Chapter 1. The role of the values of nature and valuation for addressing the biodiversity crisis and navigating towards more just and sustainable futures[1, 2]

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[1] This is the final text version of Chapter 1. A laid-out version of the full assessment report will be made available in the coming months.

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Chapter 1. The role of the values of nature and valuation for addressing the biodiversity crisis and navigating towards more just and sustainable futures

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1.1. Why is an assessment on values and valuation needed?

1.1.1. Why conducting an IPBES methodological assessment on values and valuation?

Despite humanity's reliance on nature, rapid and devastating loss of biodiversity is pervasive across our planet. The fabric of life is weakening and humanity is failing in its responsibility to live in balance with nature, preventing the flourishing of humans and of the other species with which we share the living world. Furthermore, the burdens of biodiversity loss, ecosystem degradation and climate change are felt unequally across societies and social groups (FAO, 2020; IPBES, 2019a; UNEP, 2021).

The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) was created to assess existing knowledge and inform governments about the magnitude, dimensions, consequences and options for action related to the biodiversity crisis. IPBES aims "to strengthen the science-policy interface for biodiversity and ecosystem services for the conservation and sustainable use of biodiversity, long-term human well-being and sustainable development" (IPBES, 2012). IPBES focuses on the interlinkages between people and nature and aims to address the causes of biodiversity loss and ecosystem degradation, as well as the subsequent loss of their contributions to present and future generations, while identifying ways to shift these trends towards more sustainable pathways.

The understanding of the *values of nature* is a fundamental step to better comprehend and manage the interlinkages between people and other-than-human nature, including the ways in which people *conceive and value nature*, and how these values *play out in decisions* towards achieving *a good quality of life* (Díaz et al., 2015a). Nature is understood by IPBES and by the values assessment in an inclusive way, encompassing multiple perspectives and understandings of the natural world, such as biodiversity and those perspectives of indigenous peoples and local communities who use and embody concepts like Mother Earth (Díaz et al., 2015a). Further, the way nature contributes to quality of life can be interpreted differently across societies and cultures (see *Annex 1.1*). The values people hold for nature reflect the goals, beliefs, and importance that people assign to nature's different facets and components (Pascual et al., 2017).

Values of nature vary greatly across knowledge systems, languages, cultural traditions and environmental contexts (Harmon, 2002; Koltko-Rivera, 2004; Nemogá, 2019). The way people value nature is influenced by how they interpret their relationship with nature (see *2.2.1* and *2.2.2*), people and nature can be seen as part of holistic and interdependent systems of life, or considered separate from nature. Diverse understandings of nature are expressed in different ways (e.g., via symbols, rituals, languages and data and models). Nature's values also partially shape the behaviour of individuals, societies, and organizations, as well as their attitudes towards nature. Yet, understanding the role of values of nature in decisions that can impact on nature is not an easy task. People perceive, interpret, judge, and relate to nature in very different, and sometimes, incompatible ways. Also, some actors' values can dominate decisions while those of other actors may be marginalised, often leading to inequitable outcomes or conflicts (Díaz et al., 2015a; IPBES, 2016, 2019a; Pascual et al., 2017).

Global and national initiatives have recognised the importance of living in harmony with nature and of achieving more equitable access to the benefits from biodiversity (e.g., CBD, 2020). The targets of the post-2020 global biodiversity framework being prepared under the Convention on Biological Diversity (CBD) are expected to provide globally shared objectives relating to biodiversity conservation, while the United Nations Sustainable Development Goals (SDGs) express a common vision for maintaining the strong interlinkages between people and nature. These and other

multilateral environmental agreements represent global aspirations that articulate shared values of nature.

1.1.2. The values assessment builds on previous initiatives

The importance and diversity of the values of nature were officially recognised internationally in the CBD, which was adopted at the United Nations Conference on Environment and Development (*i.e.*, the Rio "Earth Summit") in 1992 (United Nations, 1992). In its preamble, the Convention outlines the many ways in which the diverse values of nature have been deemed important: '*Conscious of the intrinsic value of biological diversity and of the ecological, genetic, social, economic, scientific, educational, cultural, recreational and aesthetic values of biological diversity and its components* [...]' (United Nations, 1992, p. 1). Since then, some international assessments and frameworks, including IPBES assessments, have aimed to better understand the various ways people value nature, the methods used to capture nature's values, and approaches used to feed these values into development frameworks and policy decisions (*Figures 1.1* and *1.2) (Annex 1.2)*.

2005

Millennium Ecosystem Assessment (MA)
- Assessment of the human impact on the environment
- Popularizes the ecosystem services (ES) concept
- Finds frequent tradeoffs between ES (with ES that have high market value usually being prioritized)

2010

The Economics of Ecosystems and Biodiversity (TEEB)
- Highlights economic benefits of ES and biodiversity
- Focus on monetary valuation of nature
- Looks to incorporate the non-market economic value of biodiversity into decision-making
- Popularizes the total economic value (TEV) framework

2020

Global Biodiversity Outlook (5th edition)
- Periodic report on biodiversity by the Convention on Biological Diversity
- Main finding is that none of the Aichi Biodiversity Targets have been fully met
- Reports that awareness of biodiversity and its values among the general population remains low
- Finds little evidence that the values of biodiversity have been truly integrated into national and local development and poverty reduction strategies and planning processes

2021

UN System of Environmental Economic Accounting (SEEA) Ecosystem Accounts (EA)
- Focus on environmental - economic accounting
- Defines a measurement framework for integrating economic and environmental data and linking it to human activity
- Provides a common framework based on standard concepts, definitions, classifications, and rules for producing internationally comparable accounts

2021

Dasgupta Review on the Economics of Biodiversity
- Tasked with assessing the economic consequences of changes in biodiversity globally
- Looks at the economic benefits of biodiversity and the costs associated with its loss
- Focuses on links between biodiversity and sustainable economic growth
- Analyses the economic sectors that are generating losses in biodiversity and those that will be most affected

Figure 1.1. Timeline and focus of influential international, non-IPBES assessments and policy documents dealing with the values of nature.

Figure 1.2. Timeline and focus of completed IPBES initiatives that emphasise the values of nature.

The values assessment builds on decades of academic and management work concerning values and valuation of nature, including the IPBES conceptual framework (Díaz et al., 2015a; IPBES-2/4) and the *Preliminary guide on values and valuation* (IPBES, 2015), which are this assessment's foundations. It draws on insights from previous IPBES thematic, regional, and global assessments. It complements other important science-policy efforts that have called for making the values of nature explicit in decision-making, including the 'The Economics of Ecosystems and Biodiversity' report (TEEB, 2010) and the more recent Dasgupta Review (Dasgupta, 2021) (Figure 1.2). This assessment enhances and expands these efforts, in order to emphasise a greater plurality of values of nature, taking into consideration various perspectives, knowledge systems, and disciplinary traditions.

1.1.3. The IPBES values assessment as a methodological assessment on values and valuation

As with all IPBES assessments, the *values assessment* is tasked with reviewing, synthesising, analysing, and judging the policy relevance of the state of knowledge, as well as identifying knowledge gaps. This knowledge is collected from the peer-reviewed academic literature, publicly available policy and management documents (academically known as 'grey' literature), and other important sources such as indigenous and local knowledge (ILK) (see *1.4*). As such, the assessment does not generate new data, but instead provides a state-of-the-art synthesis of knowledge meant to inform decision-making and policy options for a diverse range of stakeholders.

The v*alues assessment* is a '*methodological assessment regarding the diverse conceptualisations of the multiple values of nature and its benefits, including biodiversity and ecosystem services*' (IPBES/6/INF/9). Consequently, it applies the IPBES approach to assess multiple sources and traditions of knowledge regarding the diverse values of nature, including the strengths and weaknesses associated with existing valuation methods and approaches. The assessment provides conceptual and practical tools to aid policymakers in the recognition and accounting of nature's values in different decision-making contexts. The values assessment provides guidelines, criteria, tools, and a road map to navigate the ways in which values play out in civil society and public sector decisions today, as well as the role values and valuation can have in achieving more sustainable pathways. The assessment, therefore, explores to what extent, and in which ways, the diverse values of nature have been, and can better be, incorporated into decision-making. It also sheds light on the implications of including or excluding different types of values from public policy decision-making processes, and how this may affect transitions to more just and sustainable futures. It should be noted that the assessment does not provide quantifications (e.g., in monetary or other indicators) of the diverse values of nature across the globe (these are presented in previous IPBES thematic, regional, and global assessments), since the emphasis here is on methodologies.

The specific objectives of the *values assessment*, addressed across its six chapters, are to:

- Assess the diverse conceptualisations of the values of nature and of nature's contributions to people across different knowledge systems and socio-economic, ecological and cultural contexts (see *Chapter 2*);
- Assess the range of valuation approaches and methodologies that exist to make visible and capture the values of nature and nature's contributions to people into decisions, and provide insights on how valuation can be made more relevant, robust and resource efficient (see *Chapter 3*);
- Assess the extent to which values of nature are expressed or excluded in institutional and governance systems and which factors affect such expression, as well as assess the outcomes of recognising the diversity of values of nature on both people and nature in a range of decision-making contexts (see *Chapter 4*);
- Assess which combinations of values of nature are associated with future scenarios and pathways to sustainability, and how more diverse values can be mobilised to leverage system-wide transformation towards more just and sustainable futures (see *Chapter 5*); and
- Assess the opportunities and challenges for the operationalisation of values and valuation as leverage points, as well as identify the key capacity-building needs across relevant stakeholders and sectors to address current knowledge and operationalisation gaps relative to values and valuation and offer principles to guide this process (see *Chapter 6*).

1.1.4. The audience of the values assessment

The values assessment is targeted towards a wide range of stakeholders in the public and private sectors and civil society. The assessment's findings are relevant to governments (across administrative scales), multilateral organizations, the private sector (including small to large corporations), donors (e.g., aid providers), civil society organizations (CSOs), indigenous peoples and local communities (IPLCs), resource managers and users, academia, and media outlets (see *6.1.2.2* for more information on the different types of stakeholders).

The values assessment is intended to inform policies (from local to global) and is expected to be particularly relevant for example during the operationalisation of the post-2020 global biodiversity framework being prepared under the CBD, which is expected to be adopted in 2022. It can also contribute to the operationalisation of the 2030 Agenda for Sustainable Development with a values-centered perspective. The assessment also provides tools and insights that can contribute towards other international initiatives, global biodiversity related policies, public sector natural capital accounting initiatives, biodiversity related policy instruments at local, regional, and national scales, international environmental non-governmental organizations, global research initiatives, and databases to monitor the interdependencies between people and nature.

1.2. Why do the values of nature matter?

1.2.1. Values of nature

What are the "*values of nature*"?

The word "value" means different things. It can reflect life goals, beliefs and general guiding principles. It can also reflect the opinions or judgements of the importance of specific things in particular situations and contexts. Moreover, the ways in which "values" are conceptualized and linked to specific decisions and actions varies greatly across academic disciplines, as informed by different worldviews (Bigger & Robertson, 2017; Daily et al., 2000; Fish & McKelvey, 2021; O'Neill et al., 2008; Smith, 2016). For example, the idea of "value" can refer to a principle, the notion of worth, or an indicator, such as price, as explored for the particular case of the value of nature (IPBES, 2015; Pascual et al., 2017). Therefore, it is important to note that the word "value" means different things, depending on the context. Consequently, it is challenging to identify a general definition of what the "value(s) of, about or for nature" mean, in a way that it makes sense and is agreeable across all knowledge systems, academic traditions, and lay people's understandings (see *2.1.1, 2.2.3*).

In this assessment, *the values of nature* are representations of what people and society care about and what they consider important in relation to nature. While there are nuanced conceptual and linguistic differences among the expressions "values of nature", "values about nature", "values pertaining to nature" and "nature's values", this assessment generally uses them interchangeably, unless the aim is to convey a specific meaning or apply the term in a particular context. Further, when referring to the values of nature, values can refer to nature itself, to how nature contributes to people's quality of life, and also to the way people conceive of and relate to nature (Díaz et al., 2015a; 2015b). The values of nature, therefore, not only refer to the way people express the value of life-supporting processes, functions and systems, but also to the interrelated biophysical, spiritual and symbolic aspects of nature, as well as moral principles of how to interact with nature (see *2.1.2*).

Consequently, when considering the values of nature, one also needs to understand what 'nature' refers to. In this assessment, nature is recognized as a socially constructed concept; its various understandings and interpretations are underpinned by knowledge systems, cultural backgrounds, and languages (see *Annex 1.1*). For IPBES, nature refers to the non-human living world, including the scientific categories of biodiversity, ecosystem structure and functioning, evolution, the biosphere, humankind's shared biological evolutionary heritage and biocultural diversity (Díaz et al., 2015a). In addition, IPBES recognises alternative worldviews, such as those from indigenous peoples and local communities, in which people may recognize the diverse entities and elements of nature, such as rivers, mountains, plants, and animal species, existing on the planet, and denote them by other categories that imply different ways of conceiving the world, like Mother Earth and systems of life (Coscieme et al., 2020; IPBES, 2021). Also, in many cultures and traditions, nature is often understood as inextricably linked to humans, not as a separate entity (e.g., de Castro, 1998) (see *Chapter 2*). Due to the wide range of potential interpretations of nature as a concept, the idea of nature's values becomes even more challenging. This assessment recognises the diversity of values that emerges from the very different ways of perceiving, understanding, experiencing and relating to nature.

Whilst the main focus of this assessment is on the values that reflect society's relationship with nature, the findings often highlight how these are intertwined with values that define human relationships with each other (see *Chapters 2 and 5*). Which kind of human-human relationships are prioritised within a society shapes the ability to express and act on different ways of valuing nature (see *Chapter 2*). For example, the assessment finds that values centered in strong individualism present a barrier

to valuing nature as a common pool resource (see *Chapter 5*). Such human-human relationships are inscribed in institutions (i.e., societal conventions, norms and rules) in ways that largely influence what values and whose values of nature are seen as legitimate and thus can gain traction, and which ones are made invisible in everyday environmental decision-making (see C*hapters 2 and 4*).

The different chapters of the assessment have explored, when deemed feasible, some of the very different ways in which people value nature. The complex ways in which social-ecological context, ethnicity, affluence, societal role, cast, body capabilities, gender or age play out in the types of values held and expressed has still to be further explored. Also, the ways in which the rich and rapidly evolving intersectionality (e.g., as in youth global movements and the LGBTIQ+ community) is related to the diverse values of nature poses challenges beyond the reach of this assessment.

An operational typology of the values of nature

Given the diversity of worldviews, knowledge systems and disciplines, it is challenging to define nature's values in a universally intelligible and acceptable way. A comprehensive typology of the diverse values of nature can help guide decisions that affect nature and its contributions to people in diverse contexts. To understand and express the diversity of nature's values, the assessment presents a values typology (Figure 1.3), (see *2.2*). The typology encompasses different value dimensions and types, including overlapping *layers* of worldviews (and their underpinning knowledge systems, languages and cultures); broad values (i.e., life-guiding principles) and specific values (i.e., instrumental, intrinsic and relational values); and value indicators (i.e., biophysical, economic and socio-cultural indicators) and preferences.
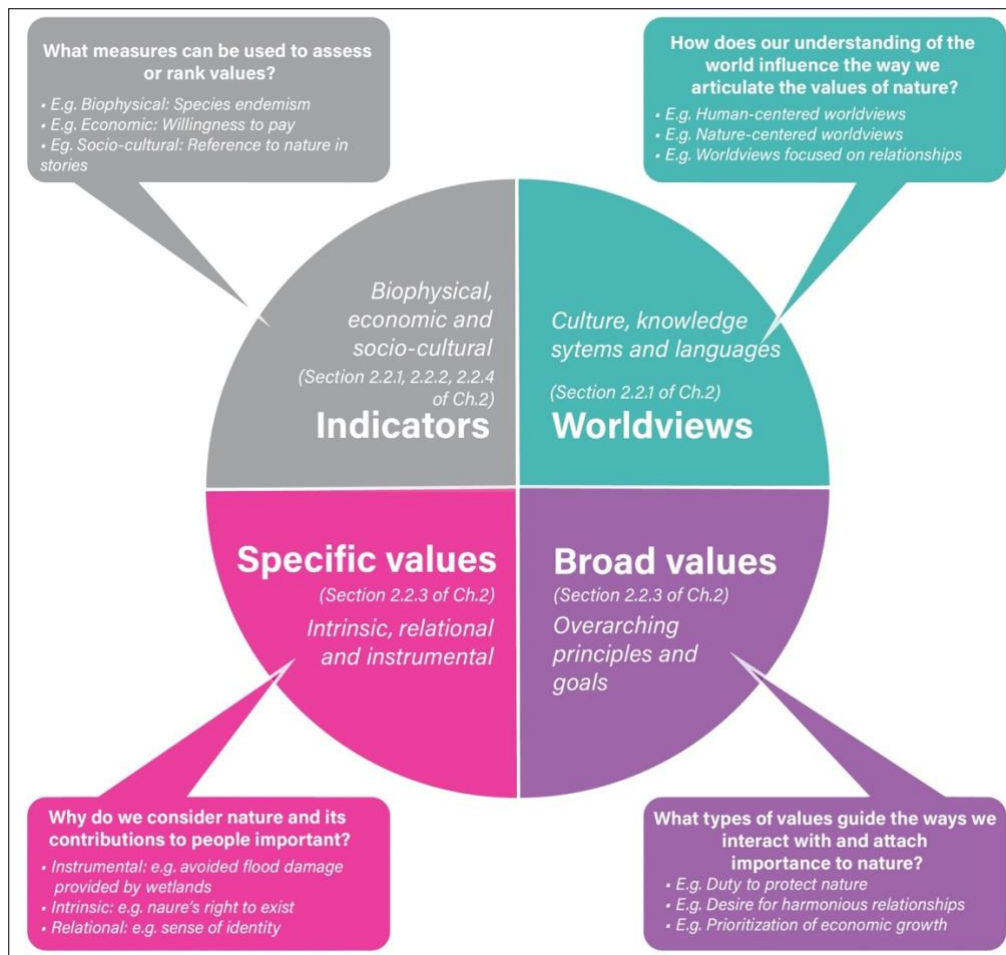

Figure 1.3. A typology of concepts about nature's values (further developed in Chapter 2).

Worldviews are ways through which people perceive, conceptualize and modify the world, rooted in cultures and languages (Olsen, 2019). Worldviews shape individual and collective ways of perceiving, interpreting and interacting with nature, and are expressed through culture, knowledge systems and languages. Worldviews can stem from diverse and often implicit assumptions about how nature and values can be known. They can also guide perspectives on how we conceive, relate to and act upon nature based on underlying value systems (e.g., human-nature worldviews). Worldviews, thus, represent the filters through which people evaluate the world and what they consider to be important in life (Manfredo et al., 2020; Olsen, 2019) (see *2.2.1*). Knowledge systems are dynamic bodies of holistic social and ecological knowledge, practices and beliefs, pertaining to the relationship of living beings, including humans, with one another and with their environment (see *2.2.1*). Languages capture, maintain, transmit and convey values, knowledge and practices that support biodiversity and nature's contributions to people connected to specific places and territories, species, ecosystems and landscapes. Linguistic diversity may be used as a proxy for both cultural and values diversity (see *2.2.2*).

Broad values refer to people's life goals and general guiding principles towards the world that are informed by their worldviews (Dietz et al., 2005). Examples of broad values include moral principles, such as justice, belonging, and freedom, but also life goals, such as enjoyment, health, and prosperity. Broad values influence specific values and provide them with a general context and meaning (Kelbessa, 2005) (see *2.2.3*).

Specific values reflect the opinions on or judgements of the importance of specific things in particular situations and contexts. There are three main types: i) instrumental values, which denote that something has value as a means to an end, and that it is, in principle, substitutable (Pascual et al., 2010); ii) relational values, which denote something whose worth originates from the relationships humans have with nature or with other humans through nature (Chan et al., 2018); and iii) intrinsic values, which denote something has value as an end-in-itself or has inherent or moral value that is not tied to human purposes (Devos et al., 2019) (see *2.2.3*).

Values can also be understood as indicators, which are the quantitative measures (e.g., monetary and non-monetary) and qualitative preference ranking and ratings, perceptions and ILK narratives, that can indicate the importance of nature to people. Sometimes value indicators may be assumed to be directly comparable (i.e., commensurable), if one indicator category is used to express different types of specific values; in other cases values may be considered incommensurable, which means they cannot be directly compared with one another (Wallace et al., 2021) (see *2.2.4)*. In this assessment, it is recognised that some values can be compatible, even if they are not measured by the same metrics. Valuation provides ways to bring together the underlying data on values to allow comparisons (see *3.2.2*). There are also cases in which different value types are neither directly comparable nor compatible and must be considered in parallel (Kronenberg & Andersson, 2019) (see *2.2.3.3*).

The different types of values can coexist. In other words, people can hold values across the different value domains (e.g., broad or specific values) and have multiple values within each category (e.g., instrumental, relational and intrinsic values). Further, there is a dynamic relationship between the different value domains. For example, worldviews may help to shape an individual's broad and specific values, while those broad and specific values may also inform peoples' worldviews (see *2.3.2, 2.5*).

Values are not static and may be formed or change at different stages of people's life and in different contexts. Broad values are considered to be more stable, largely forming in early stages of life (e.g., childhood, early adulthood) (Schwartz, 1992), but they can be modified in the face of significant life events or socio-ecological shifts (Kendal & Raymond, 2019; Manfredo et al., 2017). Specific values

are by definition malleable and adapt to changing contexts (Amel et al., 2017) (see *2.5*). Further, the way values are expressed in decisions can also change. For example, power relations between different actors can influence what values are taken into account in the decisions made and influence the resulting outcomes (Vatn, 2015) (see *2.4.2, 4.4, 4.5*).

To assist in identifying the multiple ways in which people value nature, the assessment presents four general life frames. These frames can help decision-makers organize the various ways in which nature matters to people (O'Connor & Kenter, 2019) (see *2.3*). For example, in the *living from nature* frame, nature is seen as a resource that contributes to, and provides conditions for human sustenance and prosperity. The *living with nature* frame sees nature as non-human, with its own interests, ecological processes or wild spaces, emphasizing stewardship and responsibility towards nature. The *living in nature* frame considers nature as land and landscapes, emphasizing belonging and place identity. In the *living as nature* frame, there is no separation between humans and nature; people are understood to be connected to nature physically, mentally or spiritually. This frame emphasises interdependence and reciprocity. As an example of how values may differ across life value frames, a forest may simultaneously be seen as a useful resource for harvesting timber (*living from*), a harbour of biodiversity and carbon sink (*living with*), a cultural landscape (*living in*) or as an inseparable part of one's body or of the ecological identity of a community (*living as*). The life frames are not necessarily mutually exclusive. Both individuals and collectives can harbour multiple frames, though any given frame may be emphasized in a particular situation.

1.2.2. The role of valuation to elicit and capture the values of nature into decisions

Decision-making about nature can be better informed when the relevant values about what is at stake (and for whom) are known. This is the ultimate goal of conducting valuations of nature: to determine in which ways nature is valuable and for whom, in order to enable better governance (CBD, 2010; Daily et al., 2009; Pearce & Moran, 1994; TEEB, 2010). Valuation generally entails the use of agreed-upon procedures for assessing the value of nature that stem from a given knowledge system, tradition or discipline (see *3.1.1*).

Valuation provides key knowledge about the values of biodiversity, species, ecosystems and landscapes, as well as on their contributions to people. Valuation can be used by different actors. For example, a government can conduct and uptake the results of valuation to assess the societal benefits and costs of alternative developmental options that may impact different facets of nature (*see Chapter 3*). An indigenous community can conduct valuation as a tool to elicit community members' perspectives about the use and management of biodiversity in connection to a territorial management plan (see *3.2.4*).

'Valuing' is the act of assigning a value to something. Thus, while we all go through the process of valuing as a basis for our day-to-day decisions, valuation is considered in the assessment as an exercise that is undertaken to intentionally determine the values of nature, often to understand the values at play and to inform decisions (see *3.1.1*). A focus of the assessment is identifying decision-making contexts in which "valuation" is necessary and/or sufficient for governance of nature, given that *valuing* is ubiquitous in individuals' choice-making (Laurans et al., 2013; Vatn & Bromley, 1994) (*see Chapter 4*).

Valuation methods are the specific techniques or procedures that are used to gather, analyse and make explicit information related to the importance of nature to people. *Valuation approaches* are sets of principles and theoretical frameworks that guide how the valuation is conducted and what rules inform a given method. For instance, a focus group discussion can be used as a valuation *method* that adheres to a participatory *approach* to valuation. Since valuation is conducted in a wide range of

socio-ecological contexts for a range of decision-making purposes, a wide range of methods and approaches exist (*see 3.1, 3.2*).

Different valuation methods and approaches can be used to generate information about the importance of specific facets of nature to people (e.g., crop values, recreational values, place values, etc.), the domain of the values themselves (e.g., worldviews, broad values, specific values), and the instances in which values are expressed (e.g., policies, rules, traditions, markets, behaviour, arts, etc.) (see *Chapter 3*). Some examples of methods used for valuation have been developed in the field of economics (e.g., choice experiments, travel cost, etc.) (OECD, 2018; TEEB, 2010), while other disciplines, such as ecology, geography and political science, have employed a range of different methods (e.g., participatory mapping, deliberative methods) (Chan & Satterfield, 2020). Each of these methods and approaches can be used to elicit different types of values (see *3.2.2*). Valuation methods and approaches are also applied in IPLC contexts to assess values, often manifesting as cultural practices that require specific protocols and procedures to be followed for gathering, assessing and validating the information obtained (see *3.2.4*).

Designing valuation attuned to specific socio-ecological contexts

The successful implementation of valuation depends on three broad types of considerations: relevance, resources, and robustness (*Figure 1.4*). The *relevance* of valuation entails ensuring that all the values at stake are accounted for. Valuation also requires time, financial, technical, human and political *resources*. Resource availability determines to a large extent the feasibility of the application of the different valuation methods. Methodological *robustness* is also a prerequisite for generating useful information for decision-making and entails following best practices that guarantee transparency, theoretical consistency and accuracy (see *3.3.1, 3.3.2, 3.3.3*).
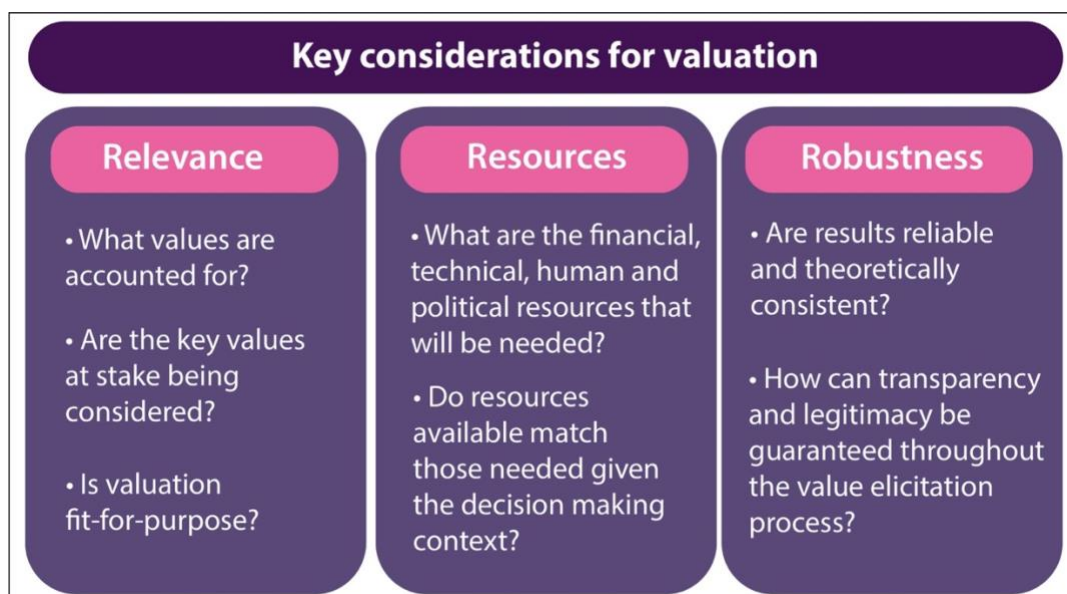

Figure 1.4. Key considerations when conducting valuation.

A common challenge in valuation is how the values of different individuals or groups are represented in decision-making. One way to do this is by *aggregating the values* expressed by different individuals and different social groups to the societal scale into so-called "social values". Social values, however, may mask the values of minorities or less powerful groups (Howarth & Wilson, 2006). Alternatively *values can be scaled up through* deliberative processes to form "shared values" (Kenter et al., 2016). These two strategies may be seen as complementary (UK NEA, 2014) (see *2.4.2.1*).

Given the diversity of nature's values, valuation processes can be described as more or less plural. A *more plural valuation* is one that considers and makes visible a wider diversity of world views, value frames, broad values and specific values. It is one that considers a wider diversity of foci of valuation, including biodiversity, nature's contributions to people, and good quality of life. It can also entail bringing together or integrating these diverse types of values (see *3.3.1, 3.3.1.3*) (Jacobs et al., 2018).

Given the diversity of stakeholders potentially affected by a decision, valuation can be participatory to a lesser or larger degree. Lower levels of participation entail the consultation with participants to retrieve information about the values of nature. High levels of participation entail engaging the relevant stakeholders throughout the process, ranging from design and operationalization to communication of the results of valuation (Arnstein, 1969). Deliberative valuation is an interactive valuation process. It entails bringing different actors together to build a shared value judgement about nature, a policy or a management issue. The deliberation process entails an open, and often iterative, dialogue among the stakeholders (Kenter et al., 2011; Wilson & Howarth, 2002) (see *Chapter 3*).

Valuation can be more effective if it is aligned with the actual purpose of *decision-making*, if the valuation objectives address the knowledge needs of specific socio-ecological and decision-making contexts, and if it addresses the trade-offs between reliability, robustness, and available resources (see *3.3.4).* Valuation can be used at different stages of an issue's attention or policy cycle (see *4.2.3, 4.6.2*) (IPBES, 2015; Jann & Wegrich, 2007; Tomich et al., 2004). Valuation can be used as a negotiation support tool involving an iterative cycle of sustained feedback between stakeholders and decision-makers (see *4.2.3, 4.3, 4.6*) (Zafra-Calvo et al., 2020).

The particularities of the decision-making context, including the complexity and stakes of the specific decision to be taken on species, ecosystems, or other landscape elements and processes, determine key choices in the valuation process (*Figure 1.5*). The degree of complexity of the decision-making context (horizontal axis) is to a large extent determined by the diversity of stakeholders and values, and by the level of uncertainty being faced. The nature of the stakes of the decision (vertical axis) is determined by the reversibility of the decision, the potential magnitude of its impact on people and nature, and the extent to which the interests of actors are aligned. Drawing on Funtowicz and Ravetz (1993), the role of valuation can be interpreted in relation to decision-making contexts that may be described in relation to different combinations of the above elements. Decisions facing relatively low *complexity* and low *stakes* (see lower left corner of *Figure 1.5*) may not even require valuation. This could be, for example, because *uncertainty* is low given a wealth of prior experience making similar decisions, or because the outcome of the decision is easily reversible, meaning that any undesirable consequences can be quickly corrected. Decisions under intermediate complexity and stakes may benefit from undertaking singular forms of valuation involving a reduced set of stakeholders with well-aligned values. Decisions under high complexity and high stakes are better informed by more plural participatory valuation. As complexity increases, more diverse and incommensurable values held by a greater diversity of actors typically lead to higher uncertainty. As stakes also increase, decisions can be harder to reverse and have deeper impacts on people and nature (see *3.3.4*).

There are different ways in which valuation can play out in decisions at high levels of complexity and stakes. One way is for dominant actors to impose their own values and preferred valuation methods and approaches, seeking to simplify the narratives about the situation at stake, which may lead to the exclusion of the other values at stake (see *4.3*). Conversely, decision-makers may embark on the use of more plural and participatory valuation methods that lead to building a collective understanding of the decisions at hand, for example through deliberative processes (see *3.3.1.3, 4.6*). In the latter case, more plural, participatory and deliberative valuation methods may be expected to be associated with higher transaction and administrative costs, in consonance with the level of increase of complexity and stakes. Yet when valuation is fully embedded in the issue (policy)-cycle, the relative cost of undertaking such a plural and participatory valuation approach could significantly diminish (*see 4.2, 4.3, 4.6*).
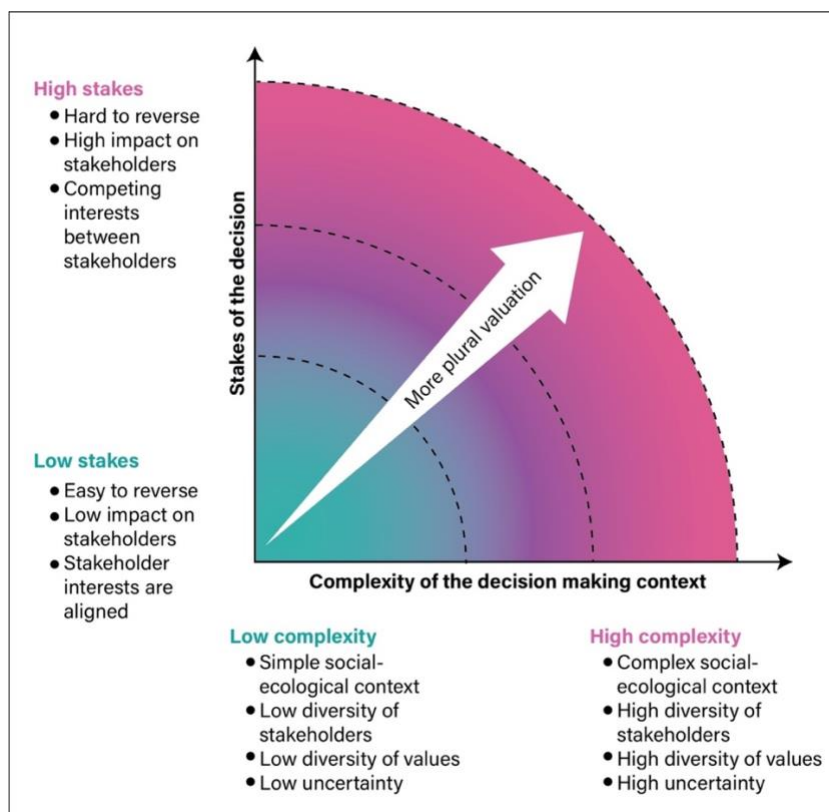
Figure 1.5. Valuation, plurality and complexity. The plurality of the valuation needed depends on the complexity of the decision-making context and the stakes of the decision (modified from (Funtowicz & Ravetz, 1993)).

1.2.3. Expression of values in decision-making

Which values dominate or are emphasized in decision-making and which ones are marginalised or excluded depends on the type of decisions, the types of decision-makers (actors) and the type of interaction among the actors (see *2.4.2*) (Vatn, 2015). Prioritisation of certain values in decision-making greatly influences which issues do and do not become part of the agenda, as well as which decision-makers are considered socially legitimate to participate in different types of decision-making processes (see *4.3, 4.5*). This prioritisation affects nature and people's relationships towards nature. While decision-making is not directly mentioned in the IPBES conceptual framework (Díaz et al., 2015a), it is implicit in the box "institutions, governance and other indirect drivers", as decisions shape institutions, while institutions shape decisions. It is thus important to explicitly unpack the "black box" of decision-making in the IPBES conceptual framework to provide coherence to the values assessment with regard to the relationships between decision-making, values and valuation.

A decision-making typology (DMT) is developed in the assessment to facilitate a structured understanding of the ways in which certain values get prominence when different types of decisions are made by various types of actors (*Annex 1.3*) (see *2.4*). Three general types of actors (political, economic, and civil society actors) and three broad types of decisions in which different values of nature are expressed (political, economic and socio-cultural decisions) can be distinguished (Dryzek et al., 2006; March, 1994; Pröpper & Haupts, 2014). This typology is necessarily fluid and applies in different ways to the same individuals depending on the specific context. For example, an individual may serve as a political actor (e.g., member of a municipality board or village representative), while also operate as an economic actor (e.g., as a farmer producing food and/or as consumer; owner of a private firm or cooperative, etc.), and yet in other contexts may also act as a community

member/citizen (either in an unorganised way as part of a social movement or as member of a civil society organisation, e.g., trade union, non-governmental organisation, etc.) (Duraiappah et al., 2014). The decision-making typology is structured in a way to help shed light on these sometimes fuzzy and overlapping relationships.

The assessment regards *political actors* as those that serve the *public interest* and have the authority to define rules for economic activity (e.g., property and use rights, regulations - as well as forming the rules for policymaking itself). *Economic actors* such as producers and consumers are those actors who hold rights to different assets, including natural assets used for economic purposes. *Civil-society actors* represent the breadth of civil society and are structured around a set of goals that serve the interests of a collective and can be structured through membership-based organizations or as social movements (Annex 1.3) (see *2.4.2*).

Political decision-making is regarded as that which defines and protects rights regarding who has access to and control over natural assets and associated nature's contributions to people (Bozeman, 2007). *Economic decision-making* covers decisions mainly about production and consumption of goods and services, as well as investments and disinvestment in natural assets (Bromley, 2006). *Socio-cultural decision-making* or processes refer to other aspects not covered by political and economic decisions, including a cultural dimension in the sense of forming, maintaining or changing the socio-cultural identity of people (e.g., sense of place), and a dimension about maintaining (or challenging) existing human-nature relationships beyond material livelihood aspects (e.g., taking care of nature for its own sake) (Comberti et al., 2015) (*Annex 1.3*) (see *2.4.2.3*).

Actors can interact with each other in different ways, for example, trading, cooperating with each other or acting in conflicting ways. These interactions influence which values are expressed, especially due to the power relations among the actors (Chaudhary & Kastner, 2016; Ostrom, 2005; Temper et al., 2018). The values assessment looks at how types of decisions, types of actors and their interactions affect value expression in decision-making. The analytical framework of the assessment addresses any type of decision (*Figure 1.6*) (*Annex 1.3*) (see *2.4.2, 4.3, 6.5.3, 6.5.4*). Most of the empirical evidence evaluated concerns decision-making by the public sector and indigenous peoples and local communities. Decisions by the corporate sector have not been equally emphasized in the assessment.
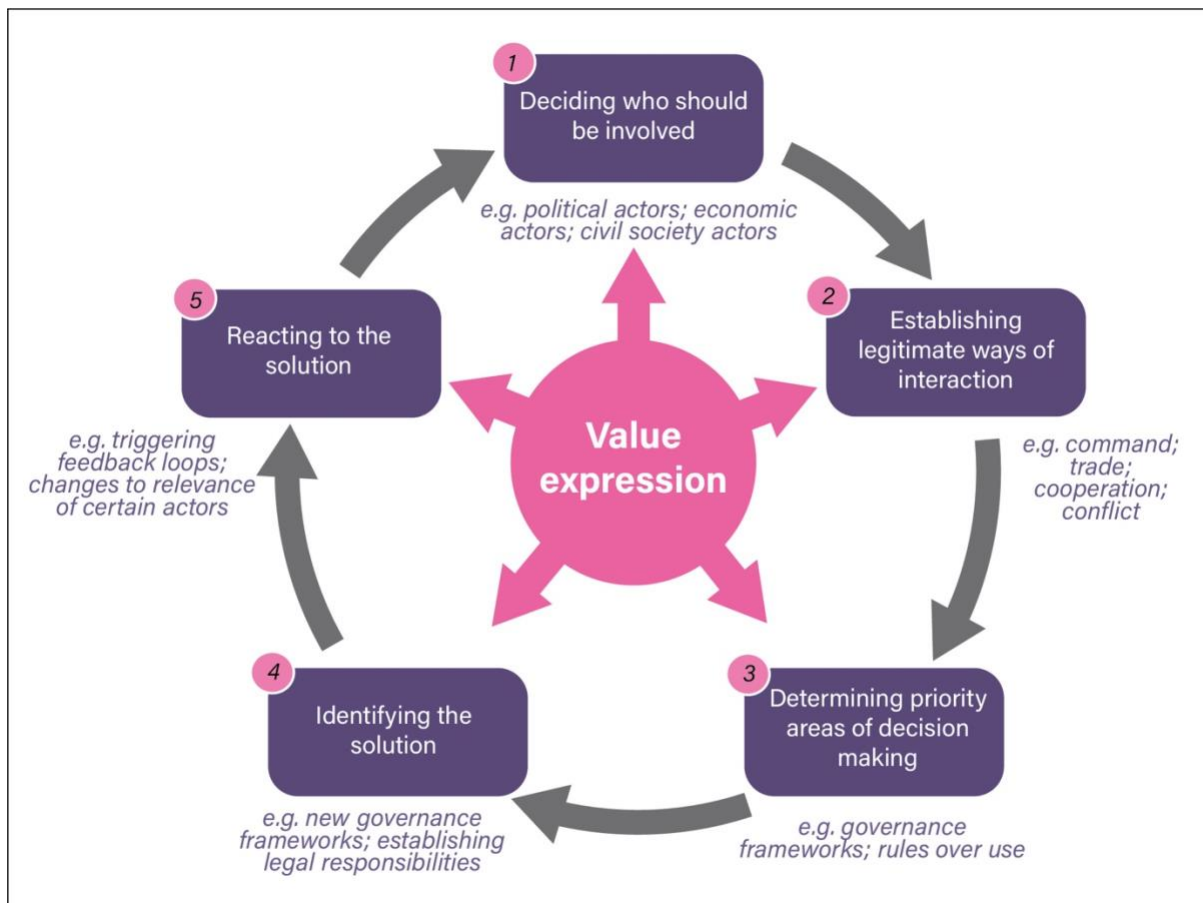
Figure 1.6. Values in an environmental governance framework. Values are expressed in different stages of the decision-making process (see more details in Annex 1.3).

Values are expressed at all stages of the decision-making process; however, the way they are expressed differs between stages. Values are expressed by having *the power to decide* on which actors can make decisions on a given issue, and with which other actors an actor can or should engage with in decision-making. Such decisions are based on an *a priori* value assessment on who should have a say (see stage 1 in *Figure 1.6*). Additionally, values are expressed by *establishing what is deemed as the legitimate way of interaction* between actors (stage 2) and by establishing the *priority areas of decision-making*, for instance the need for a governance framework for a certain societal issue or identifying areas where rules for use and management of natural assets might have to be changed (stage 3) (see *4.3*). Values are also expressed when identifying the possible solutions (stage 4). When actors react to the decisions made values are (re)expressed, which in turn can trigger feedback loops affecting the original decision and changing the relevance of certain actors and their interactions (e.g., from conflict to cooperation) (stage 5). What socio-ecological outcomes can be expected of an actor's or group of actors' decisions on nature depend on the choices at all stages of decisions as impacting the expression of values (see *4.4.2, 4.4.3, 4.4.4, 4.4.5*). The phases of decision-making where values are expressed are typically neither linear nor clearly demarcated, but instead part of a complex decision-making cycle (*Figure 1.6*) (*Annex 1.3*) (see *Chapter 2, 4.2.3, 4.3, 4.6, 6.5.5*).

1.2.4. The role of values and valuation for sustainability and justice

There are diverse understandings of the concept of *sustainability*, which stem from different cultural contexts (see *Annex 1.4*) (Seager, 2008). For some, sustainability emphasises the need for sustaining biodiversity and life support functions on the planet. For others, sustainability refers to sustaining nature's contributions to people that enhance people's livelihoods and quality of life. Sustainability

can also entail maintaining or managing landscapes as well as relations of connectedness and reciprocity with nature. In the scientific literature, sustainability refers to development trajectories that stay within critical socio-ecological thresholds, in which current and future generations can meet their needs, rights and aspirations (e.g., United Nations, 1987; WCED, 1987). This notion is embedded in the Sustainable Development Goals (SDGs), which provide a framework that allows for the consideration of synergies and trade-offs between the objectives of poverty alleviation, environmental protection, human well-being, economic growth, and peace at the global scale. The framing of the SDGs provides an opportunity to explicitly recognise and include the diverse values related to nature, nature's contributions to people and good quality of life in a myriad of socio-ecological decisions through various approaches, policy support tools and instruments (see *6.5.1*). The worldviews and ways of life of indigenous peoples and local communities emphasise other notions of sustainability; for many of them, sustainability relates to past and future generations' ability to maintain reciprocal relationships with the land, species, ecosystems and natural processes (Fernández-Llamazares & Virtanen, 2020; Whyte et al., 2018) (see *2.2.2*).

Following the United Nation's sustainable development perspective (United Nations, 1992), also embedded in the SDGs, the values assessment considers the concept of *sustainability as positively related to justice* (see *Chapter 5*). Societal progress will be sustainable only if it is just, and vice versa (Leach et al., 2018; Swilling & Annecke, 2012). The assessment thus aligns with the United Nation's vision of '*leaving no one behind*', which states that 'horizontal inequalities' between social groups and 'vertical inequalities' such as inequitable distribution of wealth and power, hinder progress towards sustainability because these destabilise societies in ways that obstruct environmental governance (United Nations, 2017).

There is a large body of research literature that documents the interconnections between sustainability and justice (Leach et al., 2018; Lele et al., 2018). The link between environmental crises and social injustice has also been emphasized by the climate community (IPCC, 2019; Klinsky et al., 2017) as reflected in the IPCC Special Report on Global Warming of 1.5°C (Masson-Delmotte et al., 2018). Countries with larger economies and larger populations contribute most to the generation of greenhouse gases in absolute terms while the wealthiest countries contribute most in terms of per capita emissions. At the same time, the impacts of heatwaves, droughts and heavy rainfall on people's livelihoods will imply higher risks in the tropics and subtropics where people are more vulnerable than in the generally richer temperate zones. Environmental degradation causes injustices, for example where impacts fall disproportionately and unfairly on economically, culturally and politically marginalised and historically disadvantaged social groups, including afro-descendants, women, indigenous peoples and future generations (Bullard, 1990). On the other hand, injustices deepen and perpetuate environmental degradation, for example by enabling more powerful actors to continue to shield themselves from the environmental consequences and costs of their actions. In this vein, sustainability is linked to both intra- and inter-generational justice, with the protection of future generations being at the very heart of sustainable development (e.g., Norton, 2005; WCED, 1987). This entails that addressing social injustice has major implications for the kind of responses needed for transformations to sustainability (see *5.1*).

The values assessment interprets justice and equity through three dimensions (Martin, 2017; Schlosberg, 2004) (*Annex 5.1*) (*Figure 1.7*). *Distributional justice* refers to the equitable distribution of the benefits derived from biodiversity and nature's contributions to people. Social groups have differentiated access to nature's contributions to people, which affects their quality of life. Some groups are disproportionately vulnerable to losses of nature's contributions to people, for example smallholder farmers who suffer from increasing crop pests (Morton, 2007), whilst future generations will suffer from the loss of the options associated with biodiversity loss (Faith, 2021). Similarly, some social groups may be disproportionately affected by biodiversity conservation policies. For example,

throughout the 20th century, local and indigenous peoples have lost their territories or access to natural resources as a result of protected area management practices (Brockington & Igoe, 2006).

Procedural justice refers to the fair inclusion of all voices in decision-making processes. For example, women's values have been marginalised from environmental policy making, despite women being disproportionately affected by climate change (Buckingham & Kulcur, 2009; Denton, 2002). Also, future generations may not be represented in policy decisions today that will affect their lives in the future. There is also growing concern for how to provide justice for other-than-human entities such as rivers, mountains, and species, through representation of their interests in environmental decision-making (see *Chapter 5, 5.1, 5.3, 5.5*) (Starik, 1995; Strang, 2020).

A third aspect of justice, *recognition* of diverse ways of knowing and valuing nature, relates to acknowledging and respecting the rights of social groups to their traditions and cultural diversity, and in particular, to the different ways they relate to nature (see *Chapters 2, and 5 - 5.1*) (Whyte, 2011). To assert a dominant view of what is and should be valued (what we consider worthy of protecting) by excluding what others consider valuable, is a form of injustice (Sikor et al., 2014). These ideas are connected to epistemic injustice, which is generally thought of as discrimination against marginalised, ways of knowing nature (see *Chapter 2*) (Coulthard, 2007; Vermeylen, 2019).

Figure 1.7. Justice is inextricably associated with sustainability.

The values assessment provides evidence that many values, but not all, align with sustainability objectives, including those embedded in the SDGs (see *2.2, 5.2 and Chapter 2*). Sustainability-aligned values refer to those broad values or societal principles (e.g., care, unity, reciprocity and justice) that underpin visions of more sustainable outcomes such as those included in visions associated with the SDGs (see *2.2, 5.2 and Chapter 2*). The values assessment explores how institutional change that mobilises sustainability-aligned values can have profound impacts by allowing people to act in accordance with their existing pro-environmental values (see *5.3*). Such mobilisation requires effective systems of governance, facilitating empowerment, societal learning and institutional change

in ways that enable more diverse and sustainability-aligned values to be widely taken up in practice (see *5.3, 5.4*).

Justice and power are strongly interconnected (*Annex 2.1*). Historical socio-cultural, political and economic processes have shaped current power relations in society (Bennett & Satterfield, 2018). Power asymmetries underpin the inequitable distribution of access to and control over natural assets and nature's contributions to people (see *Chapters 2 and 4*). Actors who have the capacity to make rules on the legitimate ways of relating to nature, who can benefit from nature's contributions to people in which ways, and who bears the cost of ecosystem degradation. In so doing, powerful actors can influence to a great extent procedural justice, by deciding who is included or excluded from decisions about nature (see *Chapters 2 and 4*). In addition, the power to frame environmental issues in a certain way, i.e., the discourses and the types of knowledges recognized as legitimate (Muradian & Pascual, 2018), can be used to undermine or foster recognitional justice, by privileging the ideas, languages and interest of some groups to the detriment of others (see *Chapters 2 and 4*).

1.3. Values and valuation as levers for transformative change

Biodiversity loss continues unabated due to a powerful mix of direct and indirect drivers, as documented by the IPBES regional, thematic and global assessments and the reported failure in achieving the CBD Aichi Targets (IPBES, 2016b, 2018a, 2018b, 2018c, 2018d, 2019a). Currently, decision-making that focuses on reversing negative environmental trends is mainly focused on coping with the negative consequences of deterioration of nature and nature's contributions to people by attempting to nudge human activities away from current deleterious practices. But it is increasingly recognised that *transformative change*, i.e., system-wide reorganizations across technological, economic and social factors, including paradigms, goals and values associated with the ways we relate to nature, is required to achieve more just and sustainable futures (IPBES, 2019a).

Similar calls are being made about the need for transformative change to address the health impacts derived from biodiversity loss and ecosystem degradation. The emergence of the COVID-19 pandemic is a case in point. Despite evidencing the connection between biodiversity and health, there is still more political interest in reactive measures based on economic and technological solutions to dealing with pandemics after they have already occurred, rather than integrated measures focused on addressing the drivers of land use change, increasing zoonotic emergence, and the development of proactive institutional logics (IPBES, 2020). This phenomenon can be framed as "single loop learning" (Argyris, 1991): as problems arise from environmental mismanagement, attempts are made to fix them, rather than addressing the underlying causes. Aiming for more just and sustainable futures requires a "double loop learning" to not only attempt to fix the symptoms of environmental mismanagement, but instead question and address the values, goals, decisions, practices and institutions that created the conditions for the environmental problems to arise in the first place.

The values assessment provides evidence to suggest that the type of transformative change needed to move towards more just and sustainable futures require a set of complementary strategies that can activate key leverage points centered around values and valuation of nature (see *Chapters 3, 4, 5 and 6*). The first strategy is to adequately *recognize the values of nature* by undertaking valuation and uptaking it into policy decisions (see *Chapters 2, 3, 4 and 6*). This means making explicit in economic and policy decisions how nature underpins human well-being, through the approaches developed (see e.g., Dasgupta review, (2021); TEEB (2010)), as well as using the wide diversity of valuation methods and approaches that are currently available (see *Chapter 3*). The second strategy is to *meaningfully include the diverse values of nature into decisions*, by embedding valuation into inclusive decision-making processes (see *Chapters 3, 4 and 6*). This entails designing valuation processes that are well attuned to the specific social and ecological context at stake (see *Chapter 3*) and respond to the specific needs of the different stages of the decision-making process (see *Chapter 4*), in ways that adequately represent the diversity of values involved (see C*hapters 2, 3, 4 and 6*). The third strategy requires institutional change based *on reformulating policy and regulations* to meaningfully consider nature's diverse values (see *5.3, 5.4,* C*hapters 4 and 6*). This requires creating space to allow for the diversity of values to be expressed in decision-making (see value expression *Figure 1.6*) and fostering coherence in implementation of policies and related decisions across various scales and jurisdictions by addressing value trade-offs (see *6.3.1, 6.3.2*). The fourth strategy focuses on *shifting personal beliefs, values and paradigms* that underpin how people relate to nature and to each other in more just and sustainable ways. This is linked to individual and societal norms that shape what is considered to be just and sustainable and what kind of futures and development pathways can be envisioned as possible and desirable. Working with values to eventually change the core goals and intent of society is ultimately necessary for the kind of profound, system-wide change that is required (see *5.3*). The assessment provides evidence of the importance of these four strategies, and yet how far short society is in terms of activating value centered leverage points around these strategies (see *Chapters 2, 3, 4, 5 and 6*).
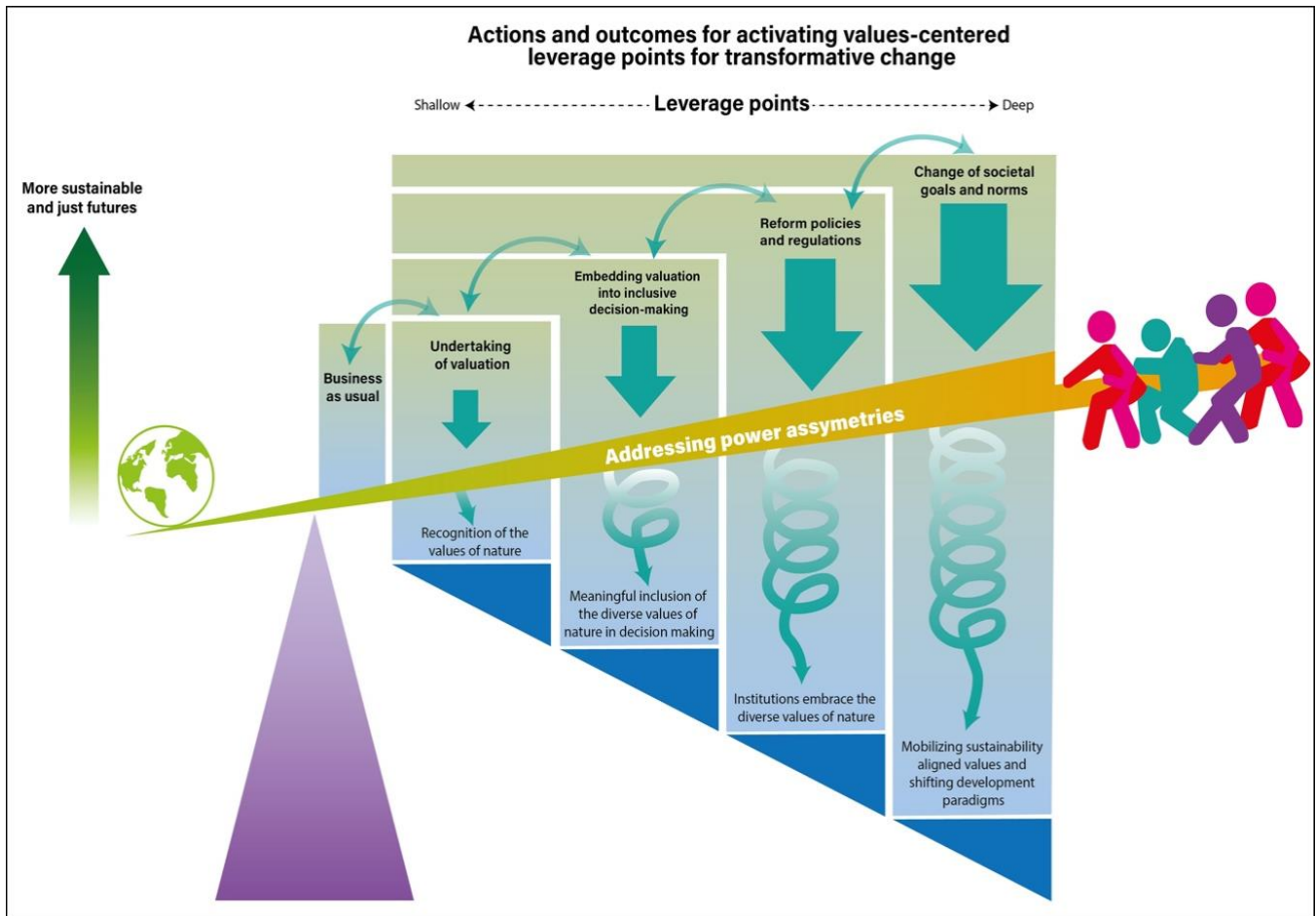
Figure 1.8. Values-centered leverage points for transformative change towards sustainability and justice.

Activating the leverage points towards sustainability pathways requires transformative governance, i.e., a governance system which combines integrative, inclusive, adaptive and pluralist approaches to trigger, manage and respond to system-wide and cross-scale transformations (see *6.1*) (Visseren-Hamakers et al., 2021). The values assessment posits that addressing structural factors to mobilise sustainability-aligned values can be facilitated by a more pluralistic perspective on human-nature relations. This can be accompanied by the recognition and elicitation of multiple values of nature and the deployment of appropriate valuation approaches that fit the social, cultural, economic, political and biophysical context in which environmental problems need to be addressed. Doing so would support an effective mix of policy interventions, providing space for innovative and more inclusive approaches (see *6.2, 6.3*). In addition, movements in this direction should be aligned with addressing current dominant institutional arrangements so that the new policy mix could thrive. In turn, facing this challenge would require that the interests that would actively counter such new policies, which are typically those that support business as usual, are kept in check.

Although several knowledge and operationalisation gaps exist that limit the elicitation of nature's values and the uptake of valuation results in policy decisions, developing motivational, analytical, bridging, negotiation, social networking and governance capacities can help overcome such limitations (see *6.4*). The values assessment thus recognises the need to focus beyond simply improving managerial and technological interventions by means of valuation. Instead, the assessment proposes the need for more fundamental and deeper changes to societal institutions and structures that produce negative impacts on nature and unequal distribution of environmental benefits and burdens.

Shifting from "business as usual" pathways or trajectories towards more sustainable pathways requires acknowledging that alternative, more sustainable pathways exist, as well as addressing the drivers that underpin the current unsustainable trends. Alternative transformation pathways advocated for reaching a just and sustainable future, include among others: *Green Economy* (Dasgupta, 2021; TEEB, 2010; UNEP, 2011), *Degrowth* (D´Alisa et al., 2014; Daly, 1996; Kallis et al., 2020), *Earth Stewardship* (Chapin III et al., 2009; Rozzi et al., 2015) and *Nature Protection* pathways (Soulé, 2013; Wilson, 2016). These pathways prioritise different sets of broad values and different bodies of knowledge, although they all identify the need for more plural valuation of nature as a basis for a more sustainable relationship between people and nature (see *5.5*). These alternative sustainability pathways are based on different sets of values. The Green Economy pathway is underpinned by prioritisation of nature's instrumental values, conceiving nature as an asset for human well-being. The Degrowth approach emphasises values of sufficiency for shaping human use of nature. The Earth Stewardship pathway prioritises biocultural diversity, alongside broad values such as solidarity – both among humans and with other-than-human entities (see *2.2, 5.5*). The Nature Protection pathway brings to the fore the need for care and empathy for nature, emphasises its intrinsic value, and argues that focussing on either instrumental or relational values alone will not result in the protection of nature. Whilst these alternative pathways differ in terms of the combinations of the values underpinning each of them, they also share broad values aligned with general notions of sustainability - these being a just and shared connected future cognisant of peoples' interdependencies with nature (see *5.5*).

1.4. Achieving robustness and plurality in the values assessment

Worldviews shape the overall framing and direction of any assessment effort. The values assessment draws on diverse knowledge systems and sources stemming from a wide range of scientific disciplines, as well as different knowledge types. It is thus important to reflect on the diverse backgrounds of the authors that have produced the assessment and how this has shaped the plurality of views portrayed in the assessment, as well as on the efforts made to integrate diverse knowledge sources and perspectives, including those of indigenous peoples and local communities (*Annex 1.5* for a review of the assessment elaboration process and *Annex 1.6* for the strategy for the inclusion and recognition of indigenous peoples and local communities).

1.4.1. Efforts to achieve robustness and plurality in the values assessment

The values assessment team of experts includes a high diversity of backgrounds. The members of the team (84 expert authors and 11 review editors, all selected by the Multidisciplinary Expert Panel) come from a broad set of academic disciplines including anthropology, biology, communication science, ecology, economics, environmental science, geography, law, philosophy, political science, policy implementation, psychology, and sociology. 18 authors are ILK experts, including two ILK holders. Over half of the experts have at least one degree in social sciences (one third of which are in economics), and over half have at least one degree in biophysical sciences. Ten percent have a degree in the humanities, and 7% in engineering. Two-thirds of the authors have changed disciplines throughout their academic careers, switching between biophysical sciences, social sciences, the humanities, engineering or a combination thereof. Experts are citizens of 47 countries from all regions of the world and speak 51 languages. The diversity of sociocultural and disciplinary backgrounds of the team is further enhanced by over 200 contributing authors (who are citizens of 49 countries from all regions of the world, and include 25 ILK experts and 12 are ILK holders) (*Annex 1.5*).

The values assessment used scoping, critical and systematic review methods (Grant & Booth, 2009; Moher et al., 2009; Pham et al., 2014) to identify, screen, select and evaluate over 13,000 sources of evidence. Complementary corpuses were also analysed using natural language processing (text analysis using artificial intelligence) to characterise broad aspects of the literature, covering more than 200,000 pieces of evidence.

The more than 13,000 pieces of evidence that form the main corpus analysed and cited in the values assessment include academic literature in 11 languages from a wide range of disciplines, grey literature including policy documents, artwork, magazines, newspaper articles, videos and websites, as well as direct contributions from IPLCs. While some documents date back to early 1900, most have been published since the year 2000[3]. The sources were identified through a diverse set of approaches including 39 different literature reviews with different search strategies and review protocols, including systematic reviews and case study analyses. Systematic reviews were complemented by expert knowledge to reach the literature that tends to be omitted in systematic reviews (for instance, grey literature or literature in languages other than English). Systematic reviews of grey literature, such as policy documents and consultant reports, were limited by the lack of publicly accessible and searchable databases. Different approaches and methods were also applied in the review of the different literature and in the ways to synthesize it. Deliberation was often used to develop consensus across disciplines within the expert team (*Annex 1.5* for more details).

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[3] These correspond to the Second Order Draft that was assessed during the preparation of the final draft of the assessment.

The literature reviews were complemented by two rounds of external review to ensure that the process of identifying, selecting and analysing information was as exhaustive as possible, given the resourcing of and team of experts available to the assessment. Workshops to review the different iterations were independently organized by academic (e.g., universities, research institutes, research networks), governmental (e.g., IPBES focal points) and civil society organizations (e.g., youth environmental networks) in many different countries. Also, three formal dialogues were held with ILK holders and experts, each lasting two to three days, to address their views and validate information presented across the assessment (see *1.4.2*). This process is designed to ensure the assessment incorporates feedback from a wide range of actors, including member states, IPBES stakeholders, policymakers, ILK holders and non-IPBES experts.

1.4.2. Linking indigenous and local knowledge in the values assessment

Indigenous peoples make up around 6% of the global population and live in 90 different countries (Secretariat of the Convention on Biological Diversity, 2014). Besides indigenous peoples, 45% of the worlds' population live in local communities in rural areas. Indigenous peoples and local communities[4] (IPLCs) own, manage and/or occupy at least a quarter of the global land area under several property regimes (IPBES, 2019b), including collective property regimes that have adapted and innovated rules and institutions, some of which go back centuries or even millennia (Ostrom & Hess, 2010). Indigenous peoples and local communities include a great variety of sociocultural groups who have their identity, livelihoods and knowledge systems usually directly tied to nature. These include the ethnic groups officially recognized as indigenous peoples, Afro-descendant communities, as well as local communities' groups such as farmers, fishers, herders, hunters, riverine communities, desert dwellers, and forest users attached to particular ecosystems in different parts of the world (IPBES, 2021) (see *2.2.1*). In 2007, indigenous peoples rights were internationally recognized by the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) (United Nations, 2007), which was signed by 144 member States.

IPLCs hold specific worldviews and place-based, detailed, knowledge of nature and about biodiversity, which is referred to as indigenous and local knowledge (ILK). For IPLCs, the constant struggle to keep their traditional practices, rights, languages, and associated values of nature, are major concerns for biodiversity conservation, nature's contributions to people and human-environmental well-being (IPBES, 2019b). Also, concerns about equity and justice over their territories and resources are now one of the biggest threats IPLCs face, given the fast-paced environmental and climate change processes, as well as increased pressure and disputes over land and resources. In this sense, it is important to recognise how IPLCs make sense of the idea of the "values of nature" and acknowledge the need for flexibility in the use of appropriate, context-specific concepts and valuation methods and tools as currently used by IPLCs.

IPBES has worked with IPLCs and indigenous and local knowledge since its formation, from which important learning processes, experiences and practices of dialogue and co-production across knowledge systems have been synthesized into an approach to recognizing and working with ILK in IPBES (ILK approach), which was approved by the IPBES Plenary in 2017. This ILK approach includes four basic principles: 1) respecting rights, 2) supporting care and mutuality, 3) strengthening IPLCs and their knowledge systems, and 4) supporting knowledge exchanges (Hill et al., 2020). In

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[4] Indigenous peoples and local communities (referred as IPLCs) is an umbrella term used internationally by representatives, organizations, and conventions to represent the most culturally diverse segment of the world's populations (IPBES, 2021). However, it is recognized that in particular contexts and situations it is more appropriate to treat them separately, as it is done in many sections of the assessment.

the values assessment we build on these previous efforts and protocols to develop a specific strategy to work with and recognize IPLCs and ILK, while expanding the mechanisms for their inclusion.

The values assessment strategy for the inclusion of ILK was led by a cross-assessment ILK-focused group, who collaborated in the development and implementation of a series of interconnected steps (*Annex 1.6*), and sources of evidence (*Figure 1.9*), to make the values of IPLCs visible. The sources of evidence used in the values assessment included a broad spectrum of ILK harboured in different forms, formats and languages (e.g., community-based protocols, songs, artwork, etc), in addition to written materials and academic formats.

ILK-based evidence assessed across all chapters in the assessment relied on different types of approaches and was developed in three different stages (*Figure 1.9*). 1) *Identifying main messages* regarding values of nature and IPLCs. Two face-to-face ILK dialogues were undertaken (Paris, France, March 2019; Calpulálpam de Juárez, Mexico, September 2019) with ILK holders and experts of the values assessment and guidance was provided by the IPBES ILK taskforce during the process. These dialogues helped delineate the messages relative to the visions of different IPLCs regarding the values of nature and fostered the exchange of ideas. 2) *Building the evidence* around those main messages. These included literature reviews by different chapters, tackling academic papers, synthesis reports and ILK sources documented in accessible written form, including compilations of literature and cases from other IPBES assessments and related reports. A global call for contributions, including community reports, declarations, academic papers, case studies, videos, songs, artworks, and materials in local languages,[5] was issued. Several ILK experts and holders participated as authors or contributing authors of the assessment. 3) *Validation process and content enrichment.* One case study was developed across the chapters of the assessment to provide specific concepts, experiences and examples on the incorporation of ILK and IPLCs' values of nature into decision and policymaking. The case study explored the philosophies of good living[6] and how values are embedded in them, as well as how they inform decisions. A third ILK dialogue was undertaken online with the objective to discuss and refine messages related to IPLCs and ILK in the summary for policymakers.
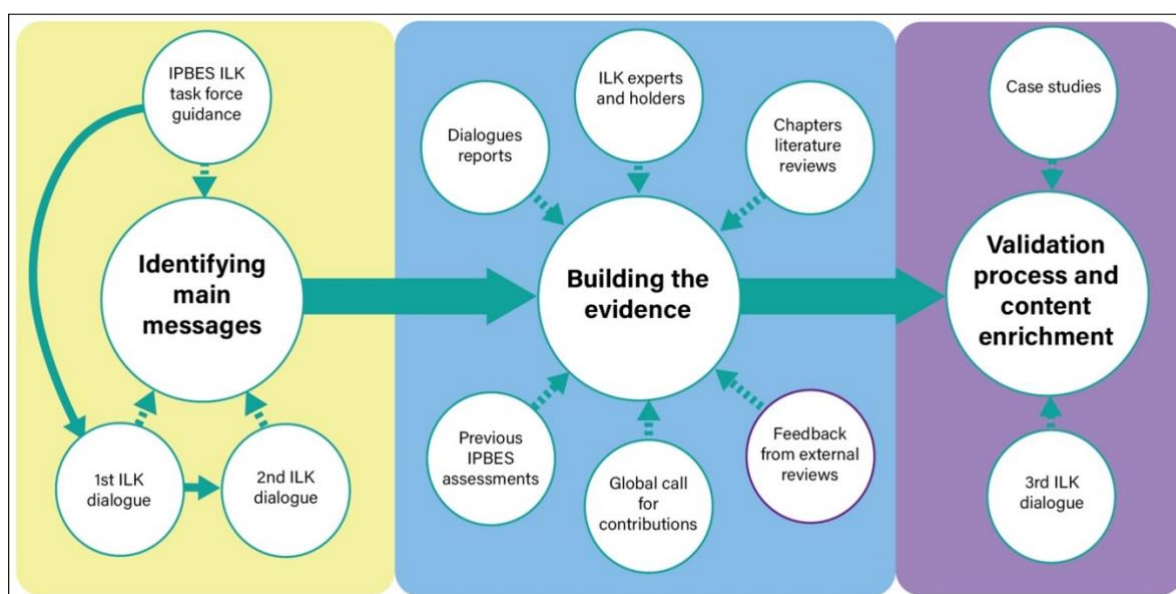

Figure 1.9. Strategy and sources of evidence for the inclusion of ILK during the realization of the values assessment.

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[5] Call for contributions on indigenous and local knowledge(https://doi.org/10.5281/zenodo.4390417).
[6] Literature review for the philosophies of good living (https://doi.org/10.5281/zenodo.4399544).

1.4.3. The plurality achieved in the assessment (and its limits)

This assessment's authors recognize the diversity of knowledge and values represented within and across sociocultural groups and knowledge systems worldwide. This ranges from the worldviews, knowledges and values that are place-based and held by IPLCs (e.g., farmers, pastoralists, forest managers, and women's cooperatives) to regional and global insights by academics from different traditions, to the perspectives of policymakers at local to national scales, urban groups and emerging social movements formed around shared values (e.g., neighbourhood associations, youth international movements, landless movements and others). For instance, some indigenous conceptualisations of nature and their related values associated with kinship, reciprocity, responsibility and stewardship can provide important global lessons to address the current biodiversity crisis (*Annex 1.6*). This diversity is not understood as a dichotomy between IPLCs and western societies, between the global south or the global north, or between ILK or academic knowledge, but as a multidimensional network of "hubs" or clusters of shared knowledges and values, which may dynamically intertwine and hybridise, like strands in a woven patchwork (*Figure 1.10*). These knowledge systems – which reflect and reinforce the worldviews, values and experiences of their holders and users – have guided and informed the daily decisions and actions of individuals, families, communities and others since time immemorial, and continue to do so today.
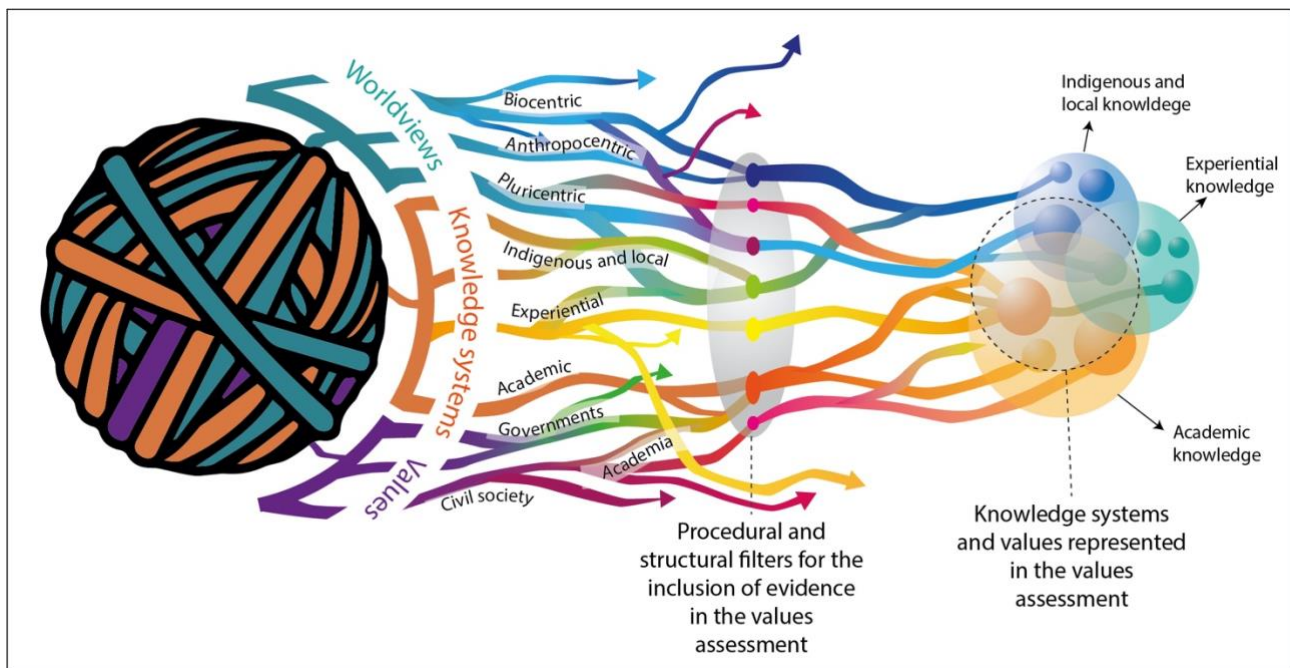

Figure 1.10. The plurality achieved in the values assessment and its limitations. Representation of the multidimensional and dynamic nature of worldviews, knowledge and values, and how they get filtered through procedures, structures and evidence presented in the assessment. Some strands of knowledge and values intertwine, while others remain distinct. From this diversity, some "strands" are more prominently represented in the assessment, as is the case of academic knowledge. Adapted from Sillitoe (2006) and Tengö (2014).

The capacity of the assessment expert team to perceive and represent this diversity is bounded by the conditions that underpin the production of the assessment. The approaches used and insights gained have been filtered by the IPBES conceptual framework, IPBES procedures (e.g., the use of systematic literature reviews) and structures (e.g., the disciplinary representation and organization of experts) that have guided the assessment. Only a part of the vast spectrum of diverse worldviews and knowledges could be reflected: grey literature, difficult to identify by using search engines, and governmental documents (e.g., policies, laws), not easily accessible, only represented a small fraction

of the sources (11%) even after devoting important effort to avoid this bias (18 of the 39 literature reviews- see above).

A large share of the sources cited in the assessment (96%) were published in English, reflecting the rise of English as the *lingua franca* of global science at the cost of a global homogenisation and reduced plurality in cross-cultural science production and communication (Hanauer et al., 2019; Ramírez-Castañeda, 2020). The literature cited presents information from all the regions of the world, but countries belonging to the Western Europe and Others Group (WEOG) were the most frequently represented (21%), and those from Eastern Europe were very poorly depicted (1.1%). A strong bias was found in the country of affiliation of the first authors of these sources, with a large proportion of them based in countries of the Western Europe and Others Group (73%), with very few of them based in Africa (4%) or Eastern Europe (1%). Reports from governments and civil society organizations, including non-scientific valuation exercises published in consultant reports, that constitute substantial "grey literature" only represent a limited fraction of the sources of the assessment (8%), despite having targeted several search strategies to these types of documents. Other types of knowledge, different worldviews, kinds of narratives and expressions about the values of nature have their own perspectives that are hard to be captured, for example, in written form. All these sources have unavoidably been interpreted through the scientific approaches of the team of assessment experts and IPBES procedures.

Regarding the conceptualization of nature-human relations, the types of values of nature, as well as valuation approaches and methods, IPLCs apply their own knowledge systems and conceptualizations, which do not usually align with the logic and procedures established by academia (see *3.2.4*). The assessment provides the conceptual basis to recognise indigenous and local knowledge systems and to create mechanisms to elicit their values and to co-construct inclusive decision-making processes. Yet, the study of valuation by IPLCs is a relatively young field in academia and it has just begun to be explored by IPLC scholars (see *3.2.4*). In the absence of IPLC conceptualisations, attempts to understand the knowledge, worldviews, values and approaches to valuations by IPLCs is subject to western science conceptualisations of nature, methods, evidence, and confines how other methods might be organised or what logics might inform them. The values assessment has significantly expanded upon previous IPBES approaches to its co-production with IPLCs, but still remains a process primarily framed by a western academic scientific worldview (e.g., written text, in English, encompassing mostly a western-science-perspective).

Importantly, academic sources used to incorporate IPLCs and ILK in the assessment do not necessarily reflect the worldviews, concepts and values held by these groups, as academic researchers may present interpretations of reality based on filters from their own disciplinary fields or even personal biases. There is much more to learn directly from IPLCs, urging for the need to work with these groups (including indigenous and local knowledge holders, scholars, etc.) to fill in gaps in both the literature and in policy practice. This is not only because they hold the key to this vital knowledge, but, equally relevant, because of their sovereignty over their knowledge. Finally, it is worth mentioning that, although differences between knowledge systems do exist, including issues of intellectual property rights, linguistic particularities, context-based knowledge and others, some academic sources emphasize an existing polarization between ILK and western science or academic knowledge, which does not necessarily reflect what happens in practice. For example, some values of nature found to be connected to IPLCs' worldviews are also shared by several other sociocultural groups in both rural and urban contexts (see *2.2.1* for examples). This calls for a need to recognize the synergies and intersections across knowledge systems that can help to build dialogue, understandings and collaborative initiatives in valuation processes and policies for biodiversity conservation and sustainability (Taylor et al., 2020; McElewee et al., 2020).

1.5. The roadmap of the values assessment

The *values assessment* is organised into six chapters that address different aspects of the roles of the diverse values of nature in decisions and policies (Figure 1.11). *Chapter 1* provides an introduction to the assessment report. *Chapter 2* sheds light on the multiple conceptualisations of the values of nature, given that they emerge from the different ways people understand, interpret and experience human-nature relationships, expressed in diverse worldviews, languages and knowledge systems. *Chapter 3* analyses the goals, principles, capacities and current applications of valuation methods and approaches, and provides an overview of the potential and limitations of existing valuation methods to inform decision-making. *Chapter 4* focuses on the values revealed by existing institutions, whether (or not) the outputs of valuation methods are taken up in decision-making, and how the expression of values along with other factors including power and knowledge, influence decision outcomes. *Chapter 5* explores the types of values that are associated with different futures, and the mechanisms and approaches that facilitate transformative change and shifts towards more sustainable and just pathways. Lastly, *Chapter 6* examines the operationalisation and capacities needed to successfully incorporate the diverse values of nature into decision-making in a way that enables transformative change.

The *values assessment* offers a toolkit for decision-makers to navigate the complexities associated with the existence of a large diversity of values of nature and the different roles played by these values in decisions (Figure 1.11). These include the key concepts, typologies, guidelines and policy support tools that guide a constructive engagement with the diverse values of nature at different decision-making stages. These tools allow a wide range of stakeholders to pave the way for the transformations needed to address the current biodiversity crisis and achieve more sustainable and just futures as envisioned by the SDGs.
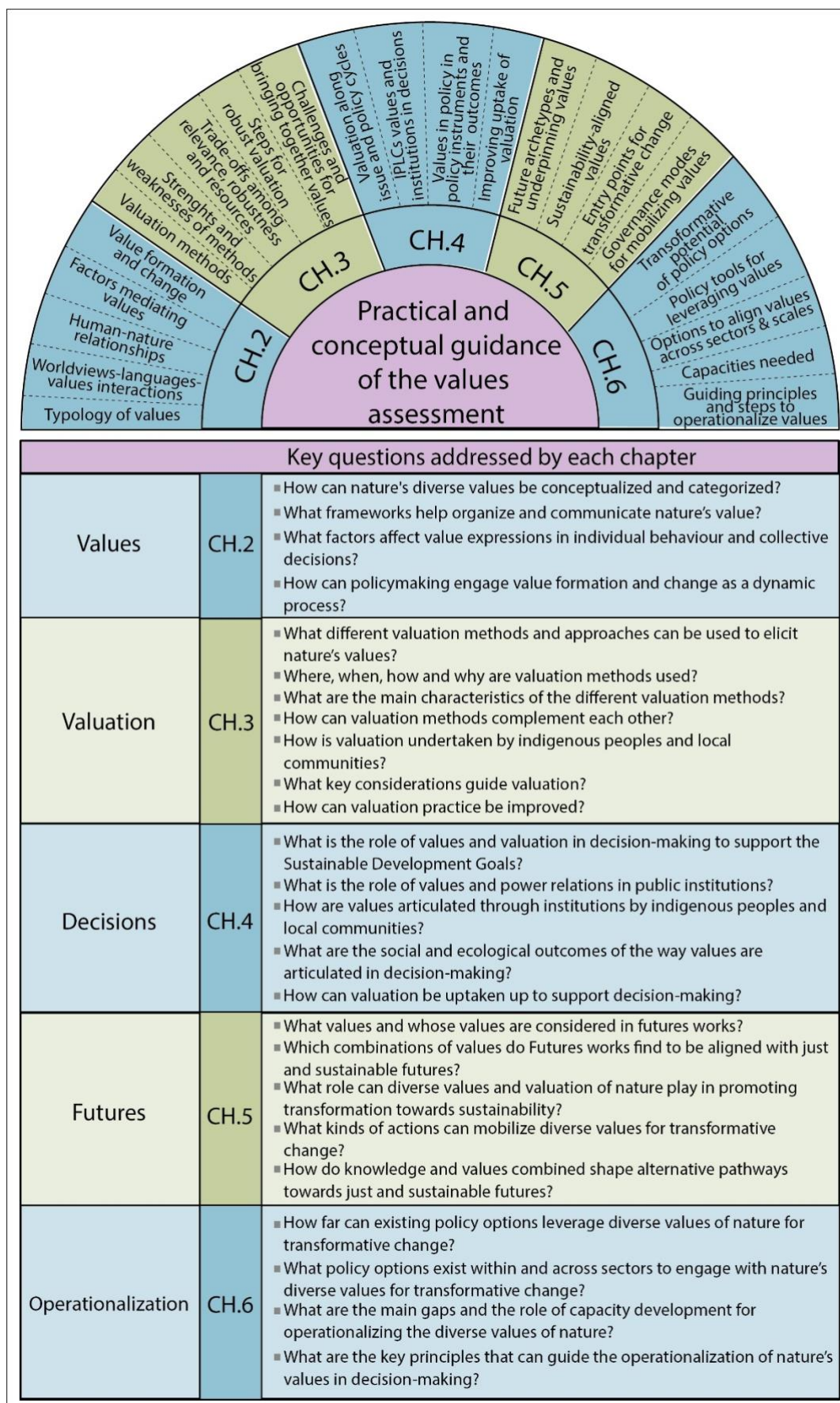
Figure 1.11. The main questions addressed, and methodological tools provided by each of the chapters.

References

Amel, E., Manning, C., Scott, B., & Koger, S. (2017). Beyond the roots of human inaction: Fostering collective effort toward ecosystem conservation. *Science*, *356*(6335), 275-279. https://doi.org/10.1016/b978-012091560-6/50013-5

Argyris, C. (1991). Teaching smart people how to learn. *Harvard business review*, *69*(3).

Arnstein, S. R. (1969). A Ladder Of Citizen Participation. *Journal of the American Institute of Planners*, *35*(4), 216-224. https://doi.org/10.1080/01944366908977225

Bennett, N. J., & Satterfield, T. (2018). Environmental governance: A practical framework to guide design, evaluation, and analysis. *Conservation Letters*, *11*(6), e12600. https://doi.org/10.1111/conl.12600

Bigger, P., & Robertson, M. (2017). Value is Simple. Valuation is Complex. *Capitalism Nature Socialism*, *28*(1), 68-77. https://doi.org/10.1080/10455752.2016.1273962

Bozeman, B. (2007). *Public values and public interest: Counterbalancing economic individualism*. Georgetown University Press.

Brockington, D., & Igoe, J. (2006). Eviction for Conservation: A Global Overview. *Conservation and Society*, *4*(3), 424.

Bromley, D. W. (2006). *Sufficient Reason: Volitional Pragmatism and the Meaning of Economic Institutions*. Princeton University Press. https://doi.org/10.2307/j.ctt7rhhm

Buckingham, S., & Kulcur, R. (2009). Gendered Geographies of Environmental Injustice. *Antipode*, *41*(4), 659-683. https://doi.org/10.1111/j.1467-8330.2009.00693.x

Bullard, R. (1990). Mobilizing the Black Community for Environmental Justice. *Journal of Intergroup Relations*, *17*(1), 33-43.

CBD. (2010). *Tenth meeting of the Conference of the Parties to the Convention on Biological Diversity (COP 10)*. https://www.cbd.int/meetings/

CBD. (2020). *Zero draft of the post-2020 global biodiversity framework*.

Chan, K. M. A., Gould, R. K., & Pascual, U. (2018). Editorial overview: Relational values: what are they, and what's the fuss about? *Current Opinion in Environmental Sustainability*, *35*, A1-A7. https://doi.org/10.1016/j.cosust.2018.11.003

Chan, K. M. A., & Satterfield, T. (2020). The maturation of ecosystem services: Social and policy research expands, but whither biophysically informed valuation? *People and Nature*, *2*(4), 1021-1060. https://doi.org/10.1002/pan3.10137

Chapin III, F. S., Gary, P. K., & Folke, C. (Eds.). (2009). *Principles of ecosystem stewardship: Resilience-based natural resource management in a changing world*. Springer Science & Business Media.

Chaudhary, A., & Kastner, T. (2016). Land use biodiversity impacts embodied in international food trade. *Global Environmental Change*, *38*, 195-204. https://doi.org/10.1016/j.gloenvcha.2016.03.013

Comberti, C., Thornton, T. F., Wyllie de Echeverria, V., & Patterson, T. (2015). Ecosystem services or services to ecosystems? Valuing cultivation and reciprocal relationships between humans and ecosystems. *Global Environmental Change*, *34*, 247-262. https://doi.org/10.1016/j.gloenvcha.2015.07.007

Coscieme, L., da Silva Hyldmo, H., Fernández-Llamazares, Á., Palomo, I., Mwampamba, T. H., Selomane, O., Sitas, N., Jaureguiberry, P., Takahashi, Y., Lim, M., Barral, M. P., Farinaci, J. S., Diaz-José, J., Ghosh, S., Ojino, J., Alassaf, A., Baatuuwie, B. N., Balint, L., Basher, Z., … Valle, M. (2020). Multiple conceptualizations of nature are key to inclusivity and legitimacy in global environmental governance. *Environmental Science & Policy*, *104*, 36-42. https://doi.org/10.1016/j.envsci.2019.10.018

Coulthard, G. S. (2007). Subjects of Empire: Indigenous Peoples and the 'Politics of Recognition' in Canada. *Contemporary Political Theory*, *6*(4), 437-460. https://doi.org/10.1057/palgrave.cpt.9300307

D´Alisa, G., Demaria, F., & Kallis, G. (Eds.). (2014). *Degrowth A Vocabulary for a New Era*. Routledge, Taylor and Francis. https://doi.org/10.1007/s13398-014-0173-7.2

Daily, G. C., Polasky, S., Goldstein, J., Kareiva, P. M., Mooney, H. A., Pejchar, L., Ricketts, T. H., Salzman, J., & Shallenberger, R. (2009). Ecosystem services in decision making: Time to deliver. *Frontiers in Ecology and the Environment*, *7*(1), 21-28. https://doi.org/10.1890/080025

Daily, G. C., Söderqvist, T., Aniyar, S., Arrow, K., Dasgupta, P., Ehrlich, P. R., Folke, C., Jansson, A., Jansson, B.-O., Kautsky, N., Levin, S., Lubchenco, J., Mäler, K.-G., Simpson, D., Starrett, D., Tilman, D., & Walker, B. (2000). The Value of Nature and the Nature of Value. *Science*, *289*(5478), 395-396. https://doi.org/10.1126/science.289.5478.395

Daly, H. E. (1996). *Beyond Growth The Economics of Sustainable Development*. Beacon Press.

Dasgupta, P. (2021). *The Economics of Biodiversity: The Dasgupta Review*. HM Treasury. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_dat a/file/962785/The_Economics_of_Biodiversity_The_Dasgupta_Review_Full_Report.pdf

de Castro, E. V. (1998). Cosmological Deixis and Amerindian Perspectivism. *The Journal of the Royal Anthropological Institute*, *4*(3), 469. https://doi.org/10.2307/3034157

Denton, F. (2002). Climate change vulnerability, impacts, and adaptation: Why does gender matter? *Gender & Development*, *10*(2), 10-20. https://doi.org/10.1080/13552070215903

Devos, Y., Munns, W. R., Forbes, V. E., Maltby, L., Stenseke, M., Brussaard, L., Streissl, F., & Hardy, A. (2019). Applying ecosystem services for pre-market environmental risk assessments of regulated stressors. *EFSA Journal*, *17*, N.PAG-N.PAG. Academic Search Premier.

Díaz, S., Demissew, S., Carabias, J., Joly, C., Lonsdale, M., Ash, N., Larigauderie, A., Adhikari, J. R., Arico, S., Báldi, A., Bartuska, A., Baste, I. A., Bilgin, A., Brondizio, E., Chan, K. M., Figueroa, V. E., Duraiappah, A., Fischer, M., Hill, R., … Zlatanova, D. (2015a). The IPBES Conceptual Framework—Connecting nature and people. *Current Opinion in Environmental Sustainability*, *14*, 1-16. https://doi.org/10.1016/j.cosust.2014.11.002

Díaz, S., Demissew, S., Joly, C., Lonsdale, W. M., & Larigauderie, A. (2015b). A Rosetta Stone for Nature's Benefits to People. *PLoS Biology*, *13*(1), 1-8. https://doi.org/10.1371/journal.pbio.1002040

Dietz, T., Fitzgerald, A., & Shwom, R. (2005). Environmental Values. *Annual Review of Environment and Resources*, *30*(1), 335-372. https://doi.org/10.1146/annurev.energy.30.050504.144444

Dryzek, J. S., Honig, B., & Phillips, A. (Eds.). (2006). *The Oxford handbook of political theory*. Oxford University Press.

Duraiappah, A. K., Asah, S. T., Brondizio, E. S., Kosoy, N., O'Farrell, P. J., Prieur-Richard, A.-H., Subramanian, S. M., & Takeuchi, K. (2014). Managing the mismatches to provide ecosystem services for human well-being: A conceptual framework for understanding the New Commons. *Current Opinion in Environmental Sustainability*, *7*, 94-100. https://doi.org/10.1016/j.cosust.2013.11.031

Faith, D. P. (2021). Valuation and Appreciation of Biodiversity: The "Maintenance of Options" Provided by the Variety of Life. *Frontiers in Ecology and Evolution*, *9*, 635670. https://doi.org/10.3389/fevo.2021.635670

FAO. (2020). *Biodiversity Integrated Assessment and Computation Tool | B-INTACT* (p. 2). Food and Agriculture Organization of the United Nations.

Fernández-Llamazares, Á., & Virtanen, P. K. (2020). Game masters and Amazonian Indigenous views on sustainability. *Current Opinion in Environmental Sustainability*, *43*, 21-27. https://doi.org/10.1016/j.cosust.2020.01.004

Fish, R., & McKelvey, H. (2021). *Valuing Nature: The Roots of Transformation*. CRC Press. https://doi.org/10.1201/9781003166177

Funtowicz, S. O., & Ravetz, J. R. (1993). Science for the post-normal age. *Futures*, *25*(7), 739-755. https://doi.org/10.1016/0016-3287(93)90022-L

Grant, M. J., & Booth, A. (2009). A typology of reviews: An analysis of 14 review types and associated methodologies. *Health Information & Libraries Journal*, *26*(2), 91-108. https://doi.org/10.1111/j.1471-1842.2009.00848.x

Hanauer, D. I., Sheridan, C. L., & Englander, K. (2019). Linguistic Injustice in the Writing of Research Articles in English as a Second Language: Data From Taiwanese and Mexican Researchers. *Written Communication*, *36*(1), 136-154. https://doi.org/10.1177/0741088318804821

Harmon, D. (2002). *In Light of Our Differences: How Diversity in Nature and Culture Makes Us Human.* Smithson. Inst. Press. https://scholarlypress.si.edu/store/anthropology-archeology/light-our-differences-how-diversity-nature-culture/

Hill, R., Adem, Ç., Alangui, W. V., Molnár, Z., Aumeeruddy-Thomas, Y., Bridgewater, P., Tengö, M., Thaman, R., Adou Yao, C. Y., Berkes, F., Carino, J., Carneiro da Cunha, M., Diaw, M. C., Díaz, S., Figueroa, V. E., Fisher, J., Hardison, P., Ichikawa, K., Kariuki, P., … Xue, D. (2020). Working with Indigenous, local and scientific knowledge in assessments of nature and nature's linkages with people. *Current Opinion in Environmental Sustainability*, *43*, 8-20. https://doi.org/10.1016/j.cosust.2019.12.006

Howarth, R. B., & Wilson, M. A. (2006). A Theoretical Approach to Deliberative Valuation: Aggregation by Mutual Consent. *Land Economics*, *82*(1), 1-16. https://doi.org/10.3368/le.82.1.1

IPBES. (2012). *Resolution on the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. https://www.ipbes.net/sites/default/files/downloads/Resolution%20establishing%20IPBES_2012.pdf

IPBES. (2015). *Preliminary guide regarding diverse conceptualization of multiple values of nature and its benefits, including biodiversity and ecosystem functions and services (deliverable 3 (d))*. IPBES Secretariat. https://ipbes.net/sites/default/files/downloads/IPBES-4-INF-13_EN.pdf

IPBES. (2016a). *Summary for policymakers of the methodological assessment of scenarios and models of biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*.

IPBES. (2016b). *The assessment report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services on pollinators, pollination and food production* (S. G. Potts, V. L. Imperatriz-Fonseca, & H. T. Ngo, Eds.).

IPBES. (2018a). *The regional assessment report on Biodiversity and Ecosystem Services for Asia and the Pacific*. IPBES Secretariat. https://ipbes.net/sites/default/files/2018_asia_pacific_full_report_book_v3_pages.pdf

IPBES. (2018b). *The regional assessment report on Biodiversity and Ecosystem Services for Europe and Central Asia*. IPBES Secretariat. https://ipbes.net/sites/default/files/2018_eca_full_report_book_v5_pages_0.pdf

IPBES. (2018c). *The regional assessment report on Biodiversity and Ecosystem Services for the Americas* (Vol. 1). IPBES Secretariat. https://doi.org/10.1016/B978-0-12-384719-5.00349-X

IPBES. (2018d). *The regional assessment report on Biodiversity and Ecosystem Sevices for Africa* (E. Archer, L. Dziba, K. J. Mulongoy, M. A. Maoela, & M. Walters, Eds.). IPBES Secretariat. https://ipbes.net/sites/default/files/africa_assessment_report_20181219_0.pdf

IPBES. (2019a). *Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. IPBES Secretariat. 978-3-947851-13-3

IPBES. (2019b). *The IPBES Global Assessment on Biodiversity and Ecosystem Services Chapter 2.1 Status and Trends—Drivers of Change* (p. 245).

IPBES. (2020). *Workshop Report on Biodiversity and Pandemics of the Intergovernmental Platform on Biodiversity and Ecosystem Services*. IPBES. https://doi.org/10.5281/zenodo.4147317

IPBES. (2021). *Methodological guidance for recognizing and working with indigenous and local knowledge in IPBES, prepared by the task force on indigenous and local knowledge in support of the implementation of the approach to recognizing and working with indigenous and local knowledge in IPBES approved by the Plenary in decision IPBES-5/1*. Guidance to Assessment Teams Developed by the IPBES Task Forces. https://ipbes.net/modules-assessment-guide

IPBES-2/4. (s. f.). *Decision IPBES-2/4: Conceptual framework for the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. IPBES.

IPBES/6/INF/9. (s. f.). *Information on the scoping for the methodological assessment regarding the diverse conceptualization of multiple values of nature and its benefits, including biodiversity and ecosystem services (deliverable 3 (d))*. IPBES.

IPCC. (2019). *Climate Change and Land: An IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems*. https://www.ipcc.ch/site/assets/uploads/2019/11/SRCCL-Full-Report-Compiled-191128.pdf

Jacobs, S., Martín-López, B., Barton, D. N., Dunford, R., Harrison, P. A., Kelemen, E., Saarikoski, H., Termansen, M., García-Llorente, M., Gómez-Baggethun, E., Kopperoinen, L., Luque, S., Palomo, I., Priess, J. A., Rusch, G. M., Tenerelli, P., Turkelboom, F., Demeyer, R., Hauck, J., … Smith, R. (2018). The means determine the end – Pursuing integrated valuation in practice. *Ecosystem Services*, *29*, 515-528. https://doi.org/10.1016/j.ecoser.2017.07.011

Jann, W., & Wegrich, K. (2007). Theories of the Policy Cycle. En *Handbook of Public Policy Analysis*. Routledge.

Kallis, A. H., Paulson, S., D'Alisa, G., & Demaria, F. (2020). *The Case for Degrowth* (Vol. 1). Wiley. https://brill.com/view/journals/prot/1/1/article-p211_211.xml

Kelbessa, W. (2005). The Rehabilitation of Indigenous Environmental Ethics in Africa. *Diogenes*, *52*(3), 17-34. https://doi.org/10.1177/0392192105055167

Kendal, D., & Raymond, C. M. (2019). Understanding pathways to shifting people's values over time in the context of social–ecological systems. *Sustainability Science*, *14*(5), 1333-1342. https://doi.org/10.1007/s11625-018-0648-0

Kenter, J. O., Hyde, T., Christie, M., & Fazey, I. (2011). The importance of deliberation in valuing ecosystem services in developing countries—Evidence from the Solomon Islands. *Global Environmental Change*, *21*(2), 505-521. https://doi.org/10.1016/j.gloenvcha.2011.01.001

Kenter, J. O., Reed, M. S., & Fazey, I. (2016). The deliberative value formation model. *Ecosystem Services*, *21*, 194-207. https://doi.org/10.1016/j.ecoser.2016.09.015

Klinsky, S., Roberts, T., Huq, S., Okereke, C., Newell, P., Dauvergne, P., O'Brien, K., Schroeder, H., Tschakert, P., Clapp, J., Keck, M., Biermann, F., Liverman, D., Gupta, J., Rahman, A., Messner, D., Pellow, D., & Bauer, S. (2017). Why equity is fundamental in climate change

policy research. *Global Environmental Change*, *44*, 170-173. https://doi.org/10.1016/j.gloenvcha.2016.08.002

Koltko-Rivera, M. E. (2004). The Psychology of Worldviews. *Review of General Psychology*, *8*(1), 3-58. https://doi.org/10.1037/1089-2680.8.1.3

Kronenberg, J., & Andersson, E. (2019). Integrating social values with other value dimensions: Parallel use vs. combination vs. full integration. *Sustainability Science*, *14*(5), 1283-1295. https://doi.org/10.1007/s11625-019-00688-7

Laurans, Y., Rankovic, A., Billé, R., Pirard, R., & Mermet, L. (2013). Use of ecosystem services economic valuation for decision making: Questioning a literature blindspot. *Journal of Environmental Management*, *119*, 208-219. https://doi.org/10.1016/j.jenvman.2013.01.008

Leach, M., Reyers, B., Bai, X., Brondizio, E. S., Cook, C., Díaz, S., Espindola, G., Scobie, M., Stafford-Smith, M., & Subramanian, S. M. (2018). Equity and sustainability in the Anthropocene: A social–ecological systems perspective on their intertwined futures. *Global Sustainability*, *1*, e13. https://doi.org/10.1017/sus.2018.12

Lele, S., Brondizio, E., Byrne, J., Mace, G. M., & Martinez-Alier, J. (2018). Framing the environment. En *Rethinking Environmentalism: Linking Justice, Sustainability, and Diversity* (pp. 1-20). MIT press. https://esforum.de/publications/sfr23/Rethinking Environmentalism.html

Manfredo, M. J., Bruskotter, J. T., Teel, T. L., Fulton, D., Schwartz, S. H., Arlinghaus, R., Oishi, S., Uskul, A. K., Redford, K., Kitayama, S., & Sullivan, L. (2017). Why social values cannot be changed for the sake of conservation. *Conservation Biology*, *31*(4), 772-780. https://doi.org/10.1111/cobi.12855

Manfredo, M. J., Teel, T. L., Berl, R. E. W., Bruskotter, J. T., & Kitayama, S. (2020). Social value shift in favour of biodiversity conservation in the United States. *Nature Sustainability*, 11. https://doi.org/10.1038/s41893-020-00655-6

March, J. G. (1994). *A Primer on Decision Making. How Decisions Happen*. New York: Free Press.

Martin, A. (2017). *Just Conservation: Biodiversity, Wellbeing and Sustainability* (1st ed.). Routledge.

Masson-Delmotte, V., Pörtner, H.-O., Skea, J., Zhai, P., Roberts, D., Shukla, P. R., Pirani, A., Pidcock, R., Chen, Y., Lonnoy, E., Moufouma-Okia, W., Péan, C., Connors, S., Matthews, J. B. R., Zhou, X., Gomis, M. I., Maycock, T., Tignor, M., & Waterfield, T. (2018). *An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty* (p. 630). IPCC.

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & Group, P. (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLoS Medicine*, *6*(7).

Morton, J. F. (2007). The Impact of Climate Change on Smallholder and Subsistence Agriculture. *Proceedings of the National Academy of Sciences of the United States of America*, *104*(50), 19680-19685.

Muradian, R., & Pascual, U. (2018). A typology of elementary forms of human-nature relations: A contribution to the valuation debate. *Current Opinion in Environmental Sustainability*, *35*, 8-14. https://doi.org/10.1016/j.cosust.2018.10.014

Nemogá, G. (2019). Indigenous Agrobiodiversity and Governance. En K. Zimmerer & S. Haan (Eds.), *Agrobiodiversity: Integrating Knowledge for a Sustainable Future* (Vol. 24, pp. 241-263). MIT Press.

Norton, B. G. (2005). *Sustainability: A Philosophy of Adaptive Ecosystem Management* (J. O'Neill, Ed.). University of Chicago Press. https://doi.org/10.2980/1195-6860(2006)13[565:SAPOAE]2.0.CO;2

O'Connor, S., & Kenter, J. O. (2019). Making intrinsic values work; integrating intrinsic values of the more-than-human world through the Life Framework of Values. *Sustainability Science*, *14*(5), 1247-1265. Scopus. https://doi.org/10.1007/s11625-019-00715-7

OECD. (2018). *Cost-Benefit Analysis and the Environment: Further Developments and Policy Use*. OECD. https://doi.org/10.1787/9789264085169-en

Olsen, M. E. (2019). *Viewing The World Ecologically*. Routledge.

O'Neill, J., Holland, A., & Light, A. (2008). *Environmental Values*. Routledge.

Ostrom, E. (2005). Understanding the diversity of structured human interactions. En *Understanding institutional diversity* (pp. 3-29). Princeton University Press.

Ostrom, E., & Hess, C. (2010). Private and common property rights. En B. Bouckaert (Ed.), *Property law and economics*. Edward Elgar.

Pascual, U., Balvanera, P., Díaz, S., Pataki, G., Roth, E., Stenseke, M., Watson, R. T., Başak Dessane, E., Islar, M., Kelemen, E., Maris, V., Quaas, M., Subramanian, S. M., Wittmer, H., Adlan, A., Ahn, S. E., Al-Hafedh, Y. S., Amankwah, E., Asah, S. T., … Yagi, N. (2017). Valuing nature's contributions to people: The IPBES approach. *Current Opinion in Environmental Sustainability*, *26-27*, 7-16. https://doi.org/10.1016/j.cosust.2016.12.006

Pascual, U., Muradian, R., Brander, L., Martin-Lopez, B., & Verma, M. (2010). The Economics of Valuing Ecosystem Services and Biodiversity. En *The Economics of Ecosystem and Biodiversity*.

Pearce, D. W., & Moran, D. (1994). *The economic value of biodiversity*. Earthscan.

Pham, M. T., Rajić, A., Greig, J. D., Sargeant, J. M., Papadopoulos, A., & McEwen, S. A. (2014). A scoping review of scoping reviews: Advancing the approach and enhancing the consistency. *Research Synthesis Methods*, *5*(4), 371-385. https://doi.org/10.1002/jrsm.1123

Pröpper, M., & Haupts, F. (2014). The culturality of ecosystem services. Emphasizing process and transformation. *Ecological Economics*, *108*, 28-35.

Ramírez-Castañeda, V. (2020). Disadvantages in preparing and publishing scientific papers caused by the dominance of the English language in science: The case of Colombian researchers in biological sciences. *PLOS ONE*, *15*(9), e0238372. https://doi.org/10.1371/journal.pone.0238372

Rozzi, R., Chapin III, F. S., Callicot, J. B., Picket, S. T. A., & Power, M. E. (2015). *Earth Stewardship: Linking Ecology and Ethics in Theory and Practice*. Springer.

Schlosberg, D. (2004). Reconceiving Environmental Justice: Global Movements And Political Theories. *Environmental Politics*, *13*(3), 517-540. https://doi.org/10.1080/0964401042000229025

Schwartz, S. H. (1992). Universals in the Content and Structure of Values: Theoretical Advances and Empirical Tests in 20 Countries. En *Advances in Experimental Social Psychology* (Vol. 25, pp. 1-65). Elsevier. https://doi.org/10.1016/S0065-2601(08)60281-6

Seager, T. P. (2008). The sustainability spectrum and the sciences of sustainability. *Business Strategy and the Environment*, *17*(7), 444-453. https://doi.org/10.1002/bse.632

Secretariat of the Convention on Biological Diversity. (2014). *Cities and biodiversity outlook: Action and policy : a global assessment of the links between urbanization, biodiversity, and ecosystem services*. https://www.deslibris.ca/ID/241668

Sikor, T., Martin, A., Fisher, J., & He, J. (2014). Toward an Empirical Analysis of Justice in Ecosystem Governance. *Conservation Letters*, *7*(6), 524-532. https://doi.org/10.1111/conl.12142

Sillitoe, P. (2006). Indigenous Knowledge in Development. *Anthropology in Action*, *13*(3), 1-12. https://doi.org/10.3167/aia.2006.130302

Smith, A. (2016). *The Wealth of Nations*. Aegitas.

Soulé, M. (2013). The "New Conservation": Editorial. *Conservation Biology*, *27*(5), 895-897. https://doi.org/10.1111/cobi.12147

Starik, M. (1995). Should trees have managerial standing? Toward stakeholder status for non-human nature. *Journal of Business Ethics*, *14*(3), 207-217. https://doi.org/10.1007/BF00881435

Strang, V. (2020). The Rights of the River: Water, Culture and Ecological Justice. En H. Kopnina & H. Washington (Eds.), *Conservation: Integrating Social and Ecological Justice* (pp. 105-119). Springer International Publishing. https://doi.org/10.1007/978-3-030-13905-6_8

Swilling, M., & Annecke, E. (2012). *Explorations of sustainability in an unfair world*. United Nations University Press.

Taylor, B., Chapron, G., Kopnina, H., Orlikowska, E., Gray, J., & Piccolo, J. J. (2020). The need for ecocentrism in biodiversity conservation. *Conservation Biology*, *34*(5), 1089-1096. https://doi.org/10.1111/cobi.13541

TEEB. (2010). *Mainstreaming the economics of nature: A synthesis of the approach, conclusions and recommendations of teeb* (UNEP, Ed.). UNEP.

Temper, L., Demaria, F., Scheidel, A., Del Bene, D., & Martinez-Alier, J. (2018). The Global Environmental Justice Atlas (EJAtlas): Ecological distribution conflicts as forces for sustainability. *Sustainability Science*, *13*(3), 573-584. https://doi.org/10.1007/s11625-018-0563-4

Tengö, M., Brondizio, E. S., Elmqvist, T., Malmer, P., & Spierenburg, M. (2014). Connecting Diverse Knowledge Systems for Enhanced Ecosystem Governance: The Multiple Evidence Base Approach. *AMBIO*, *43*(5), 579-591. https://doi.org/10.1007/s13280-014-0501-3

Tomich, T. P., Chomitz, K., Francisco, H., Izac, A.-M. N., Murdiyarso, D., Ratner, B. D., Thomas, D. E., & van Noordwijk, M. (2004). Policy analysis and environmental problems at different scales: Asking the right questions. *Agriculture, Ecosystems & Environment*, *104*(1), 5-18. https://doi.org/10.1016/j.agee.2004.01.003

UK NEA. (2014). *The UK National Ecosystem Assessment: Synthesis of the Key Findings*. UNEP-WCMC.

UNEP. (2011). *Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication Synthesis for Policy Makers*. United Nations Environment Programme. www.unep.org/greeneconomy

UNEP. (2021). *Making Peace With Nature: A scientific blueprint to tackle the climate, biodiversity and pollution emergencies* (p. en) [Synthesis report].

United Nations. (1987). *Brundtland Report: Our Common Future*. Report of the World Commission on Environment and Development. https://doi.org/10.1016/0022-2364(91)90424-R

United Nations. (1992). *Agenda 21: The Rio Declaration on Environment and Development*. United Nations. https://doi.org/10.1017/S037689290003157X

United Nations. (2007). *Declaration on the Rights of Indigenous People* (N.º 68). https://www.un.org/ga/search/view_doc.asp?symbol=A/RES/66/288&Lang=E

United Nations. (2017). *The Sustainable Development Goals Report 2017*.

Vatn, A. (2015). *Environmental governance. Institutions, policies and actions*. Edward Elgar Publishing.

Vatn, A., & Bromley, D. W. (1994). Choices without Prices without Apologies. *Journal of Environmental Economics and Management*, *26*(2), 129-148. https://doi.org/10.1006/jeem.1994.1008

Vermeylen, S. (2019). Special issue: Environmental justice and epistemic violence. *Local Environment*, *24*(2), 89-93. https://doi.org/10.1080/13549839.2018.1561658

Visseren-Hamakers, I. J., Razzaque, J., McElwee, P., Turnhout, E., Kelemen, E., Rusch, G. M., Fernández-Llamazares, Á., Chan, I., Lim, M., Islar, M., Gautam, A. P., Williams, M., Mungatana, E., Karim, M. S., Muradian, R., Gerber, L. R., Lui, G., Liu, J., Spangenberg, J. H., & Zaleski, D. (2021). Transformative governance of biodiversity: Insights for sustainable development. *Current Opinion in Environmental Sustainability*, *53*, 20-28. https://doi.org/10.1016/j.cosust.2021.06.002

Wallace, K. J., Jago, M., Pannell, D. J., & Kim, M. K. (2021). Wellbeing, values, and planning in environmental management. *Journal of Environmental Management*, *277*, 111447. https://doi.org/10.1016/j.jenvman.2020.111447

WCED. (1987). *Report from the UN World Commission on Environment and Development: Our Common Future*. World Commission on Environment and Development. http://www.un-documents.net/wced-ocf.htm

Whyte, K., Caldwell, C., & Schaefer, M. (2018). Indigenous Lessons about Sustainability Are Not Just for "All Humanity". En *Sustainability* (pp. 149-179). NYU Press. https://doi.org/10.18574/nyu/9781479894567.003.0007

Whyte, K. P. (2011). The Recognition Dimensions of Environmental Justice in Indian Country. *Environmental Justice*, *4*(4), 199-205. https://doi.org/10.1089/env.2011.0036

Wilson, E. O. (2016). *Half-Earth Our Planet's Fight for Life*. Liveright Publishing Corporation, a division of W.W. Norton & Company.

Wilson, M. A., & Howarth, R. B. (2002). Discourse-based valuation of ecosystem services: Establishing fair outcomes through group deliberation. *Ecological Economics*, *41*(3), 431-443. https://doi.org/10.1016/S0921-8009(02)00092-7

Zafra-Calvo, N., Balvanera, P., Pascual, U., Merçon, J., Martín-López, B., van Noordwijk, M., Mwampamba, T. H., Lele, S., Ifejika Speranza, C., Arias-Arévalo, P., Cabrol, D., Cáceres, D. M., O'Farrell, P., Subramanian, S. M., Devy, S., Krishnan, S., Carmenta, R., Guibrunet, L., Kraus-Elsin, Y., … Díaz, S. (2020). Plural valuation of nature for equity and sustainability: Insights from the Global South. *Global Environmental Change*, *63*, 102115. https://doi.org/10.1016/j.gloenvcha.2020.102115