities.

59. While the previous section summarized tools and mechanisms which have been suggested as helpful in the implementation of safeguards for biodiversity, Parties and organizations provided the following examples for elements which could support the implementation of social safeguards for indigenous and local communities:

(a) Engagement of the local population in the development of national and international guidelines for the integration of biodiversity protection and poverty reduction in REDD+ mechanisms;

(b) Development of subnational REDD+ implementation plans with social and environmental criteria, ensuring the protection of biodiversity and the livelihood of local communities;

¹⁰ http://awsassets.panda.org/downloads/fpic_working_paper_01_10_14_small.pdf.

¹¹ Interactive Maps show the distribution of carbon density in relation to areas of high biodiversity and protected areas at country and global scale.

¹² The Interactive Carbon Calculator provides users with initial estimates of carbon values for existing protected areas or any polygon drawn on a global map.

¹³ The Multiple Benefits Toolbox has been developed for REDD+ multiple benefits analyses and provides information on the spatial relationship between carbon and other ecosystem services.

¹⁴ www.ibatforbusiness.org.

(c) Participatory forest mapping, micro-zoning, and monitoring processes to analyse and address potential conflicts between communities, strengthen land tenure arrangements and livelihoods and form the basis for future local profit and benefit sharing mechanisms;

(d) Capacity-building for indigenous and local communities to engage with Governments and the private sector, for example, to designate areas for traditional uses, sustainable development or conservation;

(e) Fostering free, prior and informed consent; and

(f) National and regional REDD+ roundtables which bring together all relevant stakeholders to inform regional and national policies.

60. Several submissions noted that existing knowledge and experience from access and benefit-sharing schemes, payments for ecosystem services, community-based natural resource management, and other relevant discussions under the Convention and other processes could prove useful.

3. *Initiatives and experiences regarding non-market-based approaches such as joint mitigation and adaptation approaches for the integral and sustainable management of forests as a non-market alternative*

61. No information on non-market-based approaches was submitted by Parties or organizations in response to notification 2013-113. However, the Secretariat of the United Nations Framework Convention on Climate Change held joint workshops on a framework for various approaches, non-market-based approaches and the new market-based mechanism, in October 2013 in Bonn, Germany.¹⁵

62. The review of the workshop reports reveals that several Parties to the United Nations Framework Convention on Climate Change that took part in the workshops understood non-market-based approaches to be approaches to reduce emissions to achieve the stabilization of greenhouse gas concentrations in the atmosphere without the transfer, trade or offsets of units of CO₂ among Parties. The Plurinational State of Bolivia referred to a non-market-based alternative to achieve joint forest mitigation and adaptation co-benefits. Several Parties, including least developed countries, are of the view that non-market-based approaches should play a significant role in the mitigation effort of all countries. Members from the Environmental Integrity Group, consisting of Liechtenstein, Mexico, Monaco, Republic of Korea and Switzerland, noted that both market and non-market instruments are complementary tools on the national and international levels for promoting cost-effective mitigation actions. The latter group also noted that non-market-based approaches have the objective of enhancing the cost-effectiveness of mitigation actions and promoting actions, while contributing to sustainable development of the implementing countries.

C. Further actions and capacity-building needs

63. In response to paragraph 16 (a) of decision XI/19, the Executive Secretary will undertake further activities to support Parties in promoting REDD+ activities to achieve the objectives of the Convention.

64. Implementing the Cancun safeguards can increase the ability of REDD+ activities to contribute to the achievement of the Aichi Biodiversity Targets and the objectives of the Convention. Further work will focus on supporting Parties in planning for and prioritizing REDD+ activities that also support the achievement of the Aichi Biodiversity Targets.

65. Complementarity of efforts on the collection, management and sharing of information, for example, could improve data sets on biodiversity and on other national priorities to inform land-use decisions. As many developing countries are in the process of developing their national forest monitoring systems, there is an opportunity to explore synergies between these systems and the development and implementation of national biodiversity strategies and action plans, in accordance with paragraph 7 (a) of decision XI/19. These synergies could aid biodiversity monitoring and reporting at the national level and

¹⁵ http://unfccc.int/cooperation_support/market_and_non-market_mechanisms/items/7712.php.

identifying the direct and underlying drivers of forest loss and degradation. Further, these systems could form the basis for monitoring of some REDD+ safeguards.

66. The Executive Secretary and the United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC) are planning to hold an interregional workshop in August 2014, in consultation with the Secretariat of the United Nations Framework Convention on Climate Change and other relevant organizations. The workshop is intended to further build a knowledge base of experiences, in particular at the national level, among focal points to the Convention on Biological Diversity and the United Nations Framework Convention on Climate Change on potential complementarities in the implementation of REDD+ safeguards and relevant Aichi Biodiversity Targets. Practical experiences and good practices will help showcase efforts that contribute to both the objectives of REDD+ and the Convention on Biological Diversity. The workshop will provide an opportunity to discuss potential synergies and explore their relevance to individual national contexts ahead of the twelfth meeting of the Conference of the Parties to the Convention on Biological Diversity and the twentieth session of the Conference of the Parties to the United Nations Framework Convention on Climate Change.

67. In addition, the Executive Secretary will continue to collaborate with the secretariats of the other Rio conventions and the members of the Collaborative Partnership on Forests to foster opportunities for synergies in reporting frameworks, especially when collecting information from Parties on Aichi Biodiversity Targets 5, 7 11, 14 and 15, and collecting socioeconomic information to track progress on Aichi Biodiversity Targets 2 and 4.

IV. CLIMATE-RELATED GEOENGINEERING (ITEM 9.3)

68. This section was prepared in response to the requests in decision XI/20 on climate-related geoengineering. Subsection A below contains information received from Parties with regard to measures undertaken in accordance with subparagraph 8 (w) of decision X/33. Section B provides an update on recent developments with regard to the potential impacts of geoengineering techniques on biodiversity, and on the regulatory framework for climate-related geoengineering relevant to the Convention.

A. Submissions on measures undertaken in accordance with subparagraph 8 (w) of decision X/33

69. The Executive Secretary, on 12 November 2013, sent notification 2013-102 (Ref. no. SCBD/SAM/SS/ac/82893) inviting Parties to submit information on measures undertaken in accordance with the guidance on climate-related geoengineering contained in subparagraph 8 (w) of decision X/33. Parties were invited to provide information, for example, on:

- (i) General measures they have undertaken to implement subparagraph 8 (w), in particular “to ensure [...] that no climate-related geo-engineering activities that may affect biodiversity take place, until there is an adequate scientific basis on which to justify such activities and appropriate consideration of the associated risks for the environment and biodiversity and associated social, economic and cultural impacts”; and/or
- (ii) General measures that address the exception for small-scale scientific research studies contained in paragraph 8 (w) and any information on their application to specific cases.

70. Two Parties submitted information in response to this notification: Estonia and the United Kingdom of Great Britain and Northern Ireland. In addition, a submission from the French “Fondation pour la Recherche sur la Biodiversité (FRB)” was received. The compilation of submissions is available in an information note and on the CBD website at <http://www.cbd.int/climate/geoengineering/>.

71. Estonia informed the Secretariat, in its submission, that there currently are no large-scale scientific studies undertaken in Estonia in accordance with subparagraph 8 (w) of decision X/33. Any geoengineering project which could potentially have significant environmental impacts would need to follow the rules set out in Estonia’s National Environmental Impact Assessment Act.

72. In its submission, the United Kingdom of Great Britain and Northern Ireland (UK) provided information on (a) the regulatory framework for geoengineering proposals in the UK; (b) actions taken by the UK Government relevant to geoengineering; and (c) supplementary information provided by Research Councils UK, including a list of recent and current UK research projects that are contributing to the understanding of climate related geoengineering.

73. According to the submission, there are several regimes within the UK regulating activities which may have potential effects on the environment. Those regimes may require, for example, planning or marine licences, depending on the type of project. Projects likely to have a significant effect on the environment may require assessment pursuant to European Council Directive 2011/92/EU, known as the Environmental Impact Assessment Directive, for individual projects; or pursuant to European Council Directive 2001/42/EC, known as the Strategic Environmental Assessment Directive, for public plans or programmes. The UK also follows international instruments to which it is a Contracting Party and their recommendations and/or guidance as regards climate related geoengineering.

74. Regarding actions taken by the UK Government relevant to geoengineering, the UK House of Commons Science and Technology Select Committee published a report on the national and international regulation of geoengineering in coordination with a parallel inquiry by the US House of Representatives Science and Technology Committee. Further, a UK cross-government meeting with national experts, jointly organized by the UK Department for Energy and Climate Change and Oxford University, was held in March 2011 to discuss the science, governance and technology issues relating to geoengineering research and deployment. In September 2012, the UK Government published a statement of its view on geoengineering research.

75. In addition, a number of UK research projects that are intended to contribute to the understanding of climate geoengineering and its environmental impacts are underway. They include the development of the “Oxford Principles”¹⁶ on the conduct of geoengineering research, the conduct of a public dialogue¹⁷ about geoengineering to assess public opinion on how future research relating to the subject should be directed, conducted and communicated, and the development of a strategic framework for geoengineering research.¹⁸

76. According to the scientific expert group convened by the Fondation pour la Recherche sur la Biodiversité, as of January 2014 no small-scale scientific research studies had taken place in France. With regard to ocean fertilization (mainly by iron), currently no projects with the objective of geoengineering are underway in France. However, for about ten years, research has been conducted in France to understand the mechanisms linking iron fertilization and the CO₂ biological pump in the ocean. These research studies use natural analogs of fertilization, i.e. areas that are naturally fertilized by iron (e.g. the KEOPs project). Other research includes a report on the issues and methods for environmental engineering, and modelling studies.

B. Update on the potential impacts of geoengineering techniques on biodiversity, and on the regulatory framework for climate-related geoengineering relevant to the Convention on Biological Diversity

77. As the Synthesis Report of the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) will only be adopted during the week of 27-31 October 2014, in Copenhagen, Denmark, the timing of the eighteenth meeting of the Subsidiary Body on Scientific, Technical and Technological Advice does not allow the Executive Secretary to present a complete review of the IPCC report to the Subsidiary Body. The present note provides a preliminary update on recent findings based on the reports of Working Groups I, II and III of the IPCC, and recent scientific literature. A full review of the Fifth Assessment Report of the IPCC and other relevant scientific reports will be made available to

¹⁶ <http://www.geoengineering.ox.ac.uk/oxford-principles/principles/>.

¹⁷ <http://www.nerc.ac.uk/about/consult/geoengineering-dialogue-final-report.pdf>.

¹⁸ <http://www.lwec.org.uk/publications/lwec-geoengineering-report-forward-look-uk-research-climate-impacts-geoengineering>.

the next meeting of the Subsidiary Body. The Executive Secretary will seek further views of Parties, other Governments, indigenous and local communities and other stakeholders on the potential impacts of geoengineering on biodiversity, and associated social, economic and cultural impacts, in the context of this full review.

78. The information available in the reports of Working Groups I, II and III, and recent scientific literature was reviewed and evaluated against the information provided in the report on the impacts of climate-related geoengineering on biodiversity, published as CBD Technical Series No. 66: *Geoengineering in Relation to the Convention on Biological Diversity: Technical and Regulatory Matters*.¹⁹ A summary of the new available information, including a list of references, is available in information note UNEP/CBD/SBSTTA/18/INF/5. The information note contains a bibliography of more than 300 publications from 2012 to early 2014 and covers both the impacts of climate geoengineering on biodiversity and the regulatory framework for climate geoengineering relevant to the Convention.

1. Information on the possible impacts of geoengineering techniques on biodiversity and associated social, economic and cultural considerations

79. Since 2012, the reports of Working Groups of the IPCC Fifth Assessment Report and a number of additional analyses have delivered greater knowledge of the scale and risks associated with future climate change that may become unavoidable, with reduced abilities for emission reductions to diminish its potentially catastrophic consequences for biodiversity and humanity.

80. The Summary for Policymakers of the contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change contains the following statement: “Methods that aim to deliberately alter the climate system to counter climate change, termed geoengineering, have been proposed. Limited evidence precludes a comprehensive quantitative assessment of both Solar Radiation Management (SRM) and Carbon Dioxide Removal (CDR) and their impact on the climate system. CDR methods have biogeochemical and technological limitations to their potential on a global scale. There is insufficient knowledge to quantify how much CO₂ emissions could be partially offset by CDR on a century timescale. Modelling indicates that SRM methods, if realizable, have the potential to substantially offset a global temperature rise, but they would also modify the global water cycle, and would not reduce ocean acidification. If SRM were terminated for any reason, there is high confidence that global surface temperatures would rise very rapidly to values consistent with the greenhouse gas forcing. CDR and SRM methods carry side effects and long-term consequences on a global scale.”

81. The reports and publications reviewed in the information note UNEP/CBD/SBSTTA/18/INF/5, taken together, indicate that there is now greater knowledge of the limitations of a range of geoengineering approaches, both in terms of their acceptability, governance and risks (for sunlight reflection methods, SRM), and their costs, scalability and unintended impacts (for greenhouse gas removal techniques, GGR).

82. There have been around 100 publications on sunlight reflection methods (solar radiation management) in the past two years, with nearly half of these addressing *stratospheric SRM*, based on increasing the concentration of aerosols in the upper atmosphere. This topic area is covered in chapter 7 of the IPCC Working Group I report. Recent advances in understanding, based on these sources, include:

(a) Model intercomparisons (GeoMIP) and other studies confirm that stratospheric aerosol injection (e.g. by SO₂) could offset the global temperature increases of scenario RCP 4.5,²⁰ but major hydrological effects are likely to remain. Overall consequences could, in theory, be optimized;

¹⁹ Secretariat of the Convention on Biological Diversity (2012). *Geoengineering in Relation to the Convention on Biological Diversity: Technical and Regulatory Matters*, Montreal, Technical Series No. 66, 152 pages, available at <http://www.cbd.int/doc/publications/cbd-ts-66-en.pdf>.

²⁰ The scenarios are defined in terms of Representative Concentration Pathways (RCPs), quantifying the additional radiative forcing (due to greenhouse gases) in year 2100 relative to 1750, as a global mean: 2.6 W m⁻² for RCP 2.6, 4.5 W m⁻² for RCP 4.5, 6.0 W m⁻² for RCP 6.0 and 8.5 W m⁻² for RCP 8.5.

(b) Regional climatic responses to stratospheric SRM would be affected by the latitude, altitude and season of the aerosol injection;

(c) The potential for regionally-targeted stratospheric SRM, to limit Arctic sea ice-melt, has been simulated; this requires very strong local radiation reduction, and could cause other regional climate changes;

(d) As indicated by earlier studies, the cessation of stratospheric SRM is near-certain to produce very rapid warming, with potentially severe environmental consequences.

83. The scientific literature on *tropospheric SRM* (cloud brightening) has greatly increased in the past two years. Model-based studies generally confirm the theoretical potential of the approach, although its effectiveness is likely to be a function of particle size, micro-physical processes, injection amount and diurnal timing. Proposals for field-testing have been developed; these may need to be on a relatively large-scale for satellite-based detection of albedo changes.

84. The limited numbers of additional studies on *surface albedo changes, space SRM, and cirrus cloud manipulation* do not indicate that these techniques have high potential for further development.

85. Chapter 6 of the IPCC Working Group I report gives detailed attention to carbon dioxide removal (CDR), recognising that there may also be potential for removal of other greenhouse gases (e.g. methane). Key Working Group I messages relate to the relative slowness of GGR (decadal to century) in providing climatic benefits, the scale of the effort required, and potential conflicts with food production for biologically-based, terrestrial GGR. The Working Group I report also emphasises the importance of carbon cycle dynamics when assessing GGR effectiveness.

86. There are a number of new publications on *biochar*, which cover its use as a soil improver as well as its potential for carbon sequestration. Effects of biochar on soil greenhouse gas emissions (N₂O and CH₄) are generally considered favourable although dependent on treatment conditions and with negative albedo impacts.

87. As identified in CBD Technical Series No. 66, the scope for large-scale CO₂ removal by *BECCS* (bioenergy with carbon capture and storage) and *land biomass storage* is closely linked to land availability. Cost-effective carbon capture and storage is also crucial for the former, and remains an issue for direct air capture. Recent papers cover leakage risks from both *land and ocean CO₂ storage* reservoirs.

88. The feasibility of *enhanced weathering* on land and in the ocean has been further investigated and reviewed. Unresolved issues for geoengineering application relate to the cost and energy requirements of material processing and transport, also the environmental consequences of raising silicate levels and pH in rivers and/or coastal seas.

2. *Information on the regulatory framework for geoengineering relevant to the Convention*

89. Regarding the regulatory framework for geoengineering relevant to the Convention, an important recent development relates to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 (London Convention) and its 1996 Protocol (London Protocol). The Meeting of Contracting Parties to the London Protocol adopted, on 18 October 2013, resolution LP.4(8) on the amendment to the London Protocol to regulate the placement of matter for ocean fertilization and other marine geoengineering activities. The amendment is structured to allow other marine geoengineering activities to be considered and listed in a new annex in the future if they fall within the scope of the London Protocol and have the potential to harm the marine environment. The amendment will enter into force 60 days after two thirds of the Contracting Parties to the London Protocol have deposited an instrument of acceptance of the amendment with the International Maritime Organization. As of April 2014, the amendment has not received any ratification.

90. This amendment, once entered into force, will strengthen the regulatory framework for ocean fertilization activities and provide a framework for the further regulation of other marine geoengineering

activities. However, this recent development, so far, has not changed the validity of the key messages from the earlier report (UNEP/CBD/SBSTTA/16/10), including that “the current regulatory mechanisms that could apply to climate-related geoengineering relevant to the Convention do not constitute a framework for geoengineering as a whole that meets the criteria of being science-based, global, transparent and effective” and that “with the possible exceptions of ocean fertilization experiments and CO₂ storage in geological formations, the existing legal and regulatory framework is currently not commensurate with the potential scale and scope of the climate related geoengineering, including transboundary effects.”

3. *Conclusion of the update*

91. In sum, the new available information presented in information note UNEP/CBD/SBSTTA/18/INF/5 supports the key messages identified in the report reviewed at the sixteenth meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (UNEP/CBD/SBSTTA/16/10) and published in CBD Technical Series No. 66. They remain valid and are consistent with the recent scientific literature and information contained in the Summary for Policymakers of each of the contributions of the three Working Groups to the IPCC’s Fifth Assessment Report.
