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MAINSTREAMING OF BIODIVERSITY IN THE ENERGY AND MINING, INFRASTRUCTURE, MANUFACTURING AND PROCESSING, AND HEALTH SECTORS

Note by the Executive Secretary

INTRODUCTION

1. At its thirteenth meeting, the Conference of the Parties adopted a comprehensive decision on the mainstreaming of biodiversity within and across sectors with a particular focus on the agriculture, forestry, fisheries and tourism sectors (decision XIII/3). In paragraph 109 of this decision, the Conference of the Parties decided to consider at its fourteenth meeting the mainstreaming of biodiversity into the sectors of energy and mining, infrastructure, manufacturing and processing, and health.

2. The present note identifies scientific and technical matters relevant to the sectors of energy and mining, infrastructure, and manufacturing and processing. At the second meeting of the Subsidiary Body on Implementation, issues related to the policy implications of the mainstreaming of biodiversity into these sectors will be considered, including a focus on the current policies, tools and practices of Parties, and further options with respect to the mainstreaming of biodiversity in these sectors.

3. Section I of the present note provides context and general considerations related to these sectors, the provisions of the Convention and the 2030 Agenda for Sustainable Development. In section II, relevant trends are reviewed for each of the three groups of sectors (energy and mining; infrastructure; and manufacturing and processing), as are the potential impacts on biodiversity, and a short overview of measures for avoiding or mitigating impacts. Where relevant, positive linkages between biodiversity and the sectors are also explored. In section III, policies, tools and other measures that can be used to facilitate the mainstreaming of biodiversity in these sectors are considered, taking into account relevant provisions of the Convention, its programmes of work, guidelines and initiatives. In section IV, conclusions and recommendations are provided. This document is also supported by several information documents.

4. The mainstreaming of biodiversity in the health sector was considered by the Subsidiary Body on Scientific, Technical and Technological Advice at its twentieth meeting on the basis of a comprehensive state of knowledge review,[1] and decision XIII/6 was adopted on the basis of this work, including an annex which provides technical information on biodiversity-health linkages. Further work on biodiversity and

* CBD/SBSTTA/21/1.

[1] World Health Organization and Secretariat of the Convention on Biological Diversity (2015). *Connecting Global Priorities: Biodiversity and Human Health: A State of Knowledge Review*. https://www.cbd.int/health/SOK-biodiversity-en.pdf.

health, focusing on the integration of biodiversity into "One Health" approaches is being considered by the Subsidiary Body under agenda item 5. Thus, the mainstreaming of biodiversity into the health sector is not further considered in the present note.

5. In decision XIII/3, the Conference of Parties also requested in the Executive Secretary, subject to the availability of resources, to present options to the Subsidiary Body on Scientific, Technical and Technological Advice, at a meeting prior to the fourteenth meeting of the Conference of the Parties, on how to make the best use of existing programmes of work to further enhance the implementation of the Convention in the light of mainstreaming needs and the Strategic Plan for Biodiversity 2011-2020. The contribution of existing programmes of work to the sectors of energy and mining, infrastructure, and manufacturing and processing is discussed in the relevant sections of the present note. In addition, a full analysis is provided in an information note.

I. MAINSTREAMING BIODIVERSITY IN THE ENERGY AND MINING, INFRASTRUCTURE, AND MANUFACTURING AND PROCESSING SECTORS: CONTEXT AND GENERAL CONSIDERATIONS

6. The energy and mining, infrastructure, and manufacturing and processing sectors comprise a wide variety of industries and activities. While some depend, to varying degrees, on biodiversity and the ecosystem services that biodiversity underpins, all have potential impacts on biodiversity. These sectors may impact on biodiversity directly or indirectly through a range of drivers, including species and habitat loss, degradation and fragmentation, pollution, over-exploitation, increased risk of introduction of invasive alien species and climate change. From the perspective of the Convention, a key aim of mainstreaming biodiversity in these sectors is to avoid, reduce or mitigate any negative impacts, while maximizing any potential benefits to biodiversity.

7. These three groups of sectors are closely interrelated. For example, new energy facilities make up a large part of projected future infrastructure. Materials and fuels may be extracted by mining, before being processed and used in manufacturing by other industries. Infrastructure requires materials and energy for its construction, and in turn, is needed for their distribution. Many measures needed to improve the efficiency of use of material and energy will need to be developed along the entire life-cycle of material use.[2] The locations of extraction of energy and materials, their subsequent processing and use in manufacturing, the ultimate consumption of the products, and the disposal of wastes, are typically separated over large distances, such that control of impacts may require cooperation across international boundaries.[3]

8. Most of these sectors are expected to grow significantly through 2050 and beyond with the potential for major impacts on biodiversity. However, the magnitude of this growth, and the nature and degree of impacts on biodiversity, depends on decisions on the pathways for future economic and social development, as well as other factors including population growth, urbanization, economic growth, and technological development, as well as social, economic and environmental policy measures. The broad range of plausible future scenarios[4] demonstrates that there are opportunities for policies and other

[2] UNEP (2016). Global Material Flows and Resource Productivity. An Assessment Study of the UNEP International Resource Panel. Schandl, et al., United Nations Environment Programme http://www.resourcepanel.org/reports/global-material-flows-and-resource-productivity; UNEP (2010). Assessing the Environmental Impacts of Consumption and Production: Priority Products and Materials: A Report of the Working Group on the Environmental Impacts of Products and Materials to the International Panel for Sustainable Resource Management. Hertwich et al http://www.resourcepanel.org/reports/assessing-environmental-impacts-consumption-and-production.

[3] UNEP (2015), International Trade in Resources: A Biophysical Assessment, Report of the International Resource Panel. http://www.resourcepanel.org/reports/international-trade-resources

[4] See CBD/SBSTTA/21/2 "Scenarios for the 2050 Vision for Biodiversity", to be considered under agenda item 3.

measures to be put in place to promote sustainable development pathways consistent with the objectives of the Convention, its 2050 Vision, and the 2030 Agenda for Sustainable Development.[5]

9. The overarching mandate for "mainstreaming" under the Convention is Article 6(b) which calls for Parties to "integrate, as far as possible and as appropriate, the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programmes and policies". Article 10(a) calls on Parties to "integrate consideration of the conservation and sustainable use of biological resources into national decision-making". Other articles of the Convention also promote "mainstreaming" — or provide tools for it — notably the requirements to use impact assessment (Article 14), incentive measures (Article 11) and to identify and then regulate or manage processes and activities that have significant adverse impacts on biodiversity (Articles 7(c) and 8(l)).[6]

10. The Convention also provides the basis for a wide range of measures for the conservation and sustainable use of biodiversity (including, for example, protected areas, restoration, and controls of invasive alien species, among others), that have been further developed through various guidelines and programmes of work and other tools through decisions of the Conference of the Parties. Guidelines that are of particular relevance to these sectors include those on the ecosystem approach,[7] biodiversity-inclusive impact assessment,[8] and the protection of sacred sites, heritage and areas used by indigenous and local communities.[9] In addition, a number of technical studies have been develop and published. Though none of these are specifically focused on the mainstreaming of biodiversity into the sectors of energy and mining, infrastructure, manufacturing and processing, many of them provide relevant guidance and information as further explored in this document and an information note.

11. The Strategic Plan for Biodiversity 2011-2020 includes a strong focus on mainstreaming, particularly in Goal A (Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society) and Goal B, (Reduce the direct pressures on biodiversity and promote sustainable use).

12. The 2030 Agenda for Sustainable Development includes a number of goals that are closely related to the sectors of energy and mining, infrastructure, and manufacturing and processing. These include: Goal 7 (Affordable and clean energy); Goal 8 (Decent work and economic growth); Goal 9 (Industry, innovation and infrastructure); and Goal 11 (Cities and human settlements). These goals foresee, among other things, universal access to modern energy (target 7.1), sustained economic growth (target 8.1), infrastructure to support economic development and well-being (target 9.1), and access to all for housing and transport systems (targets 11.1 and 11.2). At the same time, given the indivisible nature of the 2030 Agenda, these Goals and targets must be achieved while also achieving the goals for biodiversity (Goals 14, 15) and climate action (Goal 13), as well as sustainable consumption and production (Goal 12).

[5] See CBD/SBSTTA/21/2/Add.1 "Biodiversity and the 2030 Agenda for Sustainable Development", to be considered under agenda item 3.

[6] With reference to identifying and addressing negative impacts on biodiversity, Parties are required, as far as possible and appropriate, to "identify processes and categories of activities which have or are likely to have significant adverse impacts on the conservation and sustainable use of biological diversity, and monitor their effects through sampling and other techniques" (Article 7(c)) and, "Where a significant adverse effect on biological diversity has been determined pursuant to Article 7, [to] regulate or manage the relevant processes and categories of activities" (Article 8(l)).

[7] The Ecosystem approach adopted by decision V/6 https://www.cbd.int/decision/cop/default.shtml?id=7148 with further guidance provided in decision VII/11 https://www.cbd.int/decision/cop/default.shtml?id=7748

[8] Voluntary Guidelines on Biodiversity-Inclusive Impact Assessment, decision VIII/28, https://www.cbd.int/decision/cop/default.shtml?id=11042; Annotations to the guidelines for their application in marine and coastal areas. Decision XI/18.B. https://www.cbd.int/decision/cop/default.shtml?id=13179

[9] The Akwé: Kon Voluntary Guidelines for the Conduct of Cultural, Environmental and Social Impact Assessment regarding Developments Proposed to Take Place on, or which are Likely to Impact on, Sacred Sites and on Lands and Waters Traditionally Occupied or Used by Indigenous and Local Communities https://www.cbd.int/doc/publications/akwe-brochure-en.pdf , adopted by decision VII/16.F, and the Tkarihwaié:ri Code of Ethical Conduct to Ensure Respect for the Cultural and Intellectual Heritage of Indigenous and Local Communities https://www.cbd.int/traditional/code/ethicalconduct-brochure-en.pdf , adopted through decision X/42.

Moreover, goals 7, 8, 9 and 11 include targets for sustainability.[10] Other goals provide an enabling environment for sustainability.[11] The 2030 Agenda thus sets out an ambitious framework to address a range of global societal challenges and to promote policy coherence and foster integrated implementation across sectors and domains of society. The Conference of the Parties has indeed recognized that the implementation of the 2030 Agenda provides a major opportunity for the mainstreaming of biodiversity and for the achievement of the Aichi Biodiversity Targets.

II. ENERGY AND MINING, INFRASTRUCTURE, AND MANUFACTURING AND PROCESSING SECTORS: TRENDS, IMPACTS AND MITIGATION MEASURES

A. Energy and mining

13. Energy and mining refers to the extractive industries for fossil fuels, minerals and metals, as well as to alternative energy sources.

14. At the operational level, mining, including of fossil fuels, is dependent on ecosystem services, the most prominent being water used throughout operations. Equally, many of the renewable sectors have a strong dependency on a water supply. For example, concentrated solar power requires significant water for cooling and hydropower relies on the flow regime of natural river systems. Both ecosystems and biota are relied upon for mediation of wastes and pollution from discharges and spills. The production of feedstocks for biofuels is however perhaps the sector with the greatest dependency on biodiversity and ecosystems for services such as pollination, disease control, and water supply.[12]

1. Fossil fuels (coal, oil and gas)

15. The International Energy Agency estimates that total energy production in 2015 was 13,790 million tonnes of oil equivalent. Fossil fuels accounted for almost 82 per cent of production. However growth in oil and natural gas production was almost entirely offset by a decline in coal production. Renewable energy sources such as wind, solar thermal, solar photovoltaic, geothermal, accounted for less than 2 per cent of global energy production but their use is quickly growing.[13] Under the International Energy Agency's main scenario there is projected to be a 30 per cent rise in global energy demand to 2040 with increases in consumption for all modern fuels but with the fastest growth being in renewable energy. Among fossil fuels natural gas is estimated to account for 50 per cent of consumption in 2040 and though the growth in oil demand slows it is still expected to reach 103 million barrels per day by 2040. Growth in the use of coal is estimated to end in the coming decades. It is further projected that a cumulative investment of $44 trillion is needed in global energy supply with 60 per cent going to oil, gas and coal extraction and supply, and nearly 20 per cent to renewable energies. An extra $23 trillion is required for improvements in energy efficiency. Even under this IEA scenario, hundreds of millions of people would still be without basic energy services.[14] It should be noted that oil is also used as a chemical feedstock.

16. The main impacts from the fossil fuel sectors on biodiversity can be divided into two categories: those impacts which result from the extraction and production of coal, oil and gas; and those which result from the use of these fuels. The impacts resulting from the use of fossil fuels have been well documented, including climate change, acidification, and the production of volatile organic compounds. The impacts

[10] For example, improving energy efficiency (target 7.3) and global resource efficiency (target 8.4), upgrading infrastructure and retrofitting industries to make them sustainable (target 9.4) and sustainable transport systems and sustainable urbanization (targets 11.2, 11.3). Goal 12 further calls, inter alia, for the environmentally sound management of chemicals and all wastes throughout their life cycle, and for waste generation to be substantially reduced through prevention, reduction, recycling and reuse.

[11] This matter is further discussed in CBD/SBSTTA/21/2/Add.1.

[12] Webb & Coates (2012). Biofuels and Biodiversity. Secretariat of the Convention on Biological Diversity. Montreal, *Technical Series No. 65*, 69 pages. https://www.cbd.int/doc/publications/cbd-ts-65-en.pdf.

[13] International Energy Agency (2017). World Energy Balances 2017: Overview. https://www.iea.org/publications/freepublications/publication/WorldEnergyBalances2017Overview.pdf

[14] OECD/IEA, (2016). World Energy Outlook 2016 – Executive Summary. https://www.iea.org/Textbase/npsum/WEO2016SUM.pdf.

on biodiversity from extraction vary with the specific characteristics of the site, as well as the method of extraction; however, they generally include habitat loss and pollution. The impacts on the environment include the direct result of production activities as well as unintentional results, such as oil spills. A general trend in the oil and gas sector is a move towards unconventional oil and gas production methods due to the increasing scarcity of conventional resources. This trend implies that new environments will be opened to oil and gas extraction with possible negative impacts on biodiversity.[15] The World Heritage Committee has noted with concern the growing impact of the extractive industries on World Heritage properties, and has urged all States Parties to the Convention and leading industry stakeholders, to respect the "no-go" commitment by not permitting extractive activities within World Heritage properties, and by making every effort to ensure that extractives companies located in their territory cause no damage to World Heritage properties.[16] Existing concessions for oil and gas, as well as mining, can also preclude the establishment or enlargement of protected areas.

17. Full implementation of the Paris Agreement on Climate Change would imply the urgent phase out of coal production and declining oil and gas production later this century, with any remaining production being combined with carbon capture and storage. Shorter term methods for reducing the effects of this sector on biodiversity include siting restrictions and conditions, and spatial planning techniques to ensure that oil and gas activities do not negatively impact on protected areas and/or biodiversity hotspots. Appropriate requirements to ensure the restoration of extraction sites also helps to reduce the long-term negative impacts on biodiversity. Requirements for the management of pollution resulting from extractive activities can also help to reduce the impacts on biodiversity.

18. Standards and safeguards such as those established by multilateral development banks (see para. 51) and industry guidelines (such as those developed by the global oil and gas industry association for environmental and social issues (IPIECA)[17]) aim to reduce impacts on biodiversity. Impact assessment remains an essential tool (see paras. 45-50). The Akwé: Kon Guidelines developed under the Convention aim to protect sacred sites and other areas of indigenous peoples and local communities.

2. Renewable energy

19. In 2016 more than half of the generating capacity that was added was from renewable sources, excluding large hydroelectric development. The investment in new renewable energy was approximately double what was invested in fossil fuel generation. In 2016, renewable energy accounted for 11.3 per cent of global electricity production.

20. Shifting to more renewable sources of electricity will have positive long term impacts by reducing the risk to biodiversity from climate change. However depending on the type of renewable energy used there could nonetheless be impacts on biodiversity. In particular, the large scale use of biofuels would likely lead to significant biodiversity loss from land use change, both direct and indirect.[18] Large scale expansion of hydropower through big dams has major risks for biodiversity through habitat loss, degradation and fragmentation. Windmills can have negative impacts on birds and bats, including migratory species, causing direct mortality from turbine collisions and altering migratory routes through avoidance behaviour. In addition, expansion of renewable energy gives rise to an increased need for

[15] Across Africa, 20 per cent of oil and gas contract blocks overlap with protected areas and Key Biodiversity Areas. Of particular concern are the large proportion of Alliance for Zero Extinction sites overlapping with existing contract blocks, as these areas represent the last refuge for species threatened with global extinction (Leach, Brooks &, Blyth (2016). Potential threat to areas of biodiversity importance from current and emerging oil and gas activities in Africa. UNEP World Conservation Monitoring Centre, Cambridge, United Kingdom).

[16] Decision 37 COM 7 of the World Heritage Committee (2013) http://whc.unesco.org/en/decisions/5018/.

[17] IPIECA-IOGP (2016) Biodiversity and ecosystem services fundamentals – Guidance document for the oil and gas industry. http://www.ipieca.org/resources/good-practice/biodiversity-and-ecosystem-services-fundamentals/.

[18] Webb & Coates (2012), op cit; Leadley et al (2016). "Relationships between the Aichi targets and land-based climate mitigation" (UNEP/CBD/SBSTTA/20/INF/29).

metals in batteries and electronics (and therefore more mining) and expanded power distribution infrastructure.

21. Impacts from hydropower dams and windmills can be mitigated by careful design and siting, and operational measures.[19] Many of these issues have been explored under the Convention.[20]

22. The Convention on the Conservation of Migratory Species of Wild Animals has conducted significant work towards reconciling renewable energy development with conservation of migratory species, adopting Resolution 11.27 and developing comprehensive guidelines.[21] The Ramsar Convention on Wetlands has also adopted Guidance for addressing the implications for wetlands of policies, plans and activities in the energy sector.[22]

3. Mining

23. Mining refers to the process of extracting valuable materials and minerals from the earth, including coal (considered under "fossil fuels" above), bulk materials for construction, and metals, including rare earth metals of high value. While mining is generally viewed as a single sector, it encompasses a variety industries focusing on different commodities and employing various mining techniques. Some mining operations are undertaken by large multinational corporations integrated into global supply chains while others are undertaken by individual artisanal (subsistence) miners largely supplying local markets. Similarly the processes involved in mining vary from the use of technically advanced heavy machinery to individuals employing manual tools. Generalizing trends for this sector, given the diversity of actors and processes, is difficult.

24. Mining results in both direct (exploitation site) and indirect (expansion of road networks and settlements) impacts on habitat loss, degradation and fragmentation. Sand and gravel are the most extracted group of materials worldwide, often leading to major habitat loss and degradation.[23] Mining activities can also pose significant direct pollution risks, especially for freshwater habitats, resulting from the processing of the targeted mineral. For example artisanal gold mining often requires the use of mercury or cyanide while in larger mining operations the management of tailings can result in the release of sulphide and sediment; artisanal and small-scale gold mining is the largest anthropogenic source of mercury pollution.[24] A further documented indirect effect of mining is the overexploitation of wildlife (for example from bushmeat hunting) and timber resulting from the increased population in mining sites. Mining activities have also resulted in the introduction of invasive alien species and the emergence of zoonotic diseases from opening up of areas to increased human activity. The location of mining activities

[19] Impacts of windfarms can be reduced if facilities avoid major migration stopovers and flyways or if turbine operations are reduced in these areas during peak migration. Pocewicz et al. (2013). Modeling the Distribution of Migratory Bird Stopovers to Inform Landscape-Scale Siting of Wind Development. PLOS ONE 8(10): e75363. https://doi.org/10.1371/journal.pone.0075363

[20] For example, see SCBD (2003). Interlinkages between biological diversity and climate change. Advice on the integration of biodiversity considerations into the implementation of the United Nations Framework Convention on Climate Change and its Kyoto protocol. Montreal, *Technical Series No. 10*, 154 pp. https://www.cbd.int/doc/publications/cbd-ts-10.pdf ; SCBD (2009) Connecting Biodiversity and Climate Change Mitigation and Adaptation: Report of the Second Ad Hoc Technical Expert Group on Biodiversity and Climate Change. Montreal, *Technical Series No. 41*, 126 pp. https://www.cbd.int/doc/publications/cbd-ts-41-en.pdf.

[21] CMS (2014) "Renewable energy and Migratory species" http://www.cms.int/sites/default/files/document/Res_11_27_Renewable_Energy_E.pdf . The resolution endorses 'Renewable Energy Technologies and Migratory Species: Guidelines for Sustainable Deployment' (UNEP/CMS/COP11/Doc.23.4.3.2) http://www.cms.int/sites/default/files/document/COP11_Doc_23_4_3_2_Renewable_Energy_Technologies_Guidelines_E.pdf Resolution 11.27 builds on earlier CMS Resolutions 7.5 and 10.19 and work undertaken jointly with the Agreement on the Conservation of African-Eurasian Migratory Waterbird Agreement (AEWA resolutions Resolution 5.16 and 6.11).

[22] Resolution XI.10, 2012. http://archive.ramsar.org/pdf/guide/guide-energy-e.pdf

[23] Torres et al (2017) A looming tragedy of the sand commons. *Science* 357 970-971.

[24] See, for example, UNEP, *Developing a National Action Plan to Reduce and, Where Feasible, Eliminate Mercury Use in Artisanal and Small-Scale Gold Mining (working draft)* https://wedocs.unep.org/bitstream/handle/20.500.11822/11371/National_Action_Plan_draft_guidance_v12.pdf?sequence=1&isAllowed=y

has also resulted in significant conflicts with indigenous peoples and local communities, often resulting in the loss of traditional knowledge and negative impacts on customary sustainable use. Mining of the deep-sea bed is likely to develop on a significant scale in the future.[25,26]

25. Significant work has been undertaken on identifying means of avoiding or mitigating the environmental impacts from mining, particularly on avoiding mining activities in important biodiversity areas, the reduction of the extraction footprint, post-extraction ecosystem restoration, and resource efficiency. Guidance and standards have been produced, including by the International Council on Mining and Metals.[27] As is the case for managing risks from fossil fuel extraction, impact assessment is an important tool (see para. 9 and footnotes 10 and 11).

26. The Minamata Convention on Mercury,[28] which entered into force in 2017, aims for a ban on new mercury mines, the phase-out of existing ones and the regulation of the artisanal and small-scale gold-mining.

B. Infrastructure

27. Infrastructure generally refers to the physical structures and facilities that support the operations of a society. It includes buildings, roads, water and sanitation, transportation systems, and energy and communication networks and grids. Major increases in the construction of infrastructure are projected over the coming years. Depending on the definitions and assumptions used, estimates of annual global infrastructure investment needs range from $3 trillion to $7 trillion.[29] In developing countries, investments flow from domestic public sources, as well as development partners, including multilateral development banks, whose levels of funding in this area are increasing. Many experts note that global infrastructure targets will require the mobilization of private sector funds, including from the banking industry, pension funds, sovereign wealth funds and insurance companies. Three types of infrastructure are further explored below.

1. Linear infrastructure

28. Linear infrastructure includes such things as roads and highways, electrical power lines, canals, railways and pipelines. This type of infrastructures results in linear openings or obstacles in habitat. Over the next century there is projected to be a dramatic expansion in roadways. It is estimated that by 2050, 25 million kilometres of new roads will be built. This represents a 60 per cent increase in global road infrastructure since 2010. It is further estimated that 90 per cent of new road construction will occur in developing countries, many of which are exceptionally high in biodiversity.[30] With regard to railway infrastructure, the situation is similar. It is estimated that, over the next 40 years, passenger and freight travel will double over 2010 levels. To meet this demand, rail infrastructure will need to increase significantly, including the addition of an estimated 335,000 kilometres of rail track. Much of the

[25] Under the United Nations Convention on the Law of the Sea, a regulatory framework for deep-sea mining activities has been established. The International Seabed Authority, established to implement Part XI of the Law of the Sea Convention, is charged with creating and enforcing rules for all seabed mining that takes place in areas beyond national jurisdiction as defined under the Law of the Sea Convention.

[26] A draft report on the biodiversity implications of deep-sea mining activities was issued for the twentieth session of the Subsidiary Body on Scientific, Technical and Technological Advice (see UNEP/CBD/SBSTTA/20/INF/69).

[27] International Council on Mining and Metals (ICMM)(2006). Good Practice Guidance for Mining and Biodiversity. https://www.cbd.int/development/doc/Minining-and-Biodiversity.pdf.

[28] United Nations Environment Programme, document UNEP(DTIE)/Hg/CONF/4, annex II.

[29] See, for example, The New Climate Economy, *The Sustainable Infrastructure Imperative: Financing For Better Growth and Development*, 2016; Recognizes the importance of taking into account sciences for life and the knowledge, experience and perspectives of indigenous peoples and local communities when addressing climate-related geoengineering and protecting biodiversity.; OECD (2017) Technical note on estimates of infrastructure investment needs https://www.oecd.org/env/cc/g20-climate/Technical-note-estimates-of-infrastructure-investment-needs.pdf.

[30] Laurance et al. (2014). A global strategy for road building. Nature 513, 229–232. https://www.nature.com/nature/journal/v513/n7517/full/nature13717.html.

anticipated road and railway construction will be driven by the need to access resources, such as minerals, oil and gas and timber, as well as in order to improve trade and transportation.

29. Linear infrastructure can directly fragment or destroy ecosystems during construction and perpetuate habitat degradation following project completion due to increased human presence and accessibility. These pressures affect the general health, fertility and viability of species and compromise vital ecosystem services. Expansion of linear infrastructure can be of particular concern in wilderness areas and other areas of high conservation value. Biodiversity may be impacted through fragmentation of habitats (direct effect) and further habitat loss and degradation through indirect effects, such as those triggered through settlements and secondary roads, and subsequent risks of overexploitation effects (such as bushmeat hunting and illegal logging), and the increased risk of introduction of invasive alien species (as well as emergence of zoonotic diseases) from opening up of areas. Road expansion may also bring the risk of loss of traditional knowledge and negative impact on the customary sustainable use of Indigenous Peoples and Local Communities.

30. The development and improvement of linear infrastructure is an important element in improving social and economic development. Harmonizing linear infrastructure development and biodiversity conservation will require the mainstreaming of biodiversity concerns into project planning, design and operation, at multiple scales, including, where necessary, the establishment or strengthening of protected areas. Large-scale zoning at national and regional scales could be used to maximize the economic benefits of road expansion while minimizing the costs for biodiversity.[31] Innovative project designs such as underpasses, overpasses and green infrastructure can render projects simultaneously more permeable, safe and attractive for passing wildlife, thus mitigating the deleterious impacts of habitat fragmentation. In addition meeting infrastructure needs by upgrading or enhancing the efficiency of existing infrastructure rather than developing new infrastructure should be explored. With regard to the unintended consequences of the development of linear infrastructure, for example the overexploitation of such natural resources as timber and bushmeat, appropriate monitoring should be put in place to identify and address issues as they arise.[32] Infrastructure (for example roads, pipelines, operational structures) are often dependant on erosion control, soil and slope stabilization through vegetation and the protection afforded by ecosystems against natural disasters such as flooding and storm surges).

31. Mainstreaming of biodiversity-related concerns into linear infrastructure development, as part of ecosystem-based adaptation and disaster risk reduction can also help to ensure the sustainability of infrastructure.

2. Urban infrastructure

32. Most of the new infrastructure over the next several decades will be built in or around cities. As of 2014, 54 per cent of the world's population resided in urban areas. By 2050, this is expected to reach 66 per cent. By 2030, there are projected to be 41 cities with more than 10 million inhabitants.[33] It has been estimated that, if current trends continue, by 2030 urban land cover will be 1.2 million square kilometres, almost a threefold increase since 2000.[34] The increasing rate of urbanization represents a number of challenges to biodiversity, including the growing demand for resources, such as water and energy. As a result of this growth, it has been estimated that up to 70 per cent future of infrastructure investment will be focused on urban locations.[35] The next 15 to 20 years will see enormous growth of

[31] Ibid.

[32] See also CBD/SBSTTA/21/3 "Sustainable Wildlife Management: Guidance for A Sustainable Wild Meat Sector" considered under agenda item 4.

[33] United Nations, Department of Economic and Social Affairs, Population Division (2014). *World Urbanization Prospects: The 2014 Revision*, Highlights (ST/ESA/SER.A/352). https://esa.un.org/unpd/wup/Publications/Files/WUP2014-Highlights.pdf

[34] Seto, K.C. (2012). Global forecasts of urban expansion to 2030 and direct impacts on biodiversity and carbon pools. Proceedings of the National Academy of Sciences. vol. 109 no. 40. http://www.pnas.org/content/109/40/16083.

[35] KPMG International (2012). Cities Infrastructure: a report on sustainability, https://home.kpmg.com/content/dam/kpmg/pdf/2012/05/Cities-Infrastructure-a-report-on-sustainability.pdf

urban areas; it is projected that 50 to 60 per cent of the total urban area that will exist in 2030 will be built in the first three decades of the twenty-first century.[36,37]

33. The growth of urban infrastructure will have a variety of effects on biodiversity but the main direct impact will be through habitat loss as cities grow to accommodate more people. Many expanding cities are located near biodiversity hotspots and other areas of high conservation value. There are currently 422 cities with more than 300,000 inhabitants in the world's conservation hotspots, of which 383 are evaluated as facing conflicts between urban growth and biodiversity.[38] Further, between 2000 and 2030 the urban land area located in or near biodiversity hotspots is expected to increase fourfold.[39] Most areas with exceptional and unique biodiversity already are at direct risk from urban expansion. At the same time, cities rely on biodiversity and healthy ecosystems for many basic services, such as supplying freshwater, improving air quality, regulating temperature, providing resilience against climate change and natural disasters. Thus, how the cities of the future evolve is highly relevant to biodiversity. If the projected urban expansion is not appropriately planned and managed, there is a risk of significant adverse impacts on biodiversity which, in turn, jeopardizes urban areas and has regional and global implications.

34. There are efforts under way to ensure that future urban infrastructure investments are sustainable. Historically, the focus in the development of sustainable urban infrastructure has mostly been on low carbon and climate resilient infrastructure, with biodiversity and ecosystems largely absent from the discussions. However, there are a variety of policy options which can be applied to help address the growing need for urban infrastructure while protecting biodiversity. These include the use of high-density zoning, promoting green infrastructure, reflecting habitat connectivity in planning and zoning considering, incentivizing the use of infill and brownfields, and restrictions on development of particularly vulnerable land.

35. In recent years, there has also been an increasing recognition of the role of nature-based infrastructure. The New Urban Agenda, adopted at the United Nations Conference on Housing and Sustainable Urban Development (Habitat III) in 2016,[40] clearly recognizes the key role of nature, biodiversity and ecosystems for sustainable cities and urban quality of life. Nature-based infrastructure uses natural systems, rather than "built" solutions, such as maintaining healthy coastal ecosystems to ward against flooding or damage from storms, use of "green streets" and rain capture systems to address run-off rather than traditional sewage overflow systems, and restoring green cover of cities to reduce temperature spikes and demand on power grids. Moreover, protected areas in the vicinity of cities can provide clean water supplies and other ecosystem services. Green spaces in cities can provide important health benefits to people.[41] Such solutions simultaneously address urban infrastructure needs while either avoiding impacts on biodiversity or directly benefiting it. The nexus of biodiversity and cities was comprehensively addressed in the *Cities and Biodiversity Outlook*.[42]

3. Coastal and marine infrastructure

36. Coastal and marine infrastructure includes a range of coastal, offshore and subsea structures including ports and infrastructure for shipping and fisheries, residential and commercial developments, tourist resorts, offshore energy facilities, aquaculture installations, and electrical and communication cables. Most urban development is projected to take place near coasts. According to OECD estimates,

[36] Güneralp, B., & Seto, K. C. (2013). Futures of global urban expansion: Uncertainties and implications for biodiversity conservation. *Environmental Research Letters, 8*, 014025.

[37] *Cities and Biodiversity Outlook, 2012* – cbobook.org.

[38] Weller, R., Hoch, C., Huang. C. (2017). "Atlas for the End of the World - http://atlas-for-the-end-of-the-world.com/

[39] United Nations Human Settlements Programme (UN-Habitat). (2016). *Urbanization and Development: Emerging Futures. World Cities Report 2016*. http://wcr.unhabitat.org/.

[40] General Assembly resolution 71/256, annex.

[41] World Health Organization and Secretariat of the Convention on Biological Diversity (2015). Connecting global priorities: biodiversity and human health: a state of knowledge review. https://www.cbd.int/health/SOK-biodiversity-en.pdf.

[42] www.cbobook.org.

under a business-as-usual scenario, between 2010 and 2030, the ocean -based economy could more than double its value added contribution to the world economy, reaching US$ 3 trillion. In particular, strong growth is expected in marine aquaculture, offshore wind energy, fish processing, and shipbuilding and repair. Under the same scenario, ocean industries are expected to account for 40 million full time equivalent jobs by 2030 with the fast growth in jobs occurring in offshore wind energy, marine aquaculture, fish processing and port activities.[43] The development of coastal and marine infrastructure has a range of impacts on biodiversity. These include habitat loss, pollution and sedimentation. Further many marine areas are affected by increased shipping which can result in more air and water pollution, noise-related behavioural disturbances, physical collisions with marine mammals, possible introduction of invasive alien species through ballast water and the increased risk of incidents and oil spills.

37. Ensuring healthy coastal and marine ecosystems requires a robust network of marine protected areas, urgent restorative measures and integrated marine and coastal area management framework based on processes such as marine spatial planning and environmental impact assessments. Coastal ecosystems, including coral reefs, mangroves and seagrass habitats are especially important in providing ecosystem services to the larger human populations living in the vicinity of the coast including fisheries, water quality improvement, and protection against extreme weather events. The implementation of an ecosystem-based, solution-driven approach to maintaining and recovering marine biodiversity is urgent, especially as technological advances and rising demand are likely to spur growing interest in untapped resources in deep ocean biomes and the Arctic region.

C. Manufacturing and processing industries

38. Manufacturing and processing covers a wide range of activities. For the purposes of the present document, "manufacturing and processing" is taken to refer to the transformation of materials, for example through mechanical or chemical means, into products for consumption or sale. The manufacturing and processing sector is generally understood to cover all textiles, wood products, chemicals, plastics, metallic and non-metallic products, electronics, food and beverages, transportation among other things.[44] Manufacturing and processing can further be divided into processes that rely directly on a renewable natural resource and those that have little direct dependence on biodiversity. Globally, manufacturing and processing continues to grow. It now accounts for approximately 16 per cent of global GDP and 14 per cent of employment.[45] The IEA projects that, by 2050, it will contribute 27.6 per cent of GDP and 24.2 per cent of global employment. In addition, rapid growth in emerging markets is contributing to an increase in demand for resources.[46]

39. There are both direct and indirect impacts on biodiversity from manufacturing, throughout the various phases of the product lifecycle. These include impacts from the physical siting of facilities, such as the destruction of habitat, the operation of manufacturing facilities, such as pollution, impacts generated from the use of raw materials, and disposal at the end of a product's life-cycle. These linkages are complex and differ from sector to sector. One of the challenges in terms of mainstreaming is this complexity of supply chains in most types of manufacturing and processing.

40. There are a variety of actions which can be taken to mitigate the effect of manufacturing and processing industries. These include ensuring that facilities are located in appropriate areas, regulating waste, pollution and other hazards from operations, undertaking assessments of product life cycles to identify opportunities for efficiencies, and diverting materials from waste streams. A number of United

[43] OECD (2016). *The Ocean Economy in 2030*. OECD Publishing, Paris. http://www.oecd.org/sti/futures/the-ocean-economy-in-2030-9789264251724-en.htm

[44] United Nations Statistics Division (2017). International Standard Industrial Classification of All Economic Activities, Rev.4. https://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=27

[45] McKinsey and Company (2012). Manufacturing the future. The next era of global growth innovation. http://www.mckinsey.com/business-functions/operations/our-insights/the-future-of-manufacturing

[46] S. Mohr et al (2012). Manufacturing resource productivity. McKinsey and Company http://www.mckinsey.com/business-functions/sustainability-and-resource-productivity/our-insights/manufacturing-resource-productivity

Nations agencies are engaged in work to promote sustainable production and consumption in the manufacturing sector, including the United Nations Environment Programme and the United Nations Industrial Development Organization.

41. Manufacturing and processing of natural products provides an opportunity to create incentives for the conservation and sustainable use of biodiversity, as well as for the fair and equitable sharing of benefits in accordance with the Convention and the Nagoya Protocol. A range of sectors use genetic resources and associated traditional knowledge, including the pharmaceutical, agriculture, industrial biotechnology, cosmetics, botanicals, and food and beverage sectors.[47]

42. "BioTrade" refers to those activities of collection, production, transformation, and commercialization of goods and services derived from native biodiversity under the criteria of environmental, social and economic sustainability. The revenue in 2012 for bio-trade companies was US$ 5.2 million; however, the market potential is estimated by UNCTAD at US$ 141 billion,[48] representing an opportunity for small and medium-sized enterprises to contribute to biodiversity conservation as well as job creation.

III. MAINSTREAMING BIODIVERSITY IN THE ENERGY AND MINING, INFRASTRUCTURE, AND MANUFACTURING AND PROCESSING SECTORS: APPROACHES, TOOLS, GAPS AND OPPORTUNITIES

A. Approaches to mainstreaming

43. Five broad and interconnected approaches to mainstreaming biodiversity in these sectors can be recognized:

(a) *Strategic economic and development planning* — One of the most significant opportunities to mainstream biodiversity in the energy and mining, infrastructure, and manufacturing and processing sectors is at the level of strategic decision-making within national governments and subnational governments, as well as the policies and decisions of other governments and global and regional institutions that influence such decisions;

(b) *Economy- and sector-wide policies, laws and regulations, and economic incentive measures* — These, typically set at the national level, establish the framework within which all actions take place, including requirements for impact assessments, for example;

(c) *Spatial planning across landscapes and seascapes* — The specific geographic location of mining operations, facility siting, and trajectories of linear infrastructure will strongly influence the resulting impacts on ecosystems and biodiversity, both in terms of the direct footprint of operations but also the induced impacts of associated developments. In order to minimize these impacts, land-use and marine spatial planning that integrate biodiversity values are key instruments that work across economic sectors to achieve the best possible outcomes for biodiversity and society;

(d) *Measures at the scale of the site or production-plant* — These include measures related to siting of new facilities and operations, as well as policies to address sustainable consumption and production. Typically these are driven by national or subnational legislation, requirements from financial institutions, or corporate policies;

(e) *Supply-chain measures* — Particularly in the manufacturing sector, supply chain policies can be highly powerful means for addressing the potential biodiversity impacts from suppliers, as well as the use of corporate social responsibility policies.

[47] A series of briefs and factsheets on these sectors have been prepared by the Secretariat in the Series "Bioscience at a Crossroads" available at: https://www.cbd.int/abs/resources/factsheets.shtml

[48] http://unctad.org/en/pages/newsdetails.aspx?OriginalVersionID=1102

44. Mainstreaming involves many types of actors: governments, citizens, indigenous peoples and local communities, consumers and businesses, each acting at multiple levels, from local to national. Governments play a pivotal role in establishing the enabling framework for such actors to participate and contribute, especially at the national level.

45. The Conference of the Parties at its thirteenth meeting adopted decision XIII/3 on mainstreaming, which not only focused on mainstreaming biodiversity in the agriculture, forests, fisheries and tourism sectors, but also included numerous provisions on cross-cutting issues (such as incentive measures, certification schemes, and accounting for the values of biodiversity), engagement in relevant international processes, and engagement of key actors, all of which are also relevant for mainstreaming biodiversity in the sectors now under consideration.

46. Work under the Convention to address business sector activities increased significantly following the tenth meeting of the Conference of the Parties, which called for national business and biodiversity initiatives to be established.[49] The Global Partnership on Business and Biodiversity now supports 21 such initiatives, and provides an opportunity for exchange of best practices and new initiatives. Subsequent decisions have called for deeper business engagement, particularly at the twelfth and thirteenth meetings of the Conference of the Parties. The recognition of biodiversity as an important factor for businesses is increasing. A business and biodiversity pledge launched at thirteenth meeting of the Conference of the Parties, committing signatories to take specific actions on biodiversity, has been signed by nearly 150 businesses so far. Finally, work is ongoing to respond to decision XIII/3 on business reporting.

47. The Conference of the Parties has also paid increasing attention to the role of cities and subnational governments for addressing the goals of the Convention and the Strategic Plan for Biodiversity 2011-2020, and has taken a number of decisions in this regard. The Secretariat has ongoing work to support networks of cities and subnational governments, supporting technical workshops, and policy development. A summit of cities and subnational governments has taken place at every Conference of the Parties since 2009, providing an opportunity to exchange information, best practices, and agree on next steps.

B. Tools and guidance

48. There is a range of tools and practices available to support these approaches, briefly reviewed in the following paragraphs. There is a plethora of guidance tools and mechanisms specifically geared towards businesses seeking to support the mainstreaming of biodiversity into their operations and decision-making. Many of those are of a cross-cutting nature while others focus on specific sectors. The Business and Biodiversity Platform, under the clearing house mechanism of the Convention, provides access to an online database of such tools and mechanisms. It is searchable by sector, including the sectors under consideration.[50]

1. Environmental impact assessment and strategic environmental assessment

49. Two of the most important tools for addressing the impacts from the infrastructure, energy and mining sectors, and to a lesser extent, the manufacturing and processing sectors, are the environmental impact assessment (EIA) and the strategic environmental assessment (SEA). In 2006, the Conference of the Parties adopted voluntary guidelines on impact assessment.[51] Annotations to these guidelines for their application in marine and coastal areas were developed in 2012.[52] In decision XIII/3 on mainstreaming, the Conference of the Parties highlighted the need to ensure the effectiveness of EIAs and SEAs.

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[49] Conference of the Parties decision X/21.

[50] https://www.cbd.int/business/ressources/tools.shtml

[51] *Voluntary Guidelines on Biodiversity-Inclusive Impact Assessment*, decision VIII/28, https://www.cbd.int/decision/cop/default.shtml?id=11042

[52] Decision XI/18 B.

50. There have been significant developments on best practices in this area, which are highly relevant for the consideration of mainstreaming biodiversity. The Secretariat of the Convention carried out a review of existing guidance documents for biodiversity-inclusive impact assessment and their extent of application, with a view to identifying challenges and opportunities in improving the integration of biodiversity and ecosystem services in impact assessment practices. The main findings of this review appear in the following paragraphs, and the full review is being made available as an information document.

51. Environmental impact assessment is a legally enforceable measure established in virtually all countries, providing a concrete means for strengthened mainstreaming of biodiversity in these sectors. The procedure typically includes obligatory public disclosure of documents and involvement of stakeholders that promotes transparency and public participation in decision-making. Impact assessments thus provide a way to assess the pros and cons of a proposed plan or project in an integrated manner prior to decision-making and implementation. Shortcomings of impact assessment practice include: limited or inappropriate scoping; a sole focus on negative impacts and lack of attention for potential for enhancing positive impacts; little attention to genuine alternatives; and impact assessment is conducted too late in the decision-making process, leaving little room for meaningful alternatives.

52. SEAs are part of the planning and design phase and therefore have the potential to overcome these shortcomings. SEAs are becoming established around the world and are now applied in some 90 countries either as a legal obligation or on a voluntary basis. The use of a strategic environmental assessment is key to ensuring that trade-offs and alternatives for investment pathways are considered in national and regional development and investment planning.

53. With respect to the sectors under consideration in the present document, SEA is an important tool for upstream planning, to consider whether new infrastructure is actually needed, or if the kinds of infrastructure developed could be improved vis-à-vis sustainability. The definition and comparison of alternative ways to reach specified policy or plan objectives is at the core of SEA. Proactive use of SEAs can inform policy and planning processes on opportunities and constraints for development, thus defining the boundaries for sustainable development within which a policy or plan can be defined. In this manner, an SEA can be used as a positive planning tool, in contrast to an EIA, which is sometimes perceived to be focused on negative impacts only.

54. There is enormous variation in the quality and scope of impact assessments that integrate biodiversity considerations. Country regulations often have a narrow focus on biodiversity (species and habitat conservation), leading to incomplete impact assessments. While the last decade has seen tremendous growth in approaches to assessing and valuing ecosystem services, there still is a very limited uptake of these approaches in impact assessments. In addition, the application of impact assessment legislation to projects in the marine environment is still at a relatively early stage and has been made obligatory in only a handful of sectoral and regional frameworks. More attention is needed to the adverse impacts of human activities on marine and coastal biodiversity, including coral bleaching, ocean acidification, and underwater noise and pollution, especially given current developments, such as off shore wind parks, carbon storage and plans for deep sea ore mining.

2. Multilateral environmental and social safeguard standards

55. Virtually all multilateral financial institutions, such as the World Bank and regional development banks, have adopted environmental and social safeguard standards which apply to their investments. Over the past few years, the International Finance Corporation[53] and now the World Bank[54] have adopted new

[53] IFC Performance Standard 6 on Biodiversity is consistent with the overall objectives of the CBD Voluntary Guidelines, http://www.ifc.org/wps/wcm/connect/bff0a28049a790d6b835faa8c6a8312a/PS6_English_2012.pdf?MOD=AJPERES.

[54] The Bank's standards will be operational in 2018. They include standards on: (a) environmental and social risks and impacts (ESS 1); (b) community health and safety, including a requirement on "impacts on ecosystem services that may result in adverse health and safety risks to and impact on affected communities" (ESS 4); and (c) biodiversity with reference to "vulnerable biodiversity or habitats" and "the differing values attached to biodiversity and habitats by project affected parties and other

environmental and social safeguard standards which include a stronger focus on biodiversity and, to some extent, on ecosystem services. These standards historically have set the global norm, and other multilateral development banks as well as other institutions are likely to follow suit. With respect to addressing potential impacts from operations, measures include requirements for environmental assessment, sector-specific operating requirements, regulatory approaches for pollution and waste management, health and safety measures, tax and other financial measures, standards for energy efficiency and public procurement, and use of eco-labelling.

3. Voluntary corporate standards and policies

56. An increasing number of companies have adopted corporate policies and standards which address biodiversity and impact mitigation. Incorporating biodiversity considerations into manufacturing and processing can help ensure businesses continue operating within a scarcer resource market, enhance their brand and reputation, and stay ahead of potential regulatory and legislative measures. Thus, they can provide opportunities in terms of innovation, developing technologies and access to the growing "green" market. Actions to reduce impacts on biodiversity and ecosystems can also ensure provide cost savings for business operations, for example, by increasing water efficiency use. From a reputational perspective, adhering to sustainable practices can provide brand differentiation and increase customer bases.

57. Industry wide standards and guidance have also been developed. For example, as noted earlier in this document, industry standards and guidance developed by ICMM and IPIECA include good practice codes and guidance material.[55]

4. The mitigation hierarchy, offsets and no-net loss

58. The "mitigation hierarchy" is a widely acknowledged approach for addressing potential adverse impacts on biodiversity from siting of new facilities. Application of the hierarchy calls for (a) avoiding damage of biodiversity, (b) minimizing any such damage, (c) restoration measures for sites or species damaged, and (d) as a last resort, compensating damage to biodiversity through offsets. Avoidance (e.g., siting facilities away from areas of biodiversity importance) can be the most effective way of reducing potential negative impact. A principle of the mitigation hierarchy is that offsets should only be used as a measure of last resort. A growing number of actors, including private companies, have stated commitments to No Net Loss (NNL) or Net Positive Impact (NPI). Research in 2016 identified 100 countries that are developing or starting to discuss national government policies that require, encourage, guide or enable the use of offsets, and this number is increasing.[56]

5. Tools to support spatial planning

59. At the operational level, there are several tools which support the integration of ecosystem benefits and services into land use and marine spatial planning. One example is InVEST (integrated valuation of ecosystem services and trade-offs), a freely available software tool developed by the Natural Capital Project, a partnership of Stanford University, the University of Minnesota's Institute on the Environment, the Nature Conservancy (TNC), and World Wildlife Fund (WWF).[57] In a number of country cases, the application of the tool has supported improved land use planning.[58]

6. Urban planning

60. Urban planning increasingly recognizes the critical role of ecosystems and biodiversity for sustainable urban development, underpinning the provision of necessary water resources, food security,

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interested parties" (ESS 6). http://documents.worldbank.org/curated/en/383011492423734099/pdf/114278-WP-REVISED-PUBLIC-Environmental-and-Social-Framework.pdf.

[55] http://www.ipieca.org/resources/good-practice/biodiversity-and-ecosystem-services-fundamentals; https://www.cbd.int/development/doc/Minining-and-Biodiversity.pdf.

[56] http://www.thebiodiversityconsultancy.com/es/wp-content/uploads/2013/07/Government-policy-2.pdf

[57] https://www.naturalcapitalproject.org/

[58] See the overview of country applications under https://www.naturalcapitalproject.org/how-do-we-know-it-works/#case-studies

control of air pollution and temperature regulation, as well as for human health and enjoyment. The New Urban Agenda[40] recognizes the key role of nature, biodiversity and ecosystems for sustainable cities and urban quality of life.

61. The nexus of biodiversity and cities was addressed in the *Cities and Biodiversity Outlook*,[42] whose 10 key messages include the need to integrate biodiversity and ecosystems into urban policy and planning, and the large potential of cities to generate innovation and governance tools for biodiversity and sustainable development.

7. Assessing, reporting and disclosing dependencies and impacts on biodiversity and ecosystem services

62. Corporate reporting and disclosure is another measure that can help address biodiversity. Key initiatives include the Global Reporting Initiative reporting framework and sector supplements on oil and gas and mining, the United Nations Global Compact's communication on progress,[59] which promotes responsible corporate citizenship, and the Extractive Industry Transparency Initiative,[60] which promotes transparency of payments and is aimed at both governments and corporates.

63. The Natural Capital Protocol, developed and published in 2016 by the Natural Capital Coalition, aims to provide a standardized, generic framework to support businesses in better identifying, measuring and assessing their impacts and dependencies on nature, with a view to improve pertinent decision-making. A Natural Capital Protocol Toolkit maps existing tools, methodologies and approaches for natural capital measurement against the Natural Capital Protocol framework. Additional sector guides and supplements have been launched, including for apparel as well as food and beverage.[61]

8. Valuation and incentive measures

64. Additionally, the programme of work on incentive measures under the Convention, while not making explicit reference to the sectors under consideration, covers Aichi Biodiversity Target 3 and the valuation part of Aichi Biodiversity Targets 2. At its twelfth meeting, the Conference of the Parties adopted milestones for the full operationalization of Aichi Biodiversity Target 3 on incentive measures, and also took note of the modalities developed to achieve this operationalization. Some elements of the modalities are relevant in the present context. For instance, the modalities indicate that consideration should also be given, where appropriate, to integrating biodiversity incentives into the incentives of other sectors in a manner that is consistent and in harmony with the Convention and other relevant international obligations, and taking into account national socioeconomic conditions.

65. The United Nations System of Environmental-Economic Accounting 2012 and its guidance manual on Experimental Ecosystem Accounting (SEEA-EEA) provides a spatially explicit framework to measure and link ecosystem service flows supported by biodiversity and other ecosystem characteristics (such as soil type, altitude) with the economy and other human activities. In particular, the SEEA Central Framework, which was endorsed as an international standard by the United Nations Statistical Commission, includes spatially explicit land cover and land use accounts, as part of its guidance on standard concepts, definitions, classifications, accounting rules and accounting tables for producing internationally comparable statistics.

[59] https://www.unglobalcompact.org/participation/report/cop

[60] The Extractive Industries Transparency Initiative (EITI) - an international standard to promote open and accountable management of natural resources – encourages governments, extractive companies, civil society and the public to engage in discourse around transparency of the extractives sector and it aims to facilitate the management of a country's natural resource wealth to benefit all its citizens. EITI help to build accountable and transparent institutions, widen the political space for stakeholder participation, improve tax systems, and increase the availability timely and reliable data.

[61] https://naturalcapitalcoalition.org/protocol/

9. Certification

66. Certification initiatives, traditionally a key mechanism in other commodities, such as those of the agriculture sector, have also been applied to the energy and mining sector. Responsible sourcing of commodities has typically focused on specific issues, for example the Kimberly Process for mining diamonds. This has led to broader certification, such as Responsible Jewellery Council and the Alliance for Responsible Mining, which include biodiversity as one or several elements. Recent developments include the Responsible Steel standards and certification programme, the Aluminium Stewardship Initiative and the Initiative for Responsible Mining Assurance with comprehensive provisions for biodiversity. In oil and gas, there is a single certification scheme known as Equitable Origin.

67. Other opportunities include new markets, such as water quality trading, certified sustainable products, wetland and species banking or other new revenue streams.[62]

C. Gaps and opportunities

68. There are numerous opportunities and approaches to enhance the mainstreaming of biodiversity in the energy and mining, infrastructure, and manufacturing and processing sectors. While the trends, potential impacts, and possible approaches and tools for mainstreaming biodiversity in these sectors are broadly known, the complexity and the scope of these sectors warrant additional work to support discussions of these topics and the development of recommendations for the consideration of the Conference of the Parties at its fourteenth meeting.

69. The primary mechanism under the Convention to ensure that biodiversity is factored into national decision-making is the development and implementation of national biodiversity strategies and action plans (NBSAPs), which are to be a government-wide policy instrument. However, the extent to which NBSAPs are addressing these three sectors effectively is unclear. One assessment of NBSAPs determined that only 35 per cent of these plans include actions on mining while a similar proportion contain action on non-consumptive renewable energy.[63] Parties may be encouraged to give greater attention to these sectors in future iterations of their NBSAPs.

70. Countries have varying levels of experience with these sectors, with many developing countries facing rapid growth in industrial-level mining and emerging oil and gas industries. There is therefore a considerable opportunity for countries with greater experience in managing these industries for positive biodiversity outcomes to share this with other countries, particularly within the same region and contexts. The clearing-house mechanism, together with partner organizations, could facilitate such exchanges.

71. There is potential for the wider application of strategic environmental assessments of policies as well as programmes, particular with respect to infrastructure development. There is also a need for regional and interregional cooperation in spatial planning to address the challenges from expanding infrastructure, especially transport and energy transmission networks, in order to protect the most valuable sites for biodiversity and minimize ecosystem fragmentation.

72. There exist a number of interdependencies between these sectors and biodiversity. Businesses may be encouraged to identify and assess their dependencies on biodiversity as well as their impacts, as a step towards addressing such dependencies and impacts.[64] Indeed, while these sectors have widely been understood to have a negative impact on biodiversity, there is an opportunity to harness the innovations that exist within these sectors for operations to be conducted responsibly to mitigate impacts and deliver positive contributions. Similarly, there are great opportunities to better integrate consideration of biodiversity and ecosystems into urban planning.

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[62] http://www.teebweb.org/media/2012/01/TEEB-For-Business.pdf, p.56.

[63] UNDP. 2016. National Biodiversity Strategies and Action Plans: Natural Catalysts for Accelerating Action on Sustainable Development Goals. Interim Report, p. 19.

[64] The business and biodiversity pledge launched at the thirteenth meeting of the Conference of the Parties provides for these measures.

73. There are many international entities engaged in processes relevant to mainstreaming of biodiversity in these sectors, including the United Nations Environment Programme, the United Nations Development Programme, the United Nations Industrial Development Organization, the United Nations Conference on Trade and Development, the World Bank group, as well as non-governmental organizations and business organizations, such as the World Business Council for Sustainable Development and the International Chamber of Commerce. Further collaboration with these entities could therefore support the mainstreaming of biodiversity in these sectors. The work of the Secretariat on a number of other issues can also be brought to bear on the work on mainstreaming in these sectors. In particular, work on finance and resource mobilization, private-sector engagement and sustainable cities, which is to be reported on to the Subsidiary Body on Implementation at its second meeting, will have important linkages with the infrastructure, energy and mining, and manufacturing and processing sectors.

74. Finally, the 2030 Agenda for Sustainable Development calls for transformational change across economies and societies. The magnitude of the projected growth of these sectors, how they evolve, and the nature and size of impacts on biodiversity will depend in large part on decisions related to the economic and development path of countries, as well as on broader societal trends, such as population growth, urbanization, economic trends, consumption patterns, technological development, and social development priorities. The ongoing energy transition provides an example of how policy changes, informed by societal concerns and priorities, and influenced by international agreements, can shift trends (including, for example, from coal to other fossil fuels, and from fossil fuels to renewables). This transition has resulted from concerns about climate change, as well as health effects of air pollution, as well as a growing understanding of the economic and social benefits of shifting from a fossil-fuel based economy.

V. SUGGESTED RECOMMENDATIONS

75. The Subsidiary Body on Scientific, Technical and Technological Advice at its twenty-first meeting may wish to:

(a) *Take note* of the information contained in the note by the Executive Secretary on mainstreaming of biodiversity in the energy and mining, infrastructure, and manufacturing and processing sectors;[65]

(b) *Note* that, while numerous policies and tools exist to address the mainstreaming of biodiversity in these sectors, many gaps in their implementation also exist, including with respect to strategic planning and decision-making, economy and sector-wide policies, and the wider application of biodiversity-inclusive impact assessments, in particular strategic environmental assessment of policies, plans and programmes, and the use of spatial planning at the national, regional and interregional levels;

(c) *Also note* the important role of indigenous peoples and local communities and relevant stakeholders in addressing mainstreaming in these sectors;

(d) *Invite* the Subsidiary Body on Implementation to take the information contained in above-mentioned note by the Executive Secretary into consideration during its deliberations on this issue at its second meeting;

(e) *Encourage* Parties:

(i) To review the trends with respect to these sectors in their own countries, as well as existing laws, policies and practices to address potential impacts on biodiversity from these sectors;

(ii) To share information through the clearing-house mechanism, including case studies, lessons learned, and good practice polices and tools already applied for mainstreaming of biodiversity and ecosystem services in the energy and mining,

[65] CBD/SBSTTA/21/5.

infrastructure, manufacturing and processing sectors, as well as information on gaps identified and additional options for the more effective mainstreaming of biodiversity in these sectors.

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