

## Annex VI to decision IPBES-9/1

### Foundations of the nature futures framework

#### A flexible tool to support the development of scenarios and models of desirable futures for people, nature and Mother Earth<sup>1</sup>

#### Introduction

1. The nature futures framework is a flexible tool to support the development of scenarios and models of desirable futures for people, nature and Mother Earth. The framework was developed in direct response to the conclusions of the *Methodological Assessment Report on Scenarios and Models of Biodiversity and Ecosystem Services* (IPBES, 2016b), which identified limitations of existing scenario approaches in their usefulness for biodiversity and ecosystem services. It fills a gap by providing a tool for the development of nature-centric scenarios that address the diversity of human-nature relationships to inform context- and place-specific policy options based on locally held values of nature in order to achieve a good quality of life (including human well-being and living well in balance and harmony with Mother Earth).

### I. How scenarios are used in policymaking and decision-making on biodiversity and ecosystem services

#### A. Use of scenarios and models

2. Scenarios and models of changes in biodiversity and ecosystem services are powerful tools for informing decision makers and other stakeholders on potential future impacts of changes across scales on nature, nature's contributions to people and good quality of life. "Nature", "nature's contributions to people" and "good quality of life", as well as "instrumental values", "intrinsic values" and "relational values", are terms used in the conceptual framework of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), in the preliminary guide on values and throughout IPBES assessments and documents, noting that nature embodies different concepts for different people, including biodiversity, Mother Earth, systems of life and other analogous concepts.

3. In line with this terminology, scenarios are alternative pathways to possible futures for one or more key components in a system, particularly for drivers of change in nature and nature's contributions to people, including alternative policy or management options (IPBES, 2016a; Díaz et al., 2018).<sup>2</sup> Models are qualitative or quantitative representations of key components of a system and of relationships between those components, and can be used to translate scenarios of possible futures for drivers of change or policy interventions into projected consequences for nature and nature's contributions to people (IPBES, 2016a). In combination, scenarios and models can play important roles in relation to the major phases of the policy cycle, which are (i) agenda setting, (ii) policy design, (iii) policy implementation and (iv) policy review, as described in the *Methodological Assessment Report on Scenarios and Models* (figure SPM.2). "Exploratory scenarios" can contribute to problem identification and agenda setting by examining a range of plausible futures, while "intervention scenarios" can contribute to policy design and implementation by evaluating alternative policy or management options, through either "target-seeking" or "policy-screening" analysis (IPBES, 2016b, figure SPM.2). Scenarios and models have been used in the IPBES *Global Assessment Report on Biodiversity and Ecosystem Services* (IPBES, 2019a) and its *Summary for Policymakers* (2019b) and regional assessments of biodiversity and ecosystem services (IPBES, 2018a; 2018b; 2018c; 2018d) to provide assessments of the current status of biodiversity and ecosystem services and to explore projections under different potential futures.

<sup>1</sup> Though not repeated every time throughout the present document after "nature futures framework", it is understood that any mention of the framework implicitly includes this subtitle.

<sup>2</sup> For the list of full references, see the appendix to the present annex.

4. The *Global Assessment Report* indicates that the decline of biodiversity and ecosystem services is projected to continue or worsen in many future scenarios that consider rapid human population growth, unsustainable consumption and declining production (see, for example, figure SPM.8 of the *Global Assessment Report*. In contrast, scenarios with assumptions of low-to-moderate human population growth across scales, low carbon growth, a circular economy, and transformative changes will better support long-term sustainability and good quality of life (IPBES, 2019a, figure SPM.8; 2019b).

## **B. Limitations of current scenarios and models**

5. As is pointed out in the IPBES *Methodological Assessment Report on Scenarios and Models*, most existing scenario approaches for biodiversity and nature's contributions to people have a number of shortcomings. The obvious main limitation is the extent of knowledge about the properties of nature and of its components, and about the interactions and feedback processes associated with those components. Most existing scenario approaches, especially at the global and regional scales, have been developed to address climate change issues rather than biodiversity and ecosystem services issues per se, and are limited to assessing the impacts of drivers on states of nature and nature's contributions to people. They often consider biodiversity gains or losses as an endpoint, rather than recognizing the full range of interconnections and feedback between nature and people that are central to the IPBES conceptual framework (Seppelt et al., 2020).

6. Existing scenario approaches are also limited in their ability to incorporate diverse values, norms and policy objectives related to nature conservation, sustainable use and good quality of life (IPBES, 2016a). As a result of limited stakeholder involvement, scenarios have often underrepresented the diversity of worldviews and indigenous and local knowledge (Obermeister, 2019). Furthermore, institutional barriers to the use of scenario outcomes and the timing of presenting scenarios to governments (e.g., “windows of opportunity” – see Kingdon, 1984) may need to be addressed, with a view to increasing the chance that scenario-related insights are taken up in political agendas. Capacity and technological constraints often limit the ability to monitor the status and trends of biodiversity and further deepen institutional barriers.

7. Because all models have strengths and weaknesses (IPBES, 2016a), it is vital that their capacities and limitations be carefully evaluated and communicated in assessment and decision-making processes (see Sietz and van Dijk, 2015; Fonte et al., 2012). The limitations of current scenarios and models are not necessarily a reflection of deficiency in approach – rather, they are a reflection of the degree of complexity involved in solving current problems. Existing approaches often explore the impacts of direct and indirect drivers on nature and people (e.g., adverse climate change impacts on biodiversity and ecosystem services), rather than focusing on the transformative changes required to achieve international goals for people and nature under relevant multilateral environmental agreements and the 2030 Agenda for Sustainable Development.

## **C. Addressing shortcomings for the development and use of scenarios and models in the context of nature and nature's contributions to people**

8. Addressing the shortcomings of existing scenario approaches for nature and nature's contributions to people at different scales requires better integration of the feedback processes between nature and good quality of life for people. Participatory approaches are also required to involve stakeholders in the development of future scenarios for nature and people and to incorporate multiple value perspectives and different pathways to achieve societal goals and to address the social, economic and environmental dimensions of sustainable development (IPBES, 2016a; Rosa et al., 2017; Pereira et al., 2020; Kim et al., 2021, in preprint; Lundquist et al., in preparation). The inclusion of values of nature can enhance the development of new global scenarios for nature and nature's contributions to people, as it allows the diversity of human-nature relationships to inform context- and place-specific policy options based on locally held values of nature (Braun and Castree, 2005; Cronon, 1996; Descola, 2013; Head, 2016; Latour, 2004; Robin, Sörlin and Warde, 2013).

9. To address these requirements, the IPBES Plenary mandated the expert group (2016–2019) and task force (2019–2023) on scenarios and models to catalyse the development of new scenarios that can better inform policymaking for nature and nature's contributions to people (see the terms of reference of the task force, set out in annex II to decision IPBES-7/1), building on the IPBES *Methodological Assessment Report on Scenarios and Models*. To capture the plurality of value perspectives on nature, the former expert group and current task force have worked on a new framework for the development of nature-centred and Mother Earth-centred scenarios, called the “nature futures framework”. Having a framework that is applicable across different scales, regions and

value perspectives allows the development of comparable new scenarios to better support future IPBES assessments.

#### **D. Development of a new framework to promote the effective use of scenarios for nature and nature's contributions to people**

10. This framework is consistent with the conceptual framework of IPBES. Ideally, scenarios based on the nature futures framework will include all six primary interlinked elements of the IPBES conceptual framework representing natural and social systems and their interrelationships: nature; nature's contributions to people; anthropogenic assets; institutions and governance systems and other indirect drivers of change; direct drivers of changes; and good quality of life (Diaz et al., 2015, 2018). The nature futures framework provides a tool to help identify which of these elements are emphasized when creating scenarios of desirable futures. Scenarios focusing on "nature for society" place a greater emphasis on nature's material and regulating contributions to people. Scenarios focusing on "nature for nature" place a greater emphasis on the nature element of the IPBES conceptual framework. Scenarios focusing on "nature as culture"/"one with nature" have a more complex relationship to the IPBES conceptual framework and are best understood as emphasizing the cultural contexts that permeate all relationships between people and nature (Diaz et al., 2018). Nature futures framework scenarios aim to achieve good quality of life, including eliminating poverty, eliminating hunger, and achieving education for all and gender equality.

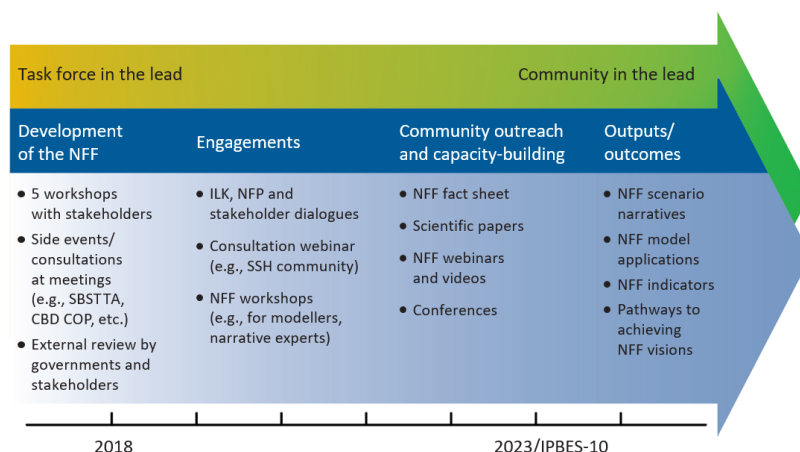
11. Specifically, the framework aims to catalyse the development of scenarios that focus on achieving a world that realizes the 2050 Vision for Biodiversity of "Living in harmony with nature" (Convention on Biological Diversity, 2010), the goals of other relevant multilateral environmental agreements and the 2030 Agenda for Sustainable Development and its Sustainable Development Goals. These visions and goals require reversing declines in biodiversity and nature's contributions to people (Pereira et al., 2020). The framework is explicitly designed to include multiple specific values of nature in scenarios and models. Positive or desirable nature futures represent scenarios in which biodiversity and nature's contributions to people are improved in one or more value perspectives in relation to the current situation.

12. Creating scenarios and models based on multiple values can make them more inclusive. The explicit inclusion of multiple values of nature enables scenarios and models to better consider and incorporate indigenous and local knowledge systems and values, as well as to better consider sociocultural contexts and alternative governance and economic systems, diverse methods of sustainable resource utilization and diverse approaches to biodiversity conservation. The IPBES task force on scenarios and models is developing methodological guidance on how to apply the nature futures framework to the development of quantitative and qualitative scenarios for a diverse range of settings and scales. A draft of the methodological guidance is set out in appendix I to the annex to document IPBES/9/INF/16, and further dialogues are planned with national focal points, indigenous and local knowledge experts, scientific communities and IPBES stakeholders to further iterate the methodological guidance of the nature futures framework between the ninth and tenth sessions of the IPBES Plenary.

13. The present document does not contain actual scenarios developed on the basis of the nature futures framework. Scenario development by the scientific community with models and other tools, and narrative development and refinement with stakeholders, still need to be carried out and are planned for the next four years, with final outputs available in time for use in a potential second edition of the *Global Assessment Report on Biodiversity and Ecosystem Services* (see figure 1).

Figure 1

### Envisioned process for catalysing a community of practice for developing scenarios based on the nature futures framework over time<sup>a</sup>



*Abbreviations:* CBD – Convention on Biological Diversity; COP – Conference of the Parties; ILK – indigenous and local knowledge; NFF – nature futures framework; NFP – national focal points; SBSTTA – Subsidiary Body on Scientific, Technical and Technological Advice; SSH – social sciences and humanities.

<sup>a</sup> The yellow-green colour gradient represents transitions in the lead of the listed activities from the IPBES task force on scenarios and models to the broader community. While the weight of the involvement of the task force is transferred to the broader community over time, there has been strong stakeholder engagement from the onset of the process. The blue arrow presents the activities of the task force on scenarios and models. It is anticipated that community engagement and outreach activities will lead to the formation of research consortiums and funded research projects that will achieve the goal of creating multi-scale (from local to global) scenarios based on the nature futures framework, which would continue to be developed and refined over the long term.

## II. Foundations of the nature futures framework

## A. History of the nature futures framework and its contribution to catalysing the development of scenarios and models

14. The nature futures framework can be used to describe a diverse set of desirable futures for nature and people that differ in their emphasis on the types of values that people assign to nature (Pereira et al., 2020). It takes into consideration the call for plural values of nature and nature's contributions to people to be recognized, referring to the preliminary guide regarding diverse conceptualization of multiple values of nature and its benefits, including biodiversity and ecosystem services, developed under the first IPBES work programme.<sup>3</sup> This preliminary guide on values, as well as the *Methodological Assessment Report on the Diverse Values and Valuation of Nature* (IPBES, 2022), are underpinned by the view that the use of diverse conceptualizations of multiple values of nature and its benefits to people must be acknowledged and fostered in order to adequately address the challenge of global sustainability (Pascual et al., 2017; IPBES, 2015). Whereas both the *Methodological Assessment Report on the Diverse Values and Valuation of Nature* and the nature futures framework incorporate values of nature, they have different purposes. The former assesses existing literature and describes different approaches to the conceptualization of values of nature, whereas the latter serves as a starting point for co-development of scenarios of desirable futures for nature. The framework emphasizes the intrinsic ("nature for nature"), instrumental ("nature for society") and relational ("nature as culture"/"one with nature") values, identified as the specific values referred to in the *Methodological Assessment Report on the Diverse Values and Valuation of Nature* (Figure SPM.2).

15. Taking into account the properties, interactions and feedback that operate in nature, the nature futures framework emerged from stakeholder consultations that gathered a wide range of visions of desirable futures for biodiversity and people (Lundquist et al., 2017; Pereira et al., 2020). This framework allows those involved in scenario-building to recognize and address, in a more explicit manner, plural values ascribed to nature and nature's contributions to people, which conventional scenario-building methods often fail to capture. The framework places the specific values that humans assign to nature at its core. The underlying assumption for formulating any type of desirable future vision of nature is that nature is valued much more in the future, but the reasons why it is valued – the

<sup>3</sup> IPBES/4/INF/13, annex III.

underlying value perspectives – can vary widely. The diverse ways in which humans value nature can be used to develop a diverse range of possible future scenarios that address current declines in nature and nature’s contributions to people across all three value perspectives, as evidenced in the IPBES *Global Assessment Report on Biodiversity and Ecosystem Services*. The framework is novel in that it explicitly provides a space for the inclusion of relational values within a global biodiversity scenarios framework, acknowledging that relational values, such as cultural identity, sense of place, traditions and reciprocity with nature, are often poorly represented or marginalized in assessments of biodiversity and ecosystem services.

## B. Description of the nature futures framework

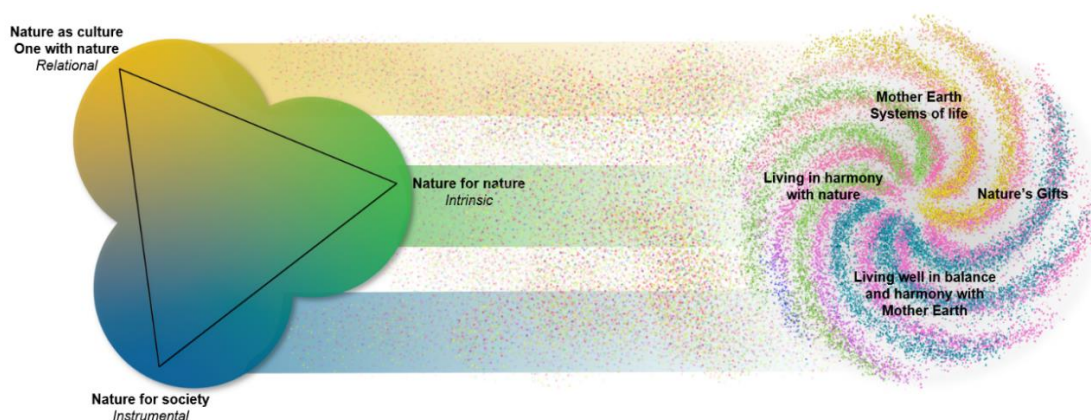
16. The nature futures framework represents the plurality of value perspectives on human-nature relationships that forms the foundation for the development of desirable future scenarios for people and nature (figure 2). Within the triangle in figure 2, each corner of the triangle illustrates the orientation towards one of the following three value perspectives on the relationship between humans and nature: nature for nature, emphasizing intrinsic values: nature as culture/one with nature, emphasizing relational values; and nature for society, emphasizing instrumental values (see glossary in appendix II to the annex to document IPBES/9/INF/16). The space within the triangle represents a continuum or gradient between these three value perspectives. As such, all the potential locations within the triangle relate to each of the three corners and thus offer some combination of all three value perspectives. It is important to bear in mind that the vertices, or corners, of the triangle offer extreme cases of what could be considered specific value perspectives to navigate to a “desirable future for nature”.

17. The nature futures framework has been developed together with different stakeholders through engagement with them since 2016 in order to address gaps in current scenarios and modelling processes for nature and nature’s contributions to people by opening up to more diverse perspectives on how the future is conceptualized. However, while it attempts to be as inclusive as possible, like all tools, it has limitations, including the fact that it may not be able to fully encapsulate all ontologies, cosmologies, knowledge systems and world-views. The examples in the right-hand part of figure 2 are taken from the IPBES conceptual framework but are not an exhaustive list of knowledge systems and world-views. The bands and dots indicate that the left- and right-hand parts of the figure are intimately related, but in complex ways that cannot be described in a one-to-one relationship. Currently available scenarios and models are not well adapted to the right-hand part of the figure, and so one objective of the scientific community should be to find tools that can be used to work with it.

18. Desirable futures developed through the nature futures framework may be place- or context-specific, subject to local cultures and values. Examples of the use of the framework to develop “desirable futures for nature” are provided in the boxes in section 4.2 of the methodological guidance. The framework does not aim to identify any particular narratives or scenarios as preferred based on their location in the nature futures framework, reflecting the fact that value preferences vary culturally and geographically.

Figure 2

**The nature futures framework, a flexible tool to support the development of scenarios and models of desirable futures for people, nature and Mother Earth<sup>a</sup>**



<sup>a</sup> The nature futures framework presents three value perspectives of nature in a triangle. In the “nature for nature” perspective, people view nature as having intrinsic value, and value is placed on the diversity of species, habitats, ecosystems and processes that form the natural world, and on nature’s ability to function autonomously.

The “nature as culture”/“one with nature” perspective primarily highlights relational values of nature, where societies, cultures, traditions and faiths are intertwined with nature in shaping diverse biocultural landscapes. The “nature for society” perspective highlights the utilitarian benefits and instrumental values that nature provides to people and societies. The coloured circles associated with each value perspective blend together where they intersect, indicating that they are not mutually exclusive. The specific value perspectives that define the corners of the triangular representation of nature futures emerged through numerous stakeholder consultations with a focus on providing a framework for scenario development. According to other knowledge systems and world-views, as portrayed in the right-hand part of the figure, human-nature relationships may be perceived in different ways. The examples in the right-hand part of the figure are taken from the IPBES conceptual framework but are not an exhaustive list of knowledge systems and world-views. The bands and dots indicate that the right-hand part of the figure and the left-hand part of the figure are intimately related, but in complex ways that cannot be described in a one-to-one relationship.

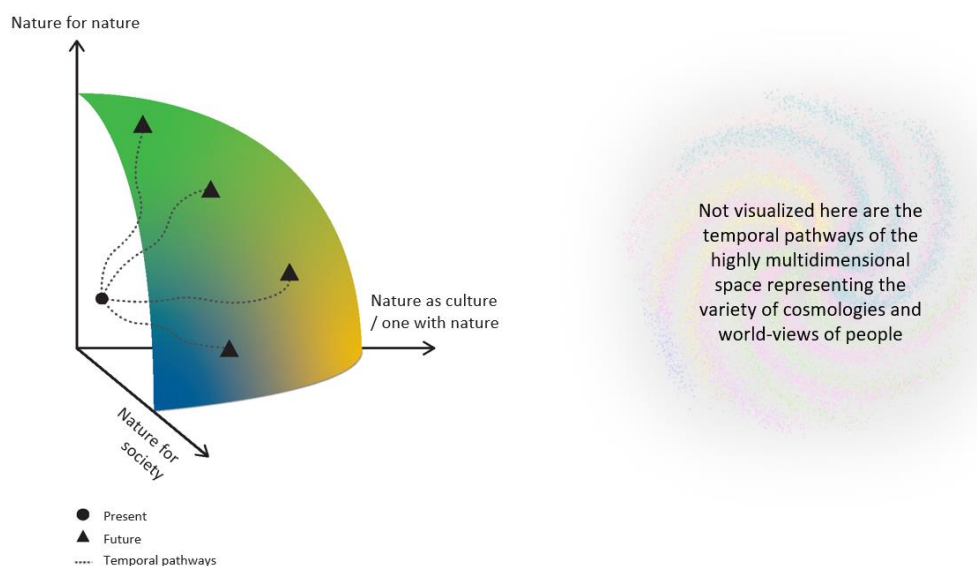
19. In the “nature for nature” perspective, people view nature as having intrinsic value, and value is placed on the diversity of species, habitats, ecosystems and processes that form the natural world, and on nature’s ability to function autonomously. The “nature as culture”/“one with nature” perspective primarily highlights relational values of nature, where societies, cultures, traditions and faiths are intertwined with nature in shaping diverse biocultural landscapes. The “nature for society” perspective highlights the utilitarian benefits and instrumental values that nature provides to people and societies. The task force will undertake further development of the nature futures framework and through that work provide a more comprehensive list of examples of how different locations in the framework could be operationalized. Some examples are presented in document IPBES/9/INF/16.

20. While the nature futures framework builds on the concepts of intrinsic, relational and instrumental values, the three value perspectives do overlap to some degree and the framework allows for their coexistence and complementarity, addressing some of the criticisms expressed by Piccolo (2017) about value dimensions. The framework allows recognition of the diversity of ways in which people define “nature”, and of the understanding that knowledge-scapes, interactions and identity influence the values that individuals attribute to nature (Berghöfer et al., 2022). “Nature for nature” both represents intrinsic values and indirectly provides instrumental values through the non-material benefits of healthy ecosystems. “Nature for society” is dominated by the direct and indirect use of a subset of instrumental values, while “nature as culture” captures relational values, including the non-material contributions of nature. The intrinsic value of nature is integral to many cultures, which is where “nature for nature” and “nature as culture” meet one another.

21. The state of the planet or any place on the planet can be assessed across these three perspectives (figure 3). The goal for scenario development with the nature futures framework is to improve the state of a place across one or more of these three perspectives. Therefore, one aims to move a place from a current condition, one that is often degraded from one or more of these perspectives (figure 3), to a higher score. As one approaches high scores in one of the perspectives, there may be trade-offs with others. Trade-offs (and potential conflicts of interests to be resolved) might arise between different spatial-temporal scales within and among particular perspectives of nature. At the global level, one may be speaking of multi-decadal timescales (e.g., 2020–2050), while at the local scale, multi-year timescales for scenario development (e.g., 5–10 years) may be more adequate.

Figure 3

**Conceptual illustration of how the nature futures framework, a flexible tool to support the development of scenarios and models of desirable futures for people, nature and Mother Earth, can be used to define pathways toward desirable futures<sup>a</sup>**



<sup>a</sup> Each axis corresponds to one of the three value perspectives for nature. In this example, actions take place to improve nature and nature's contributions to people across one or more of the value perspectives toward a more desirable nature futures frontier. Therefore, temporal pathways (represented by the dotted lines in the figure) can be plotted from the present state to the future. Increasing scores for one value perspective may require trade-offs with another value perspective (modified from Kim et al., 2021, in preprint). Not visualized here are the temporal pathways of the highly multi-dimensional space representing the variety of cosmologies and world-views of people (as depicted in the right-hand part of figure 2).

### C. What is unique in the nature futures framework?

22. In the context of the conceptual framework of IPBES, the nature futures framework is intended to catalyse the development of scenarios that can be compared and does not pre-define specific characteristics for individual scenarios; rather, it allows the development of place- and context-specific scenarios that represent local and regional priorities, ecologies and values. The use of a single framework combining different specific value perspectives for nature facilitates its application to a diverse range of regional and socioeconomic contexts, where common and specific features allow for technical comparison across scenarios. It also promotes investigation of cross-scale interactions that cannot be suitably captured at single or multiple independent scales.

23. Common features reflect shared global goals for nature and nature's contributions to people across all scenarios based on the nature futures framework. In contrast, specific features reflect commonalities for scenarios at a particular location within the nature futures framework (see section 3 of the methodological guidance).

24. To apply the framework, users can develop scenarios based on the nature futures framework within a range of sociocultural, economic and political contexts and across a wide range of spatial scales, which may identify pathways towards desirable futures that achieve the goals of relevant multilateral environmental agreements and the Sustainable Development Goals. The specificity of individual scenarios can thus be easily translated to local conditions and applied to issues of interest to local policymakers.

25. The nature futures framework can be differentiated from scenario approaches such as representative concentration pathways (RCPs) and shared socioeconomic pathways (SSPs), developed in support of the assessments of the Intergovernmental Panel on Climate Change (van Vuuren et al., 2014). The SSP-RCP framework may be perceived as prescriptive in terms of outcomes for greenhouse gas concentrations and many other direct and indirect drivers of climate change, such as human population growth, economic growth and agricultural productivity (O'Neill et al., 2017). Box 3 of the methodological guidance illustrates how the nature futures framework can be matched across shared socioeconomic pathways and representative concentration pathways, and sets out various efforts currently in place to use SSPs as entry points into novel scenarios based on the nature futures framework.

### **III. Concluding remarks**

26. The testing of the nature futures framework, including discussing its opportunities and limits, by interdisciplinary research communities, communities of practice, policymakers, indigenous peoples and local communities, and other stakeholders may lead to the further development, identification and utilization of new qualitative and quantitative scenarios and model applications. This, in turn, may provide valuable input for future IPBES assessments and trigger much-needed actions and societal transformations towards desirable futures for people and nature.



## Appendix to annex VI to decision IPBES-9/1

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