



**Plenary of the Intergovernmental Science-Policy
Platform on Biodiversity and Ecosystem Services****Eighth session**

Online, 14–24 June 2021

Item 7 (a) of the provisional agenda*

**Scoping report for a thematic assessment of the
interlinkages among biodiversity, water, food and health****Scoping report on assessing the interlinkages among
biodiversity, climate, water, food, energy and health
(nexus assessment) ******Note by the secretariat**

1. At its seventh session, in paragraph 2(a) of section II of decision IPBES-7/1, the Plenary approved the scoping process for a thematic assessment of the interlinkages among biodiversity, water, food and health (nexus assessment), in accordance with the procedures for the preparation of Platform deliverables set out in annex I to decision IPBES-3/3 and based on the initial scoping report for the assessment, set out in appendix II, section I to document IPBES/7/6.
2. Considering the extraordinary situation caused by the novel Coronavirus and given the role that IPBES can play in strengthening the knowledge base on biodiversity links of current and future pandemics such as COVID-19 and in reaching a wide public, the IPBES Bureau and Multidisciplinary Expert Panel decided that IPBES would organize a virtual Platform workshop on the links between biodiversity and pandemics. The workshop was held online, from 27 to 31 July 2020, as a “Platform Workshop” in accordance with IPBES procedures¹. The workshop report informed the health-related aspects of the scoping of the nexus assessment and will be available as supplementary material for that assessment. The report will be made available in IPBES/8/INF/5.
3. The IPBES Bureau and Multidisciplinary Expert Panel also agreed to the organization of a co-sponsored workshop² with the Intergovernmental Panel on Climate Change on biodiversity and climate change. The workshop was held online, from 14 to 17 December 2021 and the workshop report informed the scoping of the nexus assessment and will be available as supplementary material for that assessment. The report will be made available in IPBES/8/INF/20.
4. The present note sets out the scoping report presented to the Plenary by the Multidisciplinary Expert Panel. Information on the scoping process is provided in IPBES/8/INF/4.

* IPBES/8/1.

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

¹ Section 6.1 of the procedures for the preparation of IPBES deliverables, set out in annex I to decision IPBES-3/3.

² Section 6.2 of the procedures for the preparation of IPBES deliverables, set out in annex I to decision IPBES-3/3.

I. Scope, timeline and geographic coverage, policy context, overarching questions and methodological approach

A. Scope

5. This document was prepared in response to decision IPBES-7/1, which approved a scoping process, for consideration by the Plenary at its eighth session, for a thematic assessment of the interlinkages among biodiversity, water, food and health. The initial scoping report³ describes the challenge for this assessment as “achieving good health for all with food and water security, including through the use of biodiversity, without adversely impacting biodiversity, water quality or climate and in the context of global change, including climate change”. The Multidisciplinary Expert Panel proposes to include energy in the scope, to allow the assessment to fully consider synergies and trade-offs related to climate change. Accordingly, and also taking into account that biodiversity and nature’s contributions to people are fundamental to supporting these nexus interlinkages, the assessment will consider interlinkages and interdependencies among climate, water, food, energy and health through their relationship with biodiversity and nature’s contributions to people in order to provide viable policy options for achieving the 2050 Vision for Biodiversity, the Sustainable Development Goals and other relevant multilateral objectives.

6. The report will assess the state of knowledge on past, present and possible future trends in these multi-scale interlinkages with a focus on biodiversity and nature’s contributions to people to inform the development of policies and actions. Strong interlinkages and interdependencies exist among the globally agreed goals of food and water security, health for all, affordable and clean energy, protecting biodiversity on land and in the oceans, and combating climate change, among other Sustainable Development Goals. The Sustainable Development Goals are regarded as “integrated and indivisible”, balancing the economic, social and environmental dimensions of sustainable development. Similarly, the objectives of the Rio Conventions and other relevant multilateral agreements and international frameworks are also recognized as being interlinked. The complementarity and trade-offs between these agreements and frameworks will be assessed in the context of the nexus approach.

7. The assessment will, in particular, examine the critically important links between biodiversity and human health. It will assess how infectious diseases emerge from the microbial diversity found in Nature⁴ and how human activities cause their spread.⁵ It will review how Nature provides natural medicines and drugs, and inspires synthetic products.⁶

8. For the purpose of this assessment, biodiversity is “the variability among living organisms from all sources including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part. This includes variation in genetic, phenotypic, phylogenetic, and functional attributes, as well as changes in abundance and distribution over time and space within and among species, biological communities and ecosystems”;⁷ climate includes the global climate system and its interactions with human activities including greenhouse gas emission and mitigation and climate adaptation; water includes all forms of surface and ground water and the biophysical and human processes and systems that regulate its quality, quantity, distribution and use; food includes the full value chain for all cultivated and wild foods, from production to consumption and disposal; energy includes the full value chain of all renewable and non-renewable energy sources, including extraction, production, distribution, waste, and impacts; and health includes human physical and mental health and well-being and the systems related to prevention, treatment and management of diseases.

³ IPBES/7/6, appendix II, section I.

⁴ Nature, in the context of the Platform, refers to the natural world, with an emphasis on biodiversity. Within the context of science, it includes categories such as biodiversity, ecosystems, ecosystem functioning, evolution, the biosphere, humankind’s shared evolutionary heritage, and biocultural diversity. Within the context of other knowledge systems, it includes categories such as Mother Earth and systems of life. Other components of nature, such as deep aquifers, mineral and fossil reserves, and wind, solar, geothermal and wave power, are not the focus of the Platform. Nature contributes to societies through the provision of contributions to people, see IPBES (2019): Summary for Policymakers of the Global Assessment Report on Biodiversity and Ecosystem Services. S. Diaz, J. Settele, E.S. Brondizio, et al. (eds.). IPBES secretariat, Bonn, Germany. 56 pages.

⁵ IPBES (2020): Workshop Report on Biodiversity and Pandemics of the Intergovernmental Platform on Biodiversity and Ecosystem Services. P. Daszak, et al. (eds.). IPBES secretariat, Bonn, Germany. 96 pages.

⁶ IPBES (2019): Summary for Policymakers of the Global Assessment Report on Biodiversity and Ecosystem Services of IPBES. S. Diaz, J. Settele, E.S. Brondizio, et al. (eds.). IPBES secretariat, Bonn, Germany. 56 pages.

⁷ Glossary of the Global Assessment Report on Biodiversity and Ecosystem Services (IPBES 2019).

9. The assessment will highlight thresholds, feedbacks and resilience in nexus linkages, as well as opportunities, synergies and trade-offs between different response options. The assessment will consider the synergies and trade-offs in terms of broadly defined social (e.g., cultural, spiritual, health, governance, power, gender, equity, security), economic (e.g., livelihoods, income, employment, distribution, equity) and ecological (e.g., populations decline, extinction risk, ecosystem condition, connectivity, climate conditions, water conditions) impacts. When possible, such analyses will be quantitative. Emphasis will be placed on response options that consider these nexus elements and their diverse dimensions.

10. The assessment will evaluate the role of the most important indirect (i.e., societal values, production and consumption patterns, demography, technology and culture, and governance) and direct drivers of change (i.e., land and sea-use change, exploitation, pollution, invasive species, and climate change),⁸ the role of both formal and informal institutions, and the impacts of the patterns of production, supply and consumption (including telecoupling) on nature, nature's contributions to people and good quality of life.

11. The assessment process and its outputs will be supported by, and contribute to, the four functions of the Platform.⁹

B. Timeline and geographic coverage

12. This assessment will be global in scope, but highlight regional similarities and differences, and will include terrestrial, freshwater and marine systems.

13. The time frame of analyses will cover the past (last 50 years) and current status and plausible future projections up until 2050, with a focus on various periods up to 2050 that cover key target dates related to the post-2020 global biodiversity framework¹⁰ and the Sustainable Development Goals. Longer historic time horizons may be considered to understand the roles of key drivers that occurred or were initiated more than 50 years ago and are clearly relevant to future response options. Longer future time horizons up to 2100 will be considered where they add relevant knowledge on the long-term consequences of nexus interactions or the long-term resilience of response options.

14. The assessment will be conducted over approximately three years, which positions it well to inform and facilitate a review of progress towards the post-2020 global biodiversity framework, the 2030 Agenda for Sustainable Development, and the Paris Agreement on Climate Change.

C. Policy context

15. This assessment will contribute to the development of a strengthened knowledge base for policymakers for informed science-based decision-making, in the context of the 2050 Vision for Biodiversity, the post-2020 global biodiversity framework and its targets, as well as national biodiversity strategies and action plans, nationally determined contributions and long term strategies under the Paris Agreement, and the 2030 Agenda for Sustainable Development.

16. Intended users include Governments, multilateral environmental agreements (including but not limited to: the Convention on Biological Diversity, the Convention on International Trade in Endangered Species of Wild Fauna and Flora, the Ramsar Convention on Wetlands, the Convention on Migratory Species of Wild Animals, the United Nations Convention to Combat Desertification, the United Nations Framework Convention on Climate Change, oceans-related processes under the United Nations General Assembly), other multilateral environmental organizations, academic organizations, the private sector and civil society, including indigenous peoples and local communities and non-governmental organizations. The assessment is also expected to inform other national, regional and global policies on the conservation and sustainable use of biodiversity and ecosystems and their contributions to people. The assessment will also provide guidance on building resilience from pandemics highlighting the role of biodiversity and restoration of ecosystem functions in their prevention.

⁸ As identified in the Summary for Policymakers of the Global Assessment Report on Biodiversity and Ecosystem Services.

⁹ UNEP/IPBES.MI/2/9, annex I, appendix I, section I.

¹⁰ Decision 14/34 of the Conference of the Parties to the Convention on Biological Diversity. For more information see <https://www.cbd.int/conferences/post2020>.

D. Overarching questions

17. The assessment will aim to address, inter alia, the following questions of relevance to decision-makers dealing with complex interactions among nexus elements; there is no direct one-to-one relationship between these questions and the chapters of the assessment:

(a) How do past and current approaches to the production and use of water, food and energy, and their interactions, impact on/interact with biodiversity and nature's contributions to people, including the disadvantaged and indigenous peoples and local communities? How will climate change interact with and modify the role of nexus elements? What is the role of cultural uses in this interaction?

(b) What is the role of biodiversity and nature's contributions to people in human health and well-being? How is that role mediated and/or impacted by water, food or energy production and supply, consumption, climate change and/or their interactions?

(c) How can synergies among the Sustainable Development Goals be maximized to enhance biodiversity and resolve conflicts between development and biodiversity conservation?

(d) What are the various policy/management and financial options, for conserving and sustainably using biodiversity, nature's contributions to people and human health while implementing an integrated and sustainable water/food/energy system? How can these policy/management options also improve climate change resilience and reduce greenhouse gas emissions?

(e) What are the components of a successful¹¹ integrated management system for water/food/energy designed to minimize negative impacts to biodiversity, nature's contributions to people, climate change and human health? How can biodiversity contribute to and enhance the resilience and adaptability of food and bioenergy production systems? How can progress be measured towards equitability and sustainability of access to relevant components of biodiversity and nature's contributions to people, including among indigenous peoples and local communities? Which indicators can be used to track progress toward goals and targets, how effective are the indicators of the monitoring framework of the post-2020 global biodiversity framework and the 2030 Agenda at capturing the nexus interactions and what options exist for improvement?

E. Methodological approach

18. The assessment will be produced by a group of experts in accordance with the procedures for the preparation of Platform deliverables. It will include a summary for policymakers and a set of chapters, submitted to the Plenary for its approval and acceptance, respectively.

19. The assessment will aim to be credible, legitimate, and build from a multiple evidence-base. The summary for policymakers will highlight key policy-relevant findings and non-prescriptive policy options for a wide range of end users, some of which are mentioned above, and reflect the comprehensive analysis of the current state of scientific knowledge and other knowledge systems (including indigenous and local knowledge) performed in the chapters.

20. The assessment will be based on existing evidence: data (including, as appropriate, national data), scientific and grey literature and other forms of knowledge and languages (to the extent possible), including indigenous and local knowledge, in line with relevant procedures of the Platform.

21. The assessment will build on and complement previous and ongoing work by IPBES, including IPBES assessments (methodological, thematic, regional and global). The reports from the IPBES workshop on biodiversity and pandemics and the IPBES/IPCC co-sponsored workshop on climate and biodiversity will be considered as supplementary material in the preparation of the assessment. The assessment will also use existing data and information held by global, regional, subregional and national institutions including but not limited to relevant multilateral environmental agreements and intergovernmental organizations. The assessment will use existing scenarios and models as well as new scenarios and models whose production may be catalyzed as part of the follow-up to the IPBES Assessment of Scenarios and Models of Biodiversity and Ecosystem Services¹².

¹¹ "Success" is described as a system having minimal impacts on biodiversity.

¹² IPBES (2016): The Methodological Assessment Report on Scenarios and Models of Biodiversity and Ecosystem Services. S. Ferrier, K. N. Ninan, P. Leadley, R. Alkemade, et al. (eds.). IPBES secretariat, Bonn, Germany. 348 pages.

22. The assessment will identify key knowledge gaps and areas of knowledge generation needs in capacity, policies and policy supporting tools and will provide options and solutions for addressing them at the appropriate scales.
23. The task force on indigenous and local knowledge will support the implementation of the approach to recognizing and working with indigenous and local knowledge in IPBES for this assessment. The task force on knowledge and data will support work related to data and knowledge, as detailed in section III below. The task force on scenarios and models will support the work of authors, and in particular those from chapter 4. The task force on policy support will perform work to increase the policy relevance of the assessment and its use in decision-making, once approved. Finally, the task force on capacity-building will oversee the implementation of capacity-building activities as outlined in section V below.
24. Given the potentially strong interlinkages between the planned IPBES nexus assessment and transformative change assessment (thematic assessment of the underlying causes of biodiversity loss and the determinants of transformative change and options for achieving the 2050 Vision for Biodiversity, IPBES/8/4), close coordination and facilitation between both assessment processes during their development will be ensured to enable complementarity and synergies and to avoid duplication of scope and work. The two assessments will be complementary, with the transformative change assessment focused on determinants of transformative change, and the nexus assessment focused on options for overcoming trade-offs and for enabling synergies between biodiversity, water, food, climate, energy and health.

I. Chapter outline

25. Sustainable water, food, energy and health systems are interconnected with biodiversity, ecosystems and nature's contributions to people. The nexus of biodiversity, water, food, energy and health also interacts with climate change, and in particular with how people mitigate emissions and develop options to adapt to climate change. Nexus approaches simultaneously address interactions across multiple sectors and the cumulative impacts of various drivers, that are at the heart of the Sustainable Development Goals and other relevant multilateral goals, reflecting their integrated, indivisible and interlinked nature.
26. The assessment will be divided into two parts, with part I focused on framing the nexus, and part II on pathways to sustainable futures. Part I will include four chapters, part II eight, each containing an executive summary.

Part I. Framing the nexus

27. **Chapter 1: Introducing the nexus.** Chapter 1 will outline the general framework for the assessment, define the elements of the nexus, including their social, economic and environmental aspects, and portray the interlinkages and interdependencies among the elements (biodiversity, climate, and the systems pertaining to water, food, energy and health) across scales and geographic regions. Chapter 1 will explain the policy relevance of the nexus assessment, provide a road map and overarching rationale for the sequence of chapters in the assessment and identify the policy relevant key questions pertinent to the nexus assessment (see section D). The chapter will frame the conceptual basis for the nexus assessment linked to the IPBES conceptual framework including links to nature's contributions to people and good quality of life. The chapter will also discuss the importance of indicators in the context of the nexus, and the effectiveness of the monitoring frameworks of the post-2020 global biodiversity framework and of the 2030 Agenda at capturing the nexus interactions.
28. **Chapter 2: Status and past trends of basic interactions in the nexus.** Chapter 2 will assess the global and regional trends and current status of key aspects of the two-way interactions between biodiversity and each element of the nexus. The chapter treats each two-way interaction with a separate section: (a) Biodiversity and climate; (b) biodiversity and water; (c) biodiversity and food; (d) biodiversity and energy; (e) biodiversity and health.
29. Within each section, interactions will be described and assessed, quantitatively when possible, in terms of their environmental, social and economic costs and benefits. Each section will summarize overarching insights that can improve decision-making and assigns attribution of past trends in important interactions to drivers (direct and indirect), identifying which past actions, decisions, policies or institutions have or have not advanced elements of the nexus relative to the Sustainable Development Goals at various scales. The analysis and synthesis in each section will describe the roles of formal and informal institutions (e.g., shared rules, values, customs and cultural practices)

associated with any of the systems in the nexus. In addition to an in-depth assessment of two-way interactions, each section will also give a brief indication of the most important past and current higher order (three way or higher) interactions involving each pair which will be examined in more detail in chapter 3.

30. **Chapter 3: Status and past trends of complex interactions in the nexus.** Chapter 3 will assess the global and regional trends and current status in higher-order interactions among biodiversity, climate, water, food, energy, and health. Building on chapter 2, which approaches this nexus through system-specific two-way interactions, this chapter will emphasize the three-way and higher interactions (e.g., biodiversity – food – health, biodiversity – climate – water – energy). Understanding the nexus is complex but essential to managing biodiversity and development issues effectively. The chapter will attribute past trends in important interactions to drivers (direct and indirect), identifying which past actions, decisions, policies, or institutions have affected elements of the nexus relative to the Sustainable Development Goals. The chapter will assess potential synergies and trade-offs among these multiple dimensions of the nexus and identify challenges, opportunities, and methodologies for approaching them holistically instead of through the lens of one system at a time. The chapter will not attempt to assess every possible higher-order interaction. Instead, it will identify and focus on a subset of interactions that are likely to be most powerful in shaping the nexus and most relevant to response options. In doing so, it will establish a set of overarching relationships that can be explored in a consistent manner through the scenarios provided in chapter 4.

31. **Chapter 4: Future interactions across the biodiversity-climate-water-food-energy-health nexus.** Chapter 4 will assess different types of scenarios (exploratory, policy-screening and target-seeking, defined according to the IPBES Assessment of Scenarios and Models) representing plausible futures for the nexus issues addressed in this assessment. The chapter will focus on scenarios that address, in an integrated way, multiple interactions among these issues and their response to major drivers of change (e.g., population and economic growth), as identified in chapter 3 as being most powerful and relevant to response options. While the chapter will cover a range of exploratory scenarios that are likely to show positive and negative future impacts on biodiversity, a greater focus of the chapter will be on the analysis and comparison of scenarios representing sustainable futures, paving the way for chapters 5 to 11. The timeframe of the analysis will focus on scenarios covering the period from 2030 to 2050 (linking to relevant policy targets such as the Sustainable Development Goals and the 2050 Vision for Biodiversity), although longer time horizons to 2100 will be considered where they add relevant knowledge on the long-term consequences of nexus interactions or the long-term resilience of response options. Global to national (and sub-national where relevant) scale scenario studies that are quantitative and/or qualitative will be considered.

32. The chapter will cover a wide range of direct and indirect drivers of biodiversity change (see paragraph 10) that are addressed within scenarios that affect or shape the nexus, including how these drivers evolve through time into the future. The chapter will also account for the alternative worldviews and visions of the future, including those embedded within indigenous and local knowledge. The chapter will include analyses of which nexus interactions are most influential in determining how multiple internationally agreed policy goals (e.g., post-2020 global biodiversity framework, Paris Agreement and the Sustainable Development Goals) can be achieved, whilst minimizing trade-offs. It will show which pathways lead to outcomes that are closest and furthest from these policy goals. Finally, it will discuss uncertainties and limitations embedded in currently available scenarios and models, focusing on their treatment of nexus interactions.

Part II. Pathways to sustainable futures

33. Part II of the assessment will address the possible pathways to realizing a range of sustainable futures¹³.

34. Chapter 5 will assess policy and socio-political options to implement changes. Drawing from the analyses in Part I, chapters 6 to 11 will take a holistic multi-sectoral view to assess the potential for different sets of actors to create the changes identified in chapter 5. The chapters will assess options for action by actors focused on water (Chapter 6), food (Chapter 7), energy (Chapter 8), health (Chapter 9), finance (Chapter 10) and biodiversity (Chapter 11), and which are in synergy with each other, in line with the nexus approach.

¹³ The assessment will acknowledge that there is a range of sustainable futures depending on one's world view and a number of other factors.

35. Each chapter will consider:

- (a) Response options that include individual and collective action (e.g., from local to national governments, international organizations, the private sector, youth, faith-based organizations, indigenous peoples and local communities, financial institutions, non-profit organizations, research organizations) to modify or change policies and regulations, financial instruments, governance structures, technologies, business practices, behaviours, and enabling conditions to advance the changes identified in chapter 5;
- (b) Response options that require joint action by multiple sectors, emphasizing how each sector would contribute to those joint actions;
- (c) The potential of nature-based solutions¹⁴ and response options;
- (d) The ecological (e.g., biodiversity, climate, ecosystems, nature's contributions to people), social (e.g., gender equity, cultural values, disease burden, food security, water security, disaster risk) and economic (e.g., employment, livelihood options, income, access to capital) costs and benefits (positive and negative impacts) of response options that can advance the changes highlighted in chapter 5. These assessments will be quantitative when possible and include consideration of the ecological, social and economic costs of inaction or delayed action;
- (e) Which indicators are used to track progress toward goals/targets, including as part of the monitoring framework of the post-2020 global biodiversity framework and the 2030 Agenda, how efficient are they at capturing nexus interactions, what progress has been made against these indicators, and what options exist to improve or complement them?
- (f) Knowledge gaps related to response options for the given sector, including limitations to using process-based and numerical simulation models for nexus explorations;
- (g) As relevant, case studies of successes and failures at different scales.

36. **Chapter 5: Policy and socio-political options across the nexus that could facilitate the transition to a range of sustainable futures.** Chapter 5 will define what change means in the context of the present nexus and will assess the utility of different theoretical and practical frameworks for implementing sustainable management approaches, either through transformative change, or identifying other approaches to management (policy and socio-political options). Changes that could facilitate sustainability within the context of the six interacting nexus elements, and in the broader context of the Sustainable Development Goals and the Paris Agreement will be explored. This chapter will assess the factors, including economic and financial, technical and technological, social, institutional, cultural and behavioural, that could facilitate or obstruct changes to achieve a sustainable future, and avoid actions, which could be maladaptive in the longer term. Specifically, chapter 5 will identify and assess cross-cutting / high-level issues that are relevant for all nexus elements, e.g., social issues such as poverty, employment, gender, cohesion, education, food security, equity and justice, and demography; economic and financing issues such as inclusive wealth, subsidies, externalities, income, growth, cost-effectiveness; and political issues such as polycentric governance and inclusiveness. The chapter will assess how economic, financing and governance systems can evolve, as well as evaluate the potential of cross-sectoral planning and management in creating sustainable approaches to management of nexus elements. This chapter will also examine the roles of technology, and indigenous and local knowledge, and different perceptions of a good quality of life and the values and structural conditions that influence individual and collective behaviour in relationship to the nexus. The potential effectiveness of a variety of multi-governance interventions and leverage points will be assessed. The chapter will discuss and assess the types of actions that represent transformative changes and other sustainable approaches to decision-making, e.g. what actions are not in themselves transformative but lead to transformation (e.g., the elimination of perverse subsidies), and briefly identify the types of sector-specific actions that are incremental, but still very important (e.g. the use of agro-ecological practices), while understanding synergies and trade-offs with all nexus elements.

37. **Chapter 6: Options for delivering sustainable approaches to water, in synergy with other components of the nexus.** Chapter 6 will address the response options that can be implemented by actors in the freshwater sector to create the changes outlined in chapter 5. Response options such as water policies, value of water and demand management that provide a safe, adequate and equitable supply for various users and uses will be identified and assessed at the watershed and other appropriate scales. The chapter will also assess policy options available to public and private water managers such

¹⁴ Actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits (Glossary of the IPBES Global Assessment of Biodiversity and Ecosystem Services).

as participatory management, adaptive uses of water systems, water tenure, integrated watershed management, the mitigation measures for water infrastructure development, and nature-based solutions that contribute to biodiversity and ecosystem protection and management. This chapter will take a holistic integrated approach, while also seeking to address challenges to implementation of policy response options. It will incorporate biodiversity and nature's contribution to people into considerations in current policy responses, commitments, incentives and finance channels along with water management for climate change mitigation and adaptation. It will also explore the utility of relevant transdisciplinary concepts, which can be used to identify innovative policy interventions.

38. **Chapter 7: Options for delivering sustainable energy, in synergy with other components of the nexus.** Chapter 7 will address the response options that can be implemented by actors in the energy sector to create the changes outlined in chapter 5. Options will focus on mainstreaming biodiversity into the energy sector, including both carbon and non-carbon-based energy systems and may cover responses that integrate all aspects of biodiversity in the energy sector. Options will also focus on improving the location, operation and cumulative impacts of energy infrastructure by avoiding, minimizing, restoring or offsetting impacts on biodiversity and other elements of the nexus. Options will further focus on preventing or reducing the effects of scale mismatches between policies on energy security, climate change mitigation and biodiversity conservation. The assessment will examine policies and procedures related to governance of energy systems. Further, the assessment will examine financing options and incentives; how to insert biodiversity prioritization in current demand and supply side policy responses, explore nature-based solutions, and commitments and finance channels for energy security, energy access and climate change mitigation and adaptation. The assessment will examine options for advancing the transition from carbon to non-carbon-based energy systems, explore measures to manage and reduce carbon outputs (including zero or low-carbon sources) and energy efficiency. Finally, the assessment will explore the impacts of biofuel production for climate mitigation, on biodiversity loss, food production and water use or incentivize collaboration with water, food, or health on joint interests.

39. **Chapter 8: Options for delivering sustainable food systems, in synergy with other components of the nexus.** Chapter 8 will address the response options that can be implemented by actors in the food system to create the changes outlined in chapter 5. Response options considered may include policies and procedures at any scale related to food systems e.g., entire value chains of wild harvested terrestrial, freshwater or marine resources, crops, feedstocks, fiber, livestock, aquaculture, agroforestry and forestry). Response options may include governance of food systems; financing options and incentives; developing and maintaining productive and sustainable wild and cultivated food resources for subsistence and industrial scale harvesting. The assessment will also examine the use of agroecological, organic, or integrated pest management practices and/or biotechnology; integrated landscape planning and climate smart food production as pathways to sustainability. Further, the assessment will examine how to achieve food and nutrition security and food safety, and how to reduce food loss and waste. Other components of the food system such as altering food processing, packaging, distribution, trade and marketing will be considered as part of the analysis. The assessment will consider indigenous and local knowledge relevant to food systems; examine how to alter food demand and consumption and how to increase diversity in food consumption to ensure equitable access to healthy diets. Response options could also include those that contribute to water security and thriving freshwater systems; reducing greenhouse gas emissions; increased efficiency (e.g., land requirements, water and chemical inputs, soil health) in existing production or harvest systems; and improved health (e.g., under and overnutrition; air quality; pandemic prevention) in order to facilitate improvements across all elements of the nexus.

40. **Chapter 9: Options for delivering sustainable approaches to health, in synergy with other components of the nexus.** Chapter 9 will address the response options that can be implemented by health actors to create the changes outlined in chapter 5. Response options considered may include policies and procedures related to valuing the human health-related contributions from biodiversity (including medicinal plants, contributions to nutrition and to mental health). The assessment will examine progress towards equity in accessibility to health-related benefits (including for indigenous peoples and local communities, community groups, women and girls); governance of intellectual property rights; management of environmental determinants of diseases, or health system impacts on biodiversity. Response options may include health-oriented actions that benefit health and biodiversity, as well as other elements of the nexus and may require cross-sector collaboration (e.g., sanitation and wastewater treatment; diet diversification that maintains crop genetic diversity and improves nutrition; reproductive health options that aid maternal and child health and lower demands for environmental resources and maximize cross-sectoral benefits and governance; addressing a One Health Approach in an environment shared by people, animals and plants; COVID-19 recovery actions

that reduce future pandemic risk and mitigate climate change and/or enhance food security¹⁵). There may be considerations of policies and procedures that adopt frameworks that allow to explore approaches to a healthy planet, maximizing cross-sectoral benefits and governance. Response options will include those that manage the linkages among biodiversity and disease prevention, including links to anthropogenic drivers of the emergence and spread of infectious diseases including those with pandemic potential such as SARS-CoV2, SARS, Nipah, HIV/AIDS, Ebola, including land use change, climate change, wildlife consumption and trade, and livestock intensification.¹⁶

41. **Chapter 10: Options for delivering sustainable approaches to finance.** Chapter 10 will address the response options that can be implemented by actors in the financial sector to create the changes outlined in chapter 5. The assessment will examine the role of financiers (including private funds of investors, asset managers, investment and development banks, pension funds, institutional investors such as insurance companies, as well as public funds) in funding progress towards the options identified in previous chapters. The assessment will consider response options related to domestic budgets, philanthropic foundations, international aid cooperation, private investors and lenders, and multi-lateral organizations (e.g., International Monetary Fund, World Bank, World Trade Organization). Further, the chapter will assess progress in mobilizing the financing required to achieve changes highlighted in chapter 5, including those that have potential to achieve the Sustainable Development Goals. The chapter may consider market and non-market economic instruments within the context of evolving economic paradigms explored in chapter 5 (e.g., inclusive wealth, natural capital accounting). Issues to be addressed will include ecosystem valuation techniques, standards and certifications, non-tariff barriers to trade, lending standards, investment frameworks, trade regimes, including directives, payment schemes, benefit-sharing instruments, intellectual and other property rights, emissions pricing, access and benefit sharing and liability schemes and research funding, building on and complementing the IPBES assessment on values, once finalized.

42. **Chapter 11: Options for delivering sustainable approaches to biodiversity conservation and use, in synergy with other components of the nexus.** Chapter 11 will address the response options that can be implemented by environmental or conservation actors to create the changes outlined in chapter 5. Response options considered may include nature-based solutions, terrestrial and marine spatial planning, the creation and effective and sustainable management of terrestrial, freshwater and marine protected area networks and ecological corridors, other area-based effective conservation measures, environmental restoration, and environmental remediation. Response options may include environmental regulations (e.g., regarding energy development, infrastructure development, water management, fisheries management, agricultural chemical use, and pollution), and voluntary norms or formal governance agreements related to natural resource access and management. Options will include consideration of necessary research, monitoring and environmental education to support changes identified in chapter 5.

43. **Chapter 12: Summary and synthesis of options, knowledge gaps and capacity development.** Chapter 12 will summarize the opportunities for action for a range of policymakers, decision-makers and actors at all levels, including relevant parts of the United Nations system, the governing bodies of nexus-related biodiversity, climate, food, water, health or energy agreements and other relevant agreements, as appropriate and in accordance with their respective mandates, policymakers, legislators, private sector actors, financial planners, civil society, academic and research institutions and indigenous peoples and local communities who are related to any systems within the nexus. This summary will also include a synthesis of the costs of action and inaction identified in chapters 6 to 11, providing a conclusion on how they relate to each other. Emphasis will be given to summarizing which opportunities for transformation can be driven most efficiently by actors within a sector, and which opportunities will require collaborative action across multiple sectors and civil actors. Attention will also be given to which trade-offs within the nexus are likely to persist, and what can be done to mitigate these and support social groups most likely to be impacted.

44. The chapter will summarize the findings on the strengths and weaknesses of the monitoring frameworks of the post 2020 global biodiversity framework and of the 2030 Agenda for Sustainable Development in the context of the nexus and suggest options to complement them. Finally, the chapter will synthesize knowledge gaps, including governance gaps and future research needs as identified throughout the assessment. Attention will be given to opportunities for synergies in filling knowledge and capacity gaps across elements of the nexus.

¹⁵ For specific potential options see IPBES (2020): Workshop Report on Biodiversity and Pandemics of the Intergovernmental Platform on Biodiversity and Ecosystem Services.

¹⁶ Ibid.

III. Data and information

45. The nexus assessment will draw on data and information from diverse knowledge systems and languages, including scientific literature and indigenous and local knowledge, addressing all the components of the IPBES conceptual framework in order to explore the interrelationships between nature, nature's contributions to people, drivers, institutions and governance and a good quality of life.

46. Attention will be given, in accordance with the Platform's data management policy, to ensuring access to metadata and, whenever possible, the corresponding underlying data, through a findable, accessible, interoperable and reusable (FAIR) process to ensure comparability between assessments. Furthermore, the task force on knowledge and data will work towards ensuring that the outcomes (i.e. knowledge and metadata products) of the nexus assessment are widely available for future Platform assessments and other uses.

47. The assessment will also identify and seek access to globally and regionally relevant data and information sources that may exist or emerge. Potential data sources include, but are not limited to, global, regional and national institutions and organizations, scientific literature, grey literature and indigenous and local knowledge. The needs of the assessment process will be communicated widely in order to identify and encourage the sharing of relevant data and information.

48. The task force on knowledge and data will support work on data and information quality, confidence, essential biodiversity variables and indicators, baselines and representativeness, as necessary. It will also support experts in their identification of knowledge gaps and, subsequently, promote knowledge generation to address the gaps identified.

49. Addressing and working with indigenous and local knowledge in the assessment will be in line with the IPBES approach adopted by the Plenary in decision IPBES-5/1 and relevant guidance regarding its implementation prepared by the task force on indigenous and local knowledge.

IV. Capacity-building and development

50. Capacity-building activities will help support the development and uptake of the assessment. The activities will be designed in accordance with objective 2 on building capacity of the IPBES work programme up to 2030 and the capacity building rolling plan, under the guidance of the task force on capacity-building. Activities will, subject to the availability of resources, include: The IPBES fellowship programme; the training and familiarization programme; science-policy dialogues; and support to activities organized by other organizations in support of the uptake and use of the assessment findings across sectors and the strengthening of the science-policy interface at (sub)regional and national levels.

V. Communication and outreach

51. The nexus assessment report and its summary for policymakers will be published in electronic format, made available on the Platform website and promoted through social media channels of the Platform. The summary for policymakers will be available in all official languages of the United Nations and will be printed on demand, resources permitting. Outreach to a broad set of stakeholders, including the wider audience of decision-makers, will be based on the Platform's communications and outreach strategy and budget.

52. Communication and outreach will be undertaken from the outset and during the development of the assessment in order to build engagement with the wider knowledge community and the end users of the assessment. Engagement with users, across sectors, will help to define the type and range of communication products and policy support tools in multiple languages (where appropriate and capacity is available), that will be developed as part of the assessment.

VI. Technical support

53. Technical support for the nexus assessment will be provided by a technical support unit, composed of several full-time professional and administrative staff members. This unit will work in close collaboration with the groups of experts producing other IPBES assessments and with the IPBES task forces, and their respective technical support units.

VII. Process and timetable

<i>Date</i>	<i>Actions and institutional arrangements</i>
2021	
Second quarter	The Plenary at its eighth session is invited to approve the undertaking of the nexus assessment, and to request the secretariat to establish the institutional arrangements necessary to operationalize the technical support required for the assessment The Multidisciplinary Expert Panel, through the secretariat, requests nominations of experts from Governments and other stakeholders
Third quarter	The Multidisciplinary Expert Panel selects the assessment co-chairs, coordinating lead authors, lead authors and review editors in line with the procedures for the preparation of IPBES deliverables, including by implementing the procedure for filling gaps in expertise
Fourth quarter	Selection decision communicated to nominees Meeting of the management committee (co-chairs, members of the Bureau and Multidisciplinary Expert Panel assigned by these bodies to the assessment) to plan first author meeting
2022	
First quarter	First author meeting with co-chairs, coordinating lead authors, lead authors, review editors and members of the Bureau and Multidisciplinary Expert Panel that are part of the management committee of the assessment
First to third quarter	Preparation of zero-order drafts and first-order drafts of chapters
Early fourth quarter	First external review (6 weeks) – draft chapters made available for review by experts
Fourth quarter	Second author meeting with co-chairs, coordinating lead authors, lead authors, review editors and members of the Bureau and Multidisciplinary Expert Panel that are part of the management committee of the assessment Back-to-back with the second author meeting: Meeting to advance the preparation of the summary for policymakers with co-chairs, coordinating lead authors, lead authors and members of the Bureau and Multidisciplinary Expert Panel that are part of the management committee of the assessment
2023	
First to third quarter	Preparation of the second-order drafts of chapters and first-order draft of summary for policymakers
Second quarter	Writing workshop to advance the preparation of the summary for policymakers with co-chairs, coordinating lead authors, lead authors and members of the Bureau and Multidisciplinary Expert Panel that are part of the management committee of the assessment
Third quarter	Second external review (8 weeks) – draft chapters and draft of the summary for policymakers made available for review by Governments and experts
Fourth quarter	Third author meeting with co-chairs, coordinating lead authors, lead authors, review editors and members of the Bureau and Multidisciplinary Expert Panel that are part of the management committee of the assessment Back-to-back with the third author meeting: Meeting to advance the preparation of the summary for policymakers with co-chairs, coordinating lead authors, lead authors and members of the Bureau and Multidisciplinary Expert Panel that are part of the management committee of the assessment
2024	
First quarter	Online writing workshop to advance the preparation of the summary for policymakers with co-chairs, coordinating lead authors, lead authors and members of the Bureau and Multidisciplinary Expert Panel that are part of the management committee of the assessment
Third quarter	Final review (6 weeks) – final draft chapters and draft of the summary for policymakers made available for review by Governments
Early fourth quarter	Consideration by the Plenary, at its 11 th session, of the summary for policymakers of approval and the chapters for acceptance
Fourth quarter	Communication activities in relation to the assessment