UNEP

CBD

Convention on Biological Diversity

Distr.
GENERAL

CBD/SBI/2/4/Add.3
26 May 2018

ORIGINAL: ENGLISH

SUBSIDIARY BODY ON IMPLEMENTATION
Second meeting
Montreal, Canada, 9-13 July 2018
Item 5 of the provisional agenda*

MAINSTREAMING OF BIODIVERSITY IN THE ENERGY AND MINING SECTOR

I. BACKGROUND

1. At the thirteenth meeting of the Conference of the Parties to the Convention on Biological Diversity, a decision was adopted concerning the mainstreaming of biodiversity within and across economic sectors, and called for the mainstreaming of biodiversity in the sectors of energy and mining, infrastructure, manufacturing and processing, and health to be considered at its fourteenth meeting (decisions XIII/3). Definitions of mainstreaming biodiversity vary, but essentially it is the process of making the consideration of biodiversity integral to decisions that have the potential to impact it.

2. This note builds on those produced for the twenty-first meeting of the Subsidiary Body on Scientific, Technical and Technological Advice[1]. It provides a brief overview of the energy and mining sector (the different types of energy and mining, key actors, major trends, impacts and recent developments). This is followed by an exploration of key themes and potential approaches to mainstreaming biodiversity in the sector, including existing approaches and standards, good practice and challenges. Opportunities and potential actions are then presented in the final section of the present document.

II. THE ENERGY AND MINING SECTOR

A. Introduction

3. Energy and mining encompass a range of activities and economic sectors involved in the exploration, extraction, processing and distribution of oil, gas, coal, materials such as sand and rock, minerals and metals; the generation, production, distribution and delivery of energy from fossil and non-fossil sources; and the disposal of waste products associated with the sector. The broader influence of the energy and mining sector is also felt through the way their resultant products are processed (such as the production of chemicals or fertilizers), their infrastructure demands and the way in which the revenue and royalties generated are used.

4. Taken as a whole, these activities show substantial impacts and dependencies on biodiversity and ecosystem services and the people who rely on them. However, they also have the potential to create benefits.

* CBD/SBI/2/1.

[1] Documents CBD/SBSTTA/21/INF/5 (Environmental assessment legislation - a global overview); CBD/SBSTTA/21/INF/9 (Energy and mining); CBD/SBSTTA/21/INF/13 (Strategic Environmental Assessment and Environmental Assessment; CBD/SBSTTA/21/INF/15 (Options on how to make 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).

B. Types of energy and mining

5. The energy sector encompasses a wide range of different activities and sources including: oil and gas; unconventional oil and gas; coal; geothermal energy; solar energy; wind power; hydropower; wave power, biofuels; and nuclear energy. Similarly, the mining sector encompasses a range of activities in various locations including: mining for minerals and metals; sand and aggregate quarrying; gemstones; seabed mining; and artisanal and small-scale mining. Energy and mining also often involve a lot of associated infrastructure, such as pipelines and access routes (particularly for large projects).

C. Major trends

6. With a rising population, an expanding global economy and a trend towards urbanization, the demand for materials and energy is increasing, particularly in countries outside the Organisation for Economic Co-operation and Development (OECD).

7. Oil and gas play an important role in fulfilling current energy demands and is forecast to continue to do so in the coming decades. However, the Paris Agreement on Climate Change is likely to lead to coal, oil and gas production being reduced towards the end of the century, with remaining production being combined with carbon capture and storage techniques. With improvements in technology, lowering costs and drivers such as multilateral agreements on climate change, renewable sources of energy are becoming increasingly prominent. Given current policies, investment in renewables is likely to continue growing, with forecasts of renewable electricity capacity set to expand by over 43 per cent by 2022.[2] The way that renewables are used is also likely to change, with increasing use of renewable sources to provide heat and mobility. New generation biofuels are being developed, but their potential role in the future energy mix is being reviewed in many jurisdictions. Efforts to increase the efficiency of existing energy infrastructure will also be increasingly important in the face of growing demand. While it is likely to remain relatively small, the contribution of nuclear energy is forecast to grow.

8. Mining plays a vital role in the economic development of many countries (the World Bank identifies 81 countries in which non-renewable mineral resources "play a dominant role"[3]) and can be an important contributor to employment and income generation, particularly in low-income countries.[4] The global demand for metals and minerals is increasing, largely for similar reasons as the energy sector. As the large-scale mining industry tends to mine ores with lower and lower concentrations, the footprints of such mining operations are likely to increase in the future. In addition, advances in technology have facilitated mining operations in new locations such as the deep sea bed.

9. A move towards renewable energy and growth in new technologies may increase the demand for some specific mined materials.[3] Growing demand for energy storage (such as that required for many renewable energy sources) may also increase demand for lightweight metals (e.g. lithium) for batteries. This could lead to potential impacts on biodiversity and ecosystem services associated with mining for such products, including unsustainable water use, pollution and contamination. An example of this would be rare earth elements required for technologies such as smart phones, computers and batteries of hybrid and electric cars. China accounts for over 90 per cent of the world's total production of rare earth elements, with concentrations also found in Brazil and Australia.[5]

10. The demand for sand, gravel and aggregates, as well as other mined products, is likely to increase in response to growth in the infrastructure sector. In some regions, mining projects are also driving investment in infrastructure to service these industries.

---

[2] International Energy Agency (2017) World Energy Outlook 2017: Summary [Online] Available from: http://www.iea.org/weo2017/ [Accessed November 2017]

[3] World Bank (2017) The growing role of minerals and metals for a low carbon future [Online] Available from: http://documents.worldbank.org/curated/en/207371500386458722/pdf/117581-WP-P159838-PUBLIC-ClimateSmartMiningJuly.pdf [Accessed April 2018]

[4] McMahon, G. and Moreira, S. (2014) The Contribution of the Mining Sector to Socioeconomic and Human Development. Extractive industries for development series; no. 30. World Bank, Washington, D.C.

[5] Fernandez, V. (2017) Rare-earth elements market: A historical and financial perspective. *Resources Policy* 53 (2017) pp. 26-45.

11. Artisanal and small-scale mining provides livelihoods for millions of people around the world,[6] including women, indigenous peoples and local communities. Artisanal and small-scale miners work in more than 80 countries and produce some 10 per cent of the world's mined gold, 15-20 per cent of mined diamonds, approximately 20-25 per cent of mined tin and tantalum, and 80 per cent of coloured gemstones.[6] At the same time it is often associated with illegal operations, harsh working conditions and severe pollution. An example of this is the impact of the mercury used in some processes on biodiversity, ecosystem services and human health.

12. The trends above mostly relate to the longer-term horizon. The supply and demand for the products of the energy and mining sector is also subject to short term variation, related to factors such as commodity prices.

D. Biodiversity and ecosystem service impacts and dependencies

13. Impacts and dependencies of energy and mining projects on biodiversity and ecosystem services differ across the various activities, and at different stages or scales. They will also depend on the nature of the activity, the sensitivity of the environment in which it occurs, and other activities taking place in the area (among other considerations).

1. Impacts

14. Impacts within these sectors arise from the exploration and production of oil and gas, generation of renewable energy, and mining of coal, minerals and metals, as well as the transportation, processing and marketing of extracted materials. It is important to consider direct, indirect, induced and cumulative impacts on biodiversity and ecosystem services throughout the lifecycle of a project, including exploration, construction, operation, closure and post closure (legacy).[7] The supply chain from mine to market and consumer, or well to wheel, should also be considered. Many mining and energy projects can have relatively long lifespans and impacts can occur over time periods that exceed the lifetime and geographical limits of a mine or energy project. Management of all waste products associated with the mining and energy sector is particularly important to avoid or minimize impacts on biodiversity and ecosystem services. Legacy waste issues related to closed projects remain a challenge.

15. Potential direct impacts of mining and energy activities on species, life stages, habitats and ecosystems are generally well documented and understood, and can therefore often be successfully avoided or mitigated (where systems are in place to do so). Direct impacts include habitat loss, damage and fragmentation, disturbance, displacement or mortality of species (including collision with wind turbines or powerlines), disruption of breeding and migration events for certain species, changes in water quality and flow, pollution of soil, air and water (including thermal pollution) and the introduction of invasive species.

16. Renewable energy generation also has biodiversity impacts, which need to be understood and addressed. These include the significant habitat conversion impacts associated certain biofuels[8], impacts on migratory bird species from wind power as well as the supply chain impacts associated with solar technology and energy storage.

17. Nuclear energy has large impacts in terms of mining and disposal of hazardous materials, with a number of documented catastrophes related to nuclear accidents (e.g. Fukoshima in Japan). Impacts can

---

[6] Villegas, C., Weinberg, R., Levin, E., and Hund, K. (2012) Artisanal and Small-scale Mining in Protected Areas and Critical Ecosystems Programme (ASM-PACE) - A Global Solutions Study 2012 [Online] Available from: http://www.levinsources.com/assets/pages/Global-Solutions-Study.pdf [Accessed November 2017]

[7] Innovation Forum (2018) Mining's Amazon deforestation impact uncovered [Online] Available from: https://innovation-forum.co.uk/analysis.php?s=minings-amazon-deforestation-impact-uncovered [Accessed April 2018]

[8] Gasparatos, A., Stromberg, P., Takeuchi, K. (2011) Biofuels, ecosystem services and human wellbeing: putting biofuels in the ecosystem services narrative. Agriculture, Ecosystems and Environment, Elsevier, 142(3-4):111-128.; Stromberg, P., Gasparatos, A., Lee, J.S.H., Garcia-Ulloa, J., Koh, L.P., Takeuchi, K., (2010) Impact of liquid biofuels on ecosystem services and biodiversity. UNU-IAS Policy Report. United Nations University-Institute of Advanced Studies, ISBN 978-92-808-4518-1, Yokohama.

vary between the large-scale mining sector and artisanal and small-scale mining.[9] However, larger-scale mining tends to be better regulated than artisanal and small-scale mining, which can lead to avoided or reduced impacts on biodiversity and ecosystem services. For example, the use of mercury in artisanal and small-scale mining processes for gold is globally the largest single source of mercury pollution. This can lead to severe impacts on human health, biodiversity and ecosystem services such as water and food provision.

18. New mining locations (e.g. seabed mining) may pose new potential risks to biodiversity and ecosystem services.[6] However, new technologies provide opportunities to reduce risk. The use of directional drilling to avoid surface impacts on sensitive areas can help reduce risks, for example.

19. The physical footprint of energy and mining operations can be relatively small compared to some other sectors (such as agriculture or forestry, or urbanization). However, biodiversity impacts linked to the in-migration of people to an area as a result of energy and mining operations can be very significant, leading to further encroachment of natural habitats. It can also lead to increased exploitation of natural resources, including forests, wildlife and fish, to unsustainable levels.

20. Cumulative impacts from multiple operations over time at the site or landscape level can also be important. For example, the impacts on a species from habitat loss could be compounded by stress induced by operation noise. Chemicals or heavy metals can (bio)accumulate in environments over time. Habitat fragmentation caused by a pipeline can be compounded by land use change associated with agricultural operations.

21. Deforestation, habitat degradation and burning of fossil fuels contribute to climate change, which in turn presents a major threat to biodiversity and ecosystem services globally. The effects on biodiversity and ecosystem services as a result of climate change can be severe. While beyond the scope of this document, the climate change impacts of burning fossil fuels on a range of receptors should be considered when considering mainstreaming biodiversity into related sectors.

2. Dependencies

22. At the operational level, energy and mining are dependent on ecosystem services, either directly for their operations (e.g. water) as well as protection of infrastructure (e.g. roads, pipelines, dams, operational structures) from erosion effects, landslides, and natural disasters such as flooding and storm surges. For example, wet-cooled concentrated solar power plants require significant water for cooling and hydropower relies on the flow regime of natural river systems that are in some cases part of watersheds protected by national parks. The production of feedstocks for biofuels is however perhaps the sector with the greatest dependency on biodiversity for services such as pollination, disease control, and water supply. Under future climate change scenarios, factors such as increased water scarcity and frequency of extreme weather events are likely to amplify these dependencies.

E. Key actors

23. A wealth of understanding and experience of the relationship between energy and mining sectors and biodiversity and ecosystem services is held by indigenous peoples and local communities, Governments, non-governmental organizations, conservation groups, protected area and biodiversity resource managers, academia and businesses (among other stakeholders). While Governments and businesses are the key decision makers for these sectors, the biodiversity impacts associated with projects may directly affect the rights of indigenous peoples and local communities. Examples of this are causing damage or limiting access to traditional sites or natural resources used for food, fuel or medicine.[10] In instances where communities move to other natural areas, there can also be biodiversity and ecosystem impacts on receiving areas from increased pressure resources for food, fuel or shelter.

[9] Buxton, A. (2013) Responding to the challenge of artisanal and small-scale mining. How can knowledge networks help? IIED, London.

[10] Ituarte-Lima, C. (2017) Transformative biodiversity law and 2030 Agenda: mainstreaming biodiversity and justice through human rights. In: Hutter, B. M. (2017) Risk, Resilience, Inequality and Environmental Law. Edward Elgar Publishing.

24. Some larger, international companies (often in conjunction with industry associations) and governments are developing good practices and seeking opportunities to advance biodiversity conservation. There are opportunities to positively enhance biodiversity and ecosystem services through collaboration and engagement between all actors.

III. THEMES AND APPROACHES FOR MAINSTREAMING BIODIVERSITY INTO THE ENERGY AND MINING SECTOR

25. There are a number of points of intervention for improving biodiversity management and reducing impacts by the energy and mining sector, from addressing patterns of demand, to improving planning and regulation across all project value chain stages, including decommissioning. There are good examples of work being done by large scale mining and energy companies to encourage the protection of biodiversity and ecosystem services (for example, guidance and tools developed by ICMM, IPIECA and CSBI[11]), as well as through strengthened regulation and enforcement. The challenge is how to scale these approaches up beyond project level, in all relevant countries and across the energy and mining sector. There are also some issues that are generally poorly addressed, including artisanal and small-scale mining, and challenges around engaging certain actors (e.g. junior operators and State-owned enterprises).

26. Through a review of literature and a multi stakeholder workshop, several key themes and approaches to mainstream biodiversity into the energy and mining sector have been identified. These are explored in more detail in the sections below. This is not an exhaustive list, but those considered to be particularly pertinent to the topic of mainstreaming and that could potentially be promoted and facilitated through actions taken under the Convention. The first three relate predominately to planning and setting the framework for mainstreaming biodiversity into the sectors, while the latter points relate more broadly to implementation.

27. All of the themes and potential approaches explored below also relate to a number of the Sustainable Development Goals, as indicated by two recent publications that specifically mapped the mining, oil and gas industry to the Sustainable Development Goals.[12]

A. National laws and policies: incentives and penalties

1. Introduction

28. A legal framework that reflects good practice and incorporates elements of international best practice where possible is important to mainstream biodiversity into the energy and mining sector.

---

[11] For example: CSBI (2014) Timeline Tool. www.csbi.org.uk/tools-and-guidance/timeline-tool; CSBI (2015) A cross-sector guide for implementing the Mitigation Hierarchy, www.csbi.org.uk/tools-andguidance/mitigation-hierarchy; CSBI (2018) http://www.csbi.org.uk/; Gullison, R. E, Hardner, J., Anstee, S. and Meyer, M. (2015) Good Practices for the Collection of Biodiversity Baseline Data. Prepared for the Multilateral Financing Institutions Biodiversity Working Group and Cross-Sector Biodiversity Initiative. www.csbi.org.uk/tools-andguidance/biodiversity-data-collection/; IOGP-IPIECA (2014) Operating Management System Framework for controlling risk and delivering high performance in the oil and gas industry. IOGP Report 510. www.ogp.org.uk/pubs/510.pdf; IPIECA (2011) Ecosystem Services Guidance. Biodiversity and ecosystem services guide and checklists. www.ipieca.org/publication/ecosystem-servicesguidance; IPIECA-IOGP (2014) Managing Biodiversity & Ecosystem Services (BES) issues along the asset lifecycle in any environment: 10 Tips for Success in the Oil and Gas Industry, http://www.ipieca.org/resources/good-practice/managing-biodiversity-ecosystem-services-bes-issues-along-the-asset-lifecycle-in-any-environment-10-tips-for-success-in-the-oil-and-gas-industry/; IPIECA-IOGP (2016) Biodiversity and ecosystem fundamentals – Guidance document for the oil and gas industry, http://www.ipieca.org/resources/good-practice/biodiversity-and-ecosystem-services-fundamentals

[12] IPIECA, IFC and UNDP (2017) Mapping the oil and gas industry to the Sustainable Development Goals: An Atlas [Online] Available from: http://www.ipieca.org/resources/awareness-briefing/mapping-the-oil-and-gas-industry-to-the-sustainable-development-goals-an-atlas/ [Accessed March 2018] and World Economic Forum (2016) Mapping Mining to the Sustainable Development Goals: An Atlas [Online] Available from: http://www3.weforum.org/docs/IP/2016/IU/Mapping_Mining_SDGs_An_Atlas.pdf or http://www.undp.org/content/undp/en/home/librarypage/poverty-reduction/mapping-mining-to-the-sdgs--an-atlas.html [Accessed March 2018]

2. Selected approaches, standards and good practice

29. National laws and regulations create a compliance framework and enable enforcement. They are often guided by a broad array of polices, including constitutional provisions, and policies and laws related to sectors, planning, environment, and human rights. They include the regulation of the energy and mining operations via permitting processes, regulations on liability for environmental damage and access to courts.

30. Some national biodiversity strategies and action plans (NBSAPs) include recommendations related to the energy and mining sector. A high-level review of the revised NBSAPs shows that 16 have strategies or actions linked to mining, while 35 have strategies or actions that are related to energy. A total of 36 NBSAPs have strategies or actions with an environmental and social impact assessment / strategic environmental assessment link.

31. There are examples of where National Development Plans explicitly recognize the value of biodiversity (e.g. in Uganda and Ghana). As National Development Plans can be powerful instruments to set national strategic direction, balancing resource extraction with biodiversity and ecosystem services provision is key.

32. Energy and mining policies generally set out development priorities and investments for this sector. These policies may include incentives for using cleaner technology, supportive mechanisms for certain types of energy and mining activities or "best available technology" requirements. For example, under the NBSAP of Cambodia, there is an action to "support the implementation of the energy sector strategy, including the…draft Energy Strategy listing interventions to improve the sustainable supply and use of biomass in Cambodia". Another example is the South African Mining and Biodiversity Guideline[13] that provides a tool for decision makers. It was developed though multi stakeholder consultation to facilitate consistency in the consideration of biodiversity issues in the mining sector. It has subsequently been adopted by the Chamber of Mines in South Africa, which has 69 member companies.

33. Land use planning policies are crucial for avoiding impacts related to the location of energy, mining and associated activities. National Development Plans and policies can promote or require land-use planning that integrates biodiversity and ecosystem services considerations. Equally subnational legal instruments, such as land zoning diversification like the conservation zoning laws of Costa Rica, are also relevant.

34. No net loss or net gain policies that promote or require implementation of biodiversity strategies, based on the concepts of the mitigation hierarchy and biodiversity offsets, are increasingly being adopted. A large number of mining dependent and biodiversity rich countries now have offset policies in place.[14] Australia, for example, has policies at both the national and subnational level, including guidance and calculator tools. Other countries have legislation or policy that helps to facilitate voluntary offsetting.

35. Local content policies that integrate biodiversity and ecosystem service considerations can be important given the social influx related to many large energy and mining projects. If income expectations are not met, and the wealth and benefits of extractives do not trickle down and create opportunities for local people, this can create conflict and act as a catalyst for additional environmental damage. In this regard, an increasing number of countries introduced or reinforced local content policies that stipulate the use of local labour, skills, goods and services to create value in the domestic economy, and hence expand the industrial sector.

36. Legislation for scientifically rigorous and legally relevant environmental and social impact assessments and strategic environmental assessments is key. Such laws, and the national and subnational structures through which they are delivered, need to be adapted to national circumstances.

---

[13] Department of Environmental Affairs, Department of Mineral Resources, Chamber of Mines, South African Mining and Biodiversity Forum, and South African National Biodiversity Institute (201). Mining and Biodiversity Guideline: Mainstreaming biodiversity into the mining sector. Pretoria.

[14] IUCN and The Biodiversity Consultancy (2017) Understanding Government Offset Policies in the Mining Sector [Online] Available from: https://www.iucn.org/sites/dev/files/content/documents/understanding_government_biodiversity_offset_policies_in_the_mining_sector_november_2017.pdf [Accessed May 2018]

37. Many countries have protected areas legislation that explicitly excludes energy and mining developments within designated areas. For example, the South African National Environmental Management Protected Areas Act (No. 57 of 2003) prohibits mining and prospecting in protected areas. Ukraine has a law that prohibits any kind of activities that may have harmful impacts (including geological prospecting and mining) within a protected area ("On Nature Protected Fund" of 16.06.1992 № 2456-XII). However, it is important that cooperation and coordination mechanisms across government ministries and sector policies are in place to ensure such legislation is taken into account when decisions are being made to permit energy or mining activities.

38. While approaches are still in development, steps towards national integration of natural capital accounting have been taken through the Gaborone Declaration for Sustainability in Africa, which calls on governments and other stakeholders to integrate "the value of natural capital into national accounting and corporate planning and reporting processes, policies and programmes"[15] (among other actions).

39. Legislation and policy relating to civil liability on human rights are important given the potential impact of these sectors on local communities. Mongolia's human-rights based approach to the formalization of artisanal and small-scale mining within the national mining law that contributes to commitments under the Minamata Convention on Mercury. Free prior (and, vitally) informed consent processes, where communities can accept, amend or decline proposals, are essential to uphold land and natural resource access rights. Under the United Nations Declaration on the Rights of Indigenous Peoples (2006),[16] ILO 169, and various national laws, free prior informed consent of indigenous peoples is framed as a State obligation and/or indigenous peoples' rights. When community-led, such processes can provide a vital mechanism both for the preservation of human rights in relation to energy and mining projects, and the sustainable use of biodiversity and ecosystem services. However, the inclusion of free prior informed consent into laws and regulations and its enforcement is still relatively limited. There may be many different views within communities and consultation should include consideration of these, even if not raised through the process of free prior informed consent.

40. Numerous countries have set up inter-ministerial groups to develop synergies and coherence between policies and plans, including Nepal's National Biodiversity Coordination Committee and Bhutan's National Task Force. The African Leadership Group on Biodiversity Mainstreaming comprising environment, development, planning, finance and sectoral government officials from Botswana, Ghana, Malawi, Namibia, Seychelles, Uganda, Zambia and Zimbabwe. Cameroon has an inter-ministerial committee tasked with addressing cross-cutting issues (including the protection of nature and the mining sector), in response to the vision expressed by the President for the well-being of the population and development be reconciled.

3. Challenges related to national laws and policies

41. Policy coherence between the array of national and subnational policies is critical for implementation. Where new sectors arise in countries, there is often a process of legal reform to accommodate the needs of the sector. This needs to be based on overarching policies for that sector. This can be a challenge when expertise of the sector is lacking. Equally, there can be issues around developing subnational legislation that complements national laws in federal systems that only cover minimum standards or exclude vital elements such as monitoring. Permitting for mining projects in particular often take place at the subnational level. Lack of enforcement can be a serious challenge to effectively implementing policies and legislation. For example, many energy and mining rich nations have poorly resourced government departments and agencies, and a lack of expertise to implement legislation effectively. The lack of technical capacity is particularly apparent where little or no prior experience of emerging sectors exists.

[15] The Gaborone Declaration for Sustainability in Africa (no date) About the GDSA [Online] Available from: http://www.gaboronedeclaration.com/about-the-gdsa-1/ [Accessed March 2018]

[16] General Assembly resolution 61/295.

B. Planning and assessment at the policy level: spatial planning and strategic environmental assessments

1. Introduction

42. Energy and mining developments can have transformative impacts across landscapes and seascapes, driving growth in other economic sectors and significant levels of human migration to areas. It is therefore imperative that strategic level area-based planning takes place beyond the scale of individual projects and before major investments have been made to ensure the overall development of the sector considers biodiversity and ecosystem service outcomes.

2. Selected existing approaches, standards and good practice

43. A key tool in this regard is strategic environmental assessment for mining and energy policies, plans and programmes. These assessments can help address cumulative impacts and guide the permitting process for development activities, such as awarding mining concessions or identifying designated artisanal and small-scale mining zones. Investment in planning allows for the consideration of alternatives to better avoid or mitigate impact from the very beginning. It also helps to identify sustainable and less impacting alternatives, such as the consideration of mixed energy sources over a series of hydropower projects on a single stretch of river.

44. A vital part of strategic environmental assessments is consultation with stakeholders, including indigenous peoples and local communities and the private sector. Hence management hinges on mapping of uses and users of ecosystem services in different localities, accounting for future changes in demand and supply of these ecosystem services from climate change and population growth. Consideration should be given to alterations due to roads, and hydroelectric dams required for the high energy needs of mines, for example.

45. Good practice strategic environmental assessment should consider various scenarios for sustainable development (including energy and mining projects) and seek consensus (through consultation) on the preferred option. The agreed future development strategy can then be enshrined through new or revised policies, plans or programmes and provide the framework for the strategic environmental assessment to be implemented. This could include areas in which mining will not be permitted, or the requirement for all energy projects to have and implement a Biodiversity Action Plan, for example. The strategic environmental impact assessment should then guide the process for environmental and social impact assessments. Strategic environmental assessment facilitates an open and transparent societal debate among stakeholders on the value of biodiversity for livelihoods and economic development and therefore both the process and the outcomes of strategic environmental assessment are important.

46. These assessments need to include biodiversity along with a range of environmental, social and economic considerations (including cumulative impacts) and be conducted in a scientifically rigorous, coherent and consistent manner. They also need to be conducted as a planned, iterative process, and regularly updated. A vital part of this is community consultation. To be effective, they should have the buy-in of other national institutions, not least national planners and ministries of finance.

47. The Kyiv Protocol on strategic environmental assessment of the Espoo Convention recognises the importance of assessing the potential impacts of plans and programmes, requiring those countries that are signatories to do so. The World Bank has supported a number of strategic environmental and social assessments in mineral rich countries to date.

48. Government-led, area-based planning at the landscape and/or seascape level that works across sectors, integrates biodiversity and ecosystem services values and links into national and subnational planning mechanisms and policies is a key part of this exercise. Spatial planning in both the terrestrial and marine realms can be extremely valuable for the integration of multiple sectors into a single space and avoiding conflicts with conservation and social considerations (often referred to as integrated land use

and/or resources planning). For example, one analysis indicated that 20 per cent of protected areas and Key Biodiversity Areas in Africa overlapped with oil and gas contract blocks.[17]

49. Identifying areas off-limits to mining or energy projects could be based on the extreme sensitivity of an area or the lack of information and/or effective management to ensure no significant losses. Some countries have legislation that explicitly prohibits industrial extractive activities within certain protected area designations. If implemented to influence where concessions are offered and awarded, such legislation can be an effective approach to safeguard these areas. In South Africa, for example, mining and prospecting is prohibited in all protected areas. This would complement existing commitments from some companies not to explore in certain protected area designations (e.g. World Heritage Sites). However, it is important that such approaches do not lead to de-gazetting of protected areas, or the prevention of potential investment in protected areas from commercial operations.

3. Challenges to planning and assessment at the policy level

50. The use of spatial planning and strategic environmental assessments is growing, with promising initial outcomes, but they are not yet embedded in decision making and the legal framework of all countries. All high-income countries (including China and Indonesia) and many countries in Africa have legislation relating to strategic environmental assessments. However, lack of implementation is often a key challenge. With many assessments still in the early phases, developing consistent approaches to implementation will be key to their success. This is also true for marine spatial planning that, while gaining momentum, is seldom implemented.[18]

51. A lack of effective stakeholder engagement, accurate and comprehensive data and tools, government leadership and capacity, sufficient financial resources and an enforced legal framework (among other factors) are identified as key challenges to the production and implementation of strategic area-based planning, leading to implementation gaps (also known as deficits).

52. Participation from indigenous peoples and local communities, who bring knowledge of the economic, social and cultural significance of biodiversity and ecosystem services to the process, is vital for strategic level planning. At the same time, they are the groups most often impacted by poor planning and lack of consultation. Proactive and constructive engagement of key stakeholders is crucial for developing capacity, strengthening partnerships, sharing knowledge and overcoming barriers.

53. While guidance on effective participation and access to information is growing (for example, the World Bank, ICMM and others have produced manuals and tool kits on community engagement and development in mining), this is not always followed through to implementation.

C. Planning and assessment at the project level: environmental and social impact assessment

1. Introduction

54. Environmental and social impact assessments (and associated environmental management plans, Biodiversity Action Plans and Species Action Plans), coupled with robust avoidance and mitigation measures are crucial to address the potential negative impacts of energy and mining development on biodiversity.

2. Selected existing approaches, standards and good practice

55. Good practice environmental and social impact assessments should be conducted as part of the process to secure consent for projects to go ahead. Approaches vary, but generally environmental impact assessments should identify all potential direct, indirect, induced and cumulative impacts, along with actions that are required to avoid, mitigate, restore or offset those impacts. Environmental impact

[17] Leach, K. Brooks, S.E., Blyth, S. (2016) Potential threat to areas of biodiversity importance from current and emerging oil and gas activities in Africa. United Nations Environment Programme World Conservation Monitoring Centre, Cambridge, United Kingdom.

[18] Picone, F., Buonocore, E., D'Agostaro, R., Donati, S., Chemello, R., and Franzese, P.P. (2017) Integrating natural capital assessment and marine spatial planning: A case study in the Mediterranean Sea. Ecological Modelling, Volume 361, pp 1-13.

assessments should also outline the project's environmental management plan. Once approved, these actions (and their associated timelines) would become conditions of the permit or licence for the project to go ahead. They should be listed on a Compliance or Commitments Register and tracked throughout the life of the project, ideally by an independent auditor. The environmental management plan can be used to guide the project after the approval stage. Contained within the environmental management plan would be the project's Biodiversity Action Plan and, as necessary, associated Species Action Plans. Although separate from NBSAPs, project level biodiversity actions plans should seek to support and implement them.

56. Good practice guidance for environmental and social impact assessment often includes adherence to the mitigation hierarchy – a process that prioritises strategies to avoid impacts, followed by those that minimize, restore and finally offset or compensate for impacts and deliver gains - working towards targets such as no net loss or net gain of biodiversity. These principles are often integrated into the safeguards set by financial institutions (including the World Bank and the International Finance Corporation). While increasingly referred to in legislation, implementation of the mitigation hierarchy is still largely lacking. Approaches have been developed for environmental assessment and management of artisanal and small-scale mining, such as those produced by the Canadian International Resources and Development Institute[19] and the Inter-Governmental Forum on Mining and Minerals and Sustainable Development. Studies by the German Development Agency on artisanal and small-scale mining operations in Africa have looked at their operation, how to formalize the sector and encourage small operators to comply with current environmental legislation to avoid or minimize impacts on biodiversity.

57. While impact mitigation is an iterative process throughout the project life cycle, opportunities for impact avoidance are far greater at the planning phase of development where it can influence siting, site layout and design. This approach necessitates quantification of losses and gains to biodiversity and extends to induced impacts where these can be reliably predicted to occur.

58. Assessment of cumulative impacts should be undertaken as part of environmental and social impact assessments. These should address impacts derived from the successive, incremental, and/or combined effects of an action, project, or activity when added to other existing, planned, and/or reasonably anticipated future ones. The process should be clearly linked to strategic environmental assessments where they occur, and can form a bridge between the two assessments. Adaptive management is a key element of successful impact assessment, through monitoring of impacts and implementation of environmental management plans after the approval of the project. Effective environmental and social impact assessment requires:

(a) Developing comprehensive and implementable environmental management plans (with associated biodiversity action plans and species action plans as necessary);

(b) A legal process to ensure sufficient information is available at regular intervals throughout the life cycle of the project;

(c) Adequate arrangements to use the findings in a comprehensive manner (i.e. prevention of adverse impacts and enforcement measures);

(d) Availability of accurate and comprehensive data on biodiversity and ecosystem services, particularly for new sector activities or locations, such as seabed mining.

59. Good practice around accurately assessing and valuing nature is being developed, including those developed for biodiversity offsetting, and natural capital assessments and accounting. Companies are beginning to engage with natural capital accounting, as demonstrated by the various case studies presented by the Natural Capital Coalition. Engaging with academia to develop indicators and understand biodiversity impacts, emerging technologies and approaches (e.g. the effectiveness of habitat restoration) will help increase the evidence base and fill data gaps.

[19] CIRDI/ICIRD (2017) Environmental Assessment and Management for Artisanal and Small Scale Mining [Online] Available from: http://cirdi.ca/resource/environmental-assessment-and-management-for-artisanal-and-small-scale-mining/ [Accessed March 2018]

60. There are a number of entry points for strengthening the implementation of environmental management actions after the approvals stage, including expanding the powers, competency and independence of enforcement agencies, co-ordinating with subnational governments, creating regional monitoring networks and requiring a financial guarantee for the implementation of follow-up measures prior to project approval.

61. In Europe, the Directive on the management of waste from extractive industries (2006/21/EC) puts measures in place to require a financial guarantee so that there are funds readily available for the reclamation of affected land. In the technical guidelines for the establishment of the financial guarantee (2009/335/EC) it is specified that measures to reinstate biodiversity, if relevant, shall be included in the assessment of the costs necessary to ensure land reclamation. Emerging standards of civil liability for biodiversity loss could also make use of the results of environmental and social impact assessments and associated environmental management plans.

62. Industry good practice codes and guidance material include IPIECA's Biodiversity and Ecosystem Service Fundamentals [20] and Guidance on Voluntary Sustainability Reporting, [21] the Cross-Sector Biodiversity Initiative guidance on the mitigation hierarchy[22] and the Business and Biodiversity Offsets Programme Standard on Biodiversity Offsets.[23] The International Council on Mining and Metals has also developed a series of principles (including one on biodiversity and a commitment not to operate in World Heritage sites) on which members are required to report.

3. Challenges to planning and assessment at the project level

63. At the project planning stage, impact assessment procedures can identify opportunities to avoid impacts. However, as project feasibility advances and investments are made, the emphasis tends to shift to minimization, restoration and, eventually, potential off-sets of significant residual negative impacts.

64. Some of the key challenges to effective environmental and social impact assessment relate to capacity and resources for implementation of the review process, as well as monitoring and enforcement by government departments and agencies. This can be compounded by a lack of financial means and effective, transparent, accountable and accessible institutional arrangements. The lack of public and government agency access to environmental and social impact assessments, environmental management plans, decision documents and permitting conditions can hinder effective follow-up measures (such as facilitating community-based monitoring programmes or enforcement in case of non-compliance) and adaptive management. [24] Lack of capacity and technical understanding can also prevent relevant stakeholders from taking part in related processes. Environmental and social impact assessments are often very long and inaccessible documents, compounding issues around the capacity to understand the findings and recommendations, both within government and among the public.

65. There are some technical challenges to effective impact assessments, including the lack of rigorous metrics for ecosystem services, and for the calculation of equivalence in biodiversity offsets.

66. Conflicts can arise when national environmental and social impact assessment requirements are less stringent, or significantly different to, international good practice. In some cases, the existence of international lending requirements can help fill gaps in national legislation, but this requires effective oversight to ensure compliance and many projects will not be subject to these.

---

[20] IPIECA and International Association of Oil and Gas Producers (2016) Biodiversity and Ecosystem Fundamentals Guidance Document for the Oil and Gas Industry [Online] Available from: http://www.ipieca.org/resources/good-practice/biodiversity-and-ecosystem-services-fundamentals [Accessed November 2017]

[21] IPIECA, API and International Association of Oil and Gas Producers (2015) Oil and gas industry guidance on voluntary sustainability reporting (3rd Edition) [Online] Available from: http://www.ipieca.org/resources/good-practice/oil-and-gas-industry-guidance-on-voluntary-sustainability-reporting-3rd-edition/ [Accessed November 2017]

[22] Cross Sector Biodiversity Initiative (2015) A cross-sector guide for implementing the Mitigation Hierarchy. Prepared by the Biodiversity Consultancy on behalf of IPIECA, ICMM and the Equator Principles Association. Cambridge, UK.

[23] Business and Biodiversity Offsets Programme (2012) Standard on Biodiversity Offsets. BBOP, Washington, D.C.

[24] United Nations Environment Programme (2018) Assessing Environmental Impacts - A Global Review of Legislation, Nairobi, Kenya.

D. Institutions: enforcement, transparency, accountability, inclusion, coordination and consultation

1. Introduction

67. Effective, accountable, inclusive and transparent institutions are of paramount importance in enabling energy and mining projects in resource-rich countries to help achieve sustainable development. These conditions allow for the development and implementation of policies, laws and regulations, establishing mechanisms for public participation and enhancing the availability of environmental data and information. This is important both within government and the private sector.

2. Selected existing approaches, standards and good practice

68. The World Bank's Mining Sector Diagnostic is one tool that can help countries to understand governance of the mining sector and how it can be strengthened. To date it has been used in seven countries: Botswana, Democratic Republic of the Congo, Ghana, Kenya, Mozambique, Peru and Zambia. The Natural Resources Governance Institute's Charter[25] provides a set of principles for how natural resources can be harnessed to support sustainable development, aimed at both governments and societies. Initiatives such as the Africa Mining Vision and the country visions that are emanating from it can help integrate biodiversity and ecosystem service considerations into the long-term strategy for specific sectors. The Extractive Industry Transparency Initiative promotes transparency of payments (and is moving towards transparency of licences and investment agreements), is aimed at both governments and the private sector. Although not targeted at biodiversity or ecosystem services, it can help countries identify key areas for improvement. For example, understanding where licensing procedures are not being followed, especially if this understanding is used to revisit the global governance frameworks to improve sector performance and not just the workings of the standards.

69. Industry associations, such as International Council on Mining and Metals and IPIECA, can help guide and inform the private sector's approach to biodiversity and ecosystem services. Accountability and transparency is one of the 10 Principles of the International Council on Mining and Metals, which has a membership of 25 mining and metals companies and over 30 mining associations.

70. Many businesses and financial institutions have considerable experience of mainstreaming biodiversity in the energy and mining sector. Peer-to-peer learning can be a powerful tool for building capacity across the sector, including within small and medium-sized or state-owned enterprises. Opportunities exist for industry and other stakeholders to support national Governments, building wider structures to support mainstreaming efforts. There are now many good examples of business-conservation partnerships.

71. Initiatives and tools focused on artisanal and small-scale mining could also build capacity and engage actors across the sector.

72. Countries have varying levels of experience with the energy and mining sector and the concept of mainstreaming biodiversity. There is considerable opportunity for countries to share their experiences with emerging oil and gas countries (for example, through the Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development). This could be particularly useful for sharing information and experiences among countries within the same region and contexts. The Oil for Development Programme, for example, shares Norwegian experiences with developing countries to help them build effective, transparent, accountable and inclusive institutions and capacity. The UNDP-Swedish Environmental Protection Agency programme on environmental governance of mining, funded by the Swedish International Development Cooperation Agency (SIDA), helps share knowledge, develop guidance and strengthen environmental governance capacities of responsible public institutions. This initiative also undertakes assessments of the rule of law in environmental public administrations responsible for mining, which helps assess the effectiveness of these institutions. There are examples of regional efforts to share

[25] Natural Resource Governance Institute (2014) Natural Resource Centre 2nd Edition [Online] Available from: https://resourcegovernance.org/approach/natural-resource-charter [Accessed April 2018]

knowledge and develop guidance, such as the "Guidelines for Mainstreaming Biodiversity and Ecosystem Services in Extractive Industry" developed by the South African Development Community member States.

73. As the activities of the energy and mining sector have relevance for a wide range of ministries, ensuring dialogue and coordination across ministries is essential for mainstreaming biodiversity into sectors. Institutional and coordination mechanisms are necessary to facilitate integrated, coherent efforts to mainstream biodiversity into energy and mining, and implement the Sustainable Development Goals.[26]

74. Initiated by the Convention on the Conservation of Migratory Species of Wild Animals (Resolution 11.27 on Renewable Energy and Migratory Species) from 2015, the Energy Task Force is a multi-stakeholder platform that works towards reconciling renewable energy developments with conservation of migratory species. Working collaboratively with governments, multilateral environmental agreements, investors, academic and non-governmental organizations, the aim is to foster the application of existing guidance and tools through international and national level partnerships, provide recommendations and address knowledge gaps.

3. Challenges to building effective institutions

75. While good practices or tools exist to assess and strengthen institutions, it can be challenging to update, adapt and disseminate them to foster broader uptake.

76. In particular, a lack of independent enforcement, training, funding, judicial mandate, legal elaboration and clear, transparent chains of institutional responsibility can be a clear challenge to building effective institutions that can ensure biodiversity and ecosystem services are considered within energy and mining developments.

77. While the activities of the energy and mining sector have relevance for a wide range of ministries, the necessary dialogue and coordination across ministries does not always take place, often due to a lack of joined up mandates, capacity and awareness.

E. Funding and environmental and social safeguards: innovative solutions to finance and investment

1. Introduction

78. International finance plays an important role, both through the safeguards associated with investments and project finance and the potential to fund actions identified to mainstream biodiversity.

2. Selected existing approaches, standards and good practice

79. Multilateral development banks and international finance institutions provide vital project-level financial support, some of which require biodiversity and ecosystem services to be considered as a condition of funding being granted. For example, under the International Finance Corporation's Performance Standard 6, lending for any project within an area defined as a critical habitat would only be considered if it can be demonstrated that there will be a net positive biodiversity gain as a result. Appropriate use of the mitigation hierarchy is also supported through such standards. Creating strong links between national lending, legislation and policies and international standards can be a powerful tool in changing industry behaviour. The World Bank, for example, has committed to stop financing upstream oil and gas from 2019[27] as part of its efforts to tackle climate change. Certification schemes, such as the responsible Jewellery Council and Responsible Steel, create a further market based financial incentive for responsible mining projects.

---

[26] United Nations Development Programme (2017). Institutional and Coordination Mechanisms: Guidance Note on Facilitating Integration and Coherence for SDG Implementation [Online] Available from: http://www.undp.org/content/undp/en/home/librarypage/sustainable-development-goals/institutional-and-coordination-mechanisms---guidance-note.html [Accessed April 2018]

[27] Chatham House (2017) The World Bank Won't Back Oil and Gas - What Now? [Online] Available from: https://www.chathamhouse.org/expert/comment/world-bank-wont-back-oil-and-gas-what-now# [Accessed April 2018]

80. While there are well established mechanisms for funding projects that consider biodiversity and ecosystem services, there are fewer options for funding planning and impact assessments at the programme, policy and plan level. Engaging with the finance sector at this level could provide financial support and capacity building for strategic environmental assessment and developing effective, transparent, accountable and inclusive institutions. For example, many donor agencies from developed countries and multilateral institutions (e.g. the United Kingdom Department for International Development, the Swedish International Development Cooperation Agency, the German Federal Ministry of Economic Cooperation and Development, the Norwegian Agency for Development Cooperation, the World Bank) invest in government capacity related to the extractives sector to help ensure these activities do not undermine the natural assets of the country. International agreements can also direct funding in support of activities to mainstream biodiversity through mechanisms such as the Global Environment Facility (GEF) and the Green Climate Fund (GCF).

81. Financial mechanisms such as bonds, funds and guarantees for rehabilitation after project closure can ensure funding is available for such tasks from the outset of a project.

82. One source of potential finance for biodiversity conservation is compensation related to the impacts of an operation (e.g. biodiversity offsets) or payment for ecosystem services. For example, the National Biodiversity Strategy and Action Plan of Uganda contains an action to set up a 'biodiversity offset trust fund' with the purpose of ensuring that petroleum activities result in no net loss to biodiversity or to compensate for the residual impacts of petroleum exploration that cannot be mitigated against. Biodiversity offsets and compensation should however be seen as a last resort when avoidance, minimization and restoration options are exhausted and offsets as a resource mobilization strategy should be treated with caution.

83. The revenue and royalties generated from energy and mining provide an opportunity for investment that supports a sustainable development agenda. This could include government capacity for strategic environmental assessments, investment in the development of new technology, remediation or restoration projects, engagement with artisanal and small-scale miners or support for management of areas by indigenous peoples and local communities. This should be supported by a transparent process of funding and assistance with funding applications.

3. Challenges to innovative solutions to finance and investment

84. A key challenge is ensuring that consideration of biodiversity is a requirement of finance at all levels and by all finance institutions. This often requires pressure from consumers and shareholders. Implementation of these safeguards also relies on awareness by government agencies and civil society to help ensure they are met. Certification schemes are growing in the mining sector, but nature of the energy market is problematic for these market-based systems.

85. A further challenge relates to ensuring that government revenue from the energy and mining sector is used to support sustainable development. A key factor in this regard is transparency around transactions. Exploitation of natural resources, particularly in countries with limited history and experience in energy and mining has frequently been associated with what is termed the "resource curse". Regions with an abundance of natural resources may experience sluggish economic growth, and benefits which flow to individuals rather than the national economy as a whole. There is a need for addressing transparency and accountability in revenue flows to foster more equitable and sustainable investments.

F. Data and information

1. Introduction

86. Inherent in all good decision-making is the need for accurate and comprehensive data and information. Many of the overarching data and information needs are common across sectors. Collection, collation of and access to quality biodiversity and ecosystem service data is not consistent. Consultation is essential to reach the wealth of relevant information held by international organizations, national and subnational governments, national and local conservation groups, non-governmental organizations, academics, indigenous peoples and local communities and other stakeholder groups. Such consultations

can also highlight important social and cultural values associated with biodiversity and ecosystem services that may not be obvious from data alone.

2. Selected existing approaches, standards and good practice

87. Examples of tools that provide access to biodiversity-relevant data for decision makers include the Global Biodiversity Information Facility (GBIF), the Integrated Biodiversity Assessment Tool (IBAT), MapX and the Local Ecological Footprint Tool (LEFT). A number of countries are advancing their data platforms to make national level data available across institutions for decision-making. One example of this is Tanzania's Environmental Information Network.

88. Data collected through strategic environmental assessments and environmental and social impact assessments, could provide valuable information on biodiversity and ecosystem services at various scales, as well as provide transparency in assessments. Collating, creating and publicizing databases of biodiversity relevant information, and frameworks for assessing impacts (e.g. environmental and social impact assessments, use of the mitigation hierarchy and biodiversity offsetting), monitoring, mapping and accounting for nature (e.g. for natural capital assessments) are likely to be helpful to Governments, companies and other decision makers. Many good data and information instruments exist and good practice around accurately assessing and valuing nature is being developed. Instruments allowing for the dissemination of data collected through "citizen science" programmes could also be considered.

89. A number of organizations and forums have begun collating case studies of business action on biodiversity. Examples are the National Biodiversity Strategy and Action Plan Forum (NBSAP Forum), the Natural Capital Coalition and the World Business Council for Sustainable Development. Greater awareness of what actions are being undertaken already could help businesses and governments develop their own strategies. With links to both government and business stakeholder groups (through the Global Business and Biodiversity Partnership) the Convention on Biological Diversity is in a good position to add to already collated case studies and make them publicly available.

3. Challenges related to data and information

90. Data availability, accessibility and quality remains a challenge for governments and businesses alike when making decisions that can have biodiversity and ecosystem service impacts. Data platforms that provide access to accurate and up to date information on protected areas, species distributions and ecosystems (and their use in planning and decision-making) are therefore important, yet underutilized and expensive to generate and maintain. The absence of long-term funding mechanisms for biodiversity data results in variability in quality and coverage, in turn leading to inconsistent decision-making[28]. While funding models have been developed for some platforms, this remains a key challenge at global and national scales. There can also be a lack of positive feedback in relation to data, where data gaps are identified and then filled.

91. Decision-making by the private sector and government is often time constrained. Access to relevant, easily interpreted data within these timeframes can be a challenge. This includes a lack of indicators to measure the outcomes of different strategies to mainstream biodiversity (e.g. sectoral policies). Increasing the evidence base, and engaging with academia to understand biodiversity impacts, emerging technologies and approaches (e.g. the effectiveness of habitat restoration), will help fill these data gaps.

G. Innovation: reducing demand, increasing efficiency and considering alternatives

1. Introduction

92. Reducing demand for energy and mining products and supporting innovation helps move towards cleaner, more sustainable production and use of resources.

[28] Juffe-Bignoli D, Brooks TM, Butchart SHM, Jenkins RB, Boe K, Hoffmann M, et al. (2016) Assessing the Cost of Global Biodiversity and Conservation Knowledge. PLoS ONE 11(8):e0160640. doi:10.1371/journal.pone.0160640

2. Selected existing approaches, standards and good practice

93. Resource and energy efficiency measures, as well as research, development and investment in new technologies and business models can help achieve both incremental and disruptive change that considers biodiversity and ecosystem services. This can lead to cost savings for the individuals, communities and businesses that implement them over time, and help avoid costly delays and remediation activities.

94. International and national policy can encourage innovation and reduce demand. The Paris Agreement[29] under the United Nations Framework Convention on Climate Change is of particular importance in driving the reduction of demand for fossil fuels and the uptake of cleaner energy sources to mitigate the threat of climate change. In 2013, the World Bank halted support to coal projects 'except under exceptional circumstances'. Both the European Investment Bank and the European Bank for Reconstruction and Development have adopted measures to phase out financial support for coal plants, while a number of countries have pledged to invest in research into alternatives. Canada and the United Kingdom launched the Powering Past Coal Alliance at the twenty-third meeting of the Conference of the Parties, with the objective of gaining 50 commitments to coal phase down by 2030 (or 2050 for non-OECD partners).

95. Advances are being made in renewable technology to help reduce biodiversity impacts. For example, wind energy developments present a risk to migratory birds, causing direct mortality from turbine collisions and altering migratory routes through avoidance behaviour. These impacts could be reduced if facilities avoid major migration stopovers and flyways, or if turbine operations are reduced during peak migration. The Migratory Soaring Birds Project is taking a collaborative approach to reducing impacts in Egypt's energy sector, including piloting a protocol for using "shut-down-on-demand" to reduce the risks of wind farms to migratory birds.

96. Examples of innovative approaches around impact mitigation include road-less development of the western Amazon (avoiding the associated impacts of building access roads for oil and gas projects[30]), extended reach drilling being used in many locations, including Dorset, United Kingdom (to avoid direct impacts on sensitive and protected sites), and halting seismic surveys for oil exploration as part of the Sanklin Project II in the Russian Federation in response to approaching whales.

97. The development of Circular Economy approaches – including the safe and efficient recovery of mined materials (minerals and metals) from discarded technology such as mobile phones and the development of secondary markets for these materials – may slow the demand for primary production. For example, in Sweden, a copper smelter runs on concentrates from mines and on secondary raw materials such as copper scrap, electronic scrap and copper residues collected from Europe. Various countries are exploring new and innovative ways to effectively and efficiently recycle a range of materials. Instruments such as the Waste Electrical and Electronic Equipment recycling directive may help recycle components of some electrical and electronic equipment or the impacts of their disposal. Support for the implementation of energy saving or energy efficient technologies may help reduce or slow the growth of overall demand. The integration of "green" infrastructure also shows potential for reducing energy demand. The mining sector is also taking innovative actions to reduce mine waste (i.e. waste rock and tailings) in response to a number of economic, environmental and social considerations.[31]

98. In terms of experience, knowledge and funding, public-private partnerships are an opportunity to build capacity and develop innovative solutions (e.g. the European Innovation Partnership on Raw

[29] United Nations, *Treaty Series*, Registration No. I-54113.

[30] Finer, M., Babbitt, B., Novoa, S., Ferrarese, F., Eugenio Pappalardo, S., De Marchi, M., Saucedo, M., and Kumar, A. (2015) Future of oil and gas development in the western Amazon. Environmental Research Letters. 10 024003

[31] Roche, C., Thygesen, K., Baker, E. (Eds.) (2017) Mine Tailings Storage: Safety Is No Accident. A UNEP Rapid Response Assessment. United Nations Environment Programme and GRID-Arendal, Nairobi and Arendal [Online] Available from: http://www.grida.no/publications/383 [Accessed March 2018]

Materials[32]). Approaches such as natural capital assessments can help consider both the economic and environmental costs of energy and mining products and possible alternatives. National and international policy will play a key role in incentivising research, innovation and development of more efficient use of resources and alternative sources with lower biodiversity impacts and carbon footprints.

3. Challenges to innovation

99. Unlike some other sectors, the range of potential locations of mining operations are limited (in some cases very severely) by the geographical distribution (and abundance) of the target material (mines generally have to be close to the ore they are exploiting). Some (though not all) innovative approaches, such as lateral drilling for oil and gas, may also be more expensive in the initial stages, with others still at the pilot stage. A lack of funding for research into and implementation of innovative mitigation approaches is also a challenge, with the need for a direct benefit to the company or institution making the investment to be understood.

100. While renewable energy sources such as solar are likely to be an important contributor to cutting carbon emissions, the inputs required to make solar technology also has biodiversity impacts through extraction of mined products and water use during production. Where energy generation and energy consumption are located far from each other this increases the need for more transmission infrastructure (and associated impacts such as wildlife collisions with overhead power cables). It should be noted that different countries may have differing levels of capacity for innovation, highlighting the challenge of sharing information, tools and technologies around good practice, building capacity and funding for the implementation of innovative approaches.

H. Opportunities for consideration by the Subsidiary Body on Implementation

1. Parties

101. Review and update relevant national policy and legislation in view of changing sectors, technology, knowledge and demand, to address biodiversity and ecosystem service related gaps. In particular, consider reviewing, updating and/or creating policy and legislation that:

(a) Requires strategic environmental assessment and environmental and social impact assessment to be conducted (including energy and mining-specific content in sectoral laws) and explicitly links the two processes;

(b) Empowers a central environmental agency to review decisions on the need for a strategic environmental assessment made by sectoral agencies or policy-issuing institutions;

(c) Ensures informed and effective public participation (including stakeholders identified as linked to or dependent on ecosystem services) is conducted from an early stage and throughout the strategic environmental assessment and environmental and social impact assessment process, in line with Principle 10 of the Rio Declaration on Environment and Development;

(d) Includes key elements of international good practice (for example elements of the International Finance Corporation's Performance Standard 6) within sector, impact assessment and public finance laws;

(e) Includes concepts such as the mitigation hierarchy, targets of net gain for biodiversity, cumulative and induced impacts, consideration of alternatives, use of biodiversity indicators and baselines, and natural capital assessments;

(f) Ensures a financial guarantee from operators so there are funds readily available for reclamation of affected land, including measures to reinstate biodiversity, after closure of energy and mining projects;

[32] European Commission (no date), The European Innovation Partnership (EIP) on Raw Materials [Online] Available from: https://ec.europa.eu/growth/tools-databases/eip-raw-materials/en/content/european-innovation-partnership-eip-raw-materials [Accessed April 2018]

(g) Ensures mechanisms are in place (and clearly stated) to ensure accountability from the very start of the process and addresses non-compliance with environmental approval conditions (i.e. agreed mitigation measures), including accessible grievance mechanisms for affected communities;

(h) Develops a clear mechanism to ensure transparency and access to information regarding energy and mining developments, as well as responsiveness to input provided;

(i) Establishes in law which geographic areas are off-limits to prospecting based on a strategic policy planning process;[33]

(j) Includes waste management procedures that are in line with international standards minimize the generation of waste and toxicity, encouraging waste recovery, and securing its short and long-term safe disposal;

(k) Ensures policy coherence between environmental and industry laws and policies (e.g. direct references to biodiversity-related laws and policies within energy and mining plans);

(l) Promotes sharing data and information, and supports the development of national platforms and/or networks for increasing access to such information, including information from within a country's exclusive economic zone (recognizing that in a range of countries all this is already in place);

(m) Requires, encourages and/or supports businesses to make biodiversity data collected for energy and mining projects (such as data collected through environmental and social impact assessments) public, accessible and interoperable (i.e. through submission to the national biodiversity platform);

(n) Supports the mainstreaming of biodiversity into energy and mining when activities are undertaken outside national borders. This could include minimum standards for nationally registered companies operating elsewhere or a requirement for products purchased by governments to meet minimum requirements;

(o) Considers strategies to better regulate the artisanal and small-scale mining sector, including formalization, in line with actions stipulated under the Minamata Convention.

102. Address the challenge of the implementation gap (or deficit) where legislative requirements exist but are not (fully) elaborated on or complied with. This includes ensuring the financial means and capacity within Governments to undertake strategic environmental assessments and enforce compliance with legal requirements.

103. Work with finance and sector ministries to consider redirecting revenue generated from the energy and mining sectors into building capacity for environmental regulation.

104. Consider linking elements of stakeholder analysis (such as livelihoods and human rights assessments) with ecosystems valuations to help provide fair assessments of impacts on livelihoods and human rights from energy and mining projects.

105. Facilitate area-based planning at the landscape/seascape level that works across sectors, integrates biodiversity values and links into national and subnational planning mechanisms and policies through the consistent use of strategic environmental assessments. Considering the promotion of voluntary strategic environmental assessments until relevant legislation can be enacted.

106. Encourage cross government/inter-ministerial policy approaches and dialogue that builds understanding of the value of nature and the potential impacts and opportunities associated with energy and mining. This could include mechanisms for communication and/or the appointment of focal points with authority to act within and across government agencies.

[33] For example, the national position on energy and mining activities within protected areas, including indigenous and community conserved areas, as well as the conditions of licence if granted (e.g. there must be a demonstrated net gain for biodiversity as a result of the development). The designation of an area as off limits to prospecting may be based on national legislation governing biodiversity conservation both within and outside protected areas.

107. Consider the use of existing business and biodiversity platforms that include stakeholders from government (including finance and energy ministers), academia, the private sector and non-governmental organizations, indigenous peoples and local communities to encourage dialogue and build capacity on biodiversity issues.

108. Collaborate with other Governments and donors to identify opportunities for information exchange, capacity building and funding opportunities.

109. Consider public-private partnerships with businesses from the energy and mining sector to build capacity.

110. Explore and define options for incentivising research, innovation and development into sustainable mining and energy practices, particularly those that consider biodiversity and reduce carbon emissions. This could include developing training or capacity-building programmes and integrating learning around biodiversity, ecosystem services and innovation into the curricula of a range of educational institutions.

111. Take steps towards reducing demand and developing a Circular Economy.

112. Support the successful implementation of national biodiversity action plans and strategies. Consider sector specific energy and mining targets and actions during subsequent review processes, and align with other national strategies and plans and creating a coordination mechanism to achieve common objectives in a resource-efficient and effective manner.

113. Explore with the private sector the options for a national biodiversity strategy and action plan for business.

114. Link national biodiversity platforms (where present) to the obligations for reporting/data collection under other agreements to achieve synergies and cost savings.

115. Report to the Executive Secretary their strategies associated with mainstreaming biodiversity in the mining and energy sector, including pilot experiences in connection with operationalizing Sustainable Development Goal 16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.

2. Executive Secretary

116. Support coordination between Parties and international organizations (such as the United Nations Environment Programme, the United Nations Development Programme and the United Nations Human Rights Council[34]) to avoid duplication and identify synergies relating to the implementation of multilateral environmental agreements at national level.

117. Develop guidance for Parties about proper assessment of energy and mining concessions, accounting for biodiversity, human well-being, implications of public investments in mining-related infrastructure, and liabilities of remediation after bankruptcy which may compete with other public environmental investments.

118. Support Parties in adopting clear and concise language within coherent environmental and industry policies, particularly when translating international commitments into national frameworks.

119. Review existing guidance material related to strategic environmental assessment and environmental and social impact assessment with Parties, experts and other relevant stakeholders. Consider developing and issuing updated guidance, including advice on how to incorporate considerations related to ecosystem services.

120. Engage with business and financial sectors to promote strategic environmental assessment as an important tool for sustainable business and gain their support for Governments through this process.

[34] Building on recommendations by United Nations special rapporteurs relevant to mining (e.g. recommendations of the Special Rapporteur on human rights and environment concerning biodiversity (A/HRC/34/49), the Special Rapporteur on the rights of indigenous peoples with respect to extractive activities (A/HRC/24/41).

121. Provide a platform for the sharing of information and experiences on mainstreaming biodiversity into the energy and mining sector.

122. Consider creating a formal ad hoc expert group to help Parties and stakeholders build effective, transparent, accountable and inclusive institutions.

123. Encourage international organizations, including the Global Environment Facility, the World Bank and relevant regional development banks to use the Convention on Biological Diversity's voluntary guidelines for safeguards and Akwé: Kon voluntary guidelines in implementing their due diligence systems. Engage with the finance sector to develop innovative funding arrangements for mainstreaming biodiversity into the energy and mining sector, including transparent, accessible funds for communities and alternative energy innovators.

124. Increase access to data and tools for mainstreaming biodiversity into the energy and mining sector, including promoting and facilitating the work of organizations already active in the area, and facilitate peer-to-peer learning for Parties on mechanisms to fund and create effective national biodiversity and ecosystem service data platforms.

125. Engage with business and academia on innovation for sustainable energy and mining practices and facilitate peer-to-peer learning for Parties on mechanisms to fund and encourage biodiversity-inclusive innovation at the national and regional levels. This could include facilitating technology transfers, where appropriate.

126. Develop a long-term strategic theme of innovation for biodiversity under the Convention on Biological Diversity.

3. Private sector

127. Explore with Parties the options for a national biodiversity strategy and action plan for business.

128. Ensure that projects are aligned with (and participate in) strategic level planning efforts.

129. Ensure compliance with national legislation, or international good practice where this provides greater biodiversity safeguards. In particular, seek opportunities for enhancing biodiversity and ecosystem services at the planning stage and throughout project lifecycles.

130. Engage with national initiatives under the Global Partnership for Business and Biodiversity.

131. Support the development of biodiversity indicators to assess biodiversity impacts.

132. Adopt common standards of biodiversity data collection (for example the Darwin Core used by Global Biodiversity Information Facility[35]) to facilitate data sharing and develop mechanisms to share biodiversity data collected through environmental and social impact assessments and monitoring with governments and other parties.

133. Share information and experiences on mainstreaming biodiversity between operations and projects in developed oil and gas economies and emerging economies.

134. Explore options for financing sustainable energy and mining projects and using tools, such as natural capital assessments, to make the business case. Invest in research and development for innovative energy and mining practices that reduce demand increase efficiency, including developing innovative practices for recycling and recovery of mined materials, and effectively mitigate impacts on biodiversity and ecosystem services.

135. Support and develop initiatives around responsible supply chains for biodiversity and ecosystem services, allowing consumers to make informed choices and drive demand for sustainably sourced materials.

---

[35] Global Biodiversity Information Facility (no date), What is Darwin Core, and why does it matter? [Online] Available from: https://www.gbif.org/darwin-core [Accessed April 2018]