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The role of values in future scenarios: what types of values underpin (un)sustainable and (un)just futures?

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Values have been recognized as critical leverage points for sustainability transformations. However, there is limited evidence unpacking which types of values are associated with specific types of sustainable and unsustainable futures, as described by future scenarios and other types of futures-related works. This paper builds on a review of 460 future scenarios, visions, and other types of futures-related works in the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services Values Assessment, synthesizing evidence from academia, private sector, governmental and non-governmental strategies, science-policy reports, and arts-based evidence, to identify the types of values of nature that underlie different archetypes of the future. The results demonstrate that futures related to dystopian scenario archetypes such as Regional Competition, Inequality, and Breakdown are mostly underpinned by deeply individualistic and materialistic values. In contrast, futures with more sustainable and just outcomes, such as Global Sustainable Development and Regional Sustainability, tend to be underpinned by a more balanced combination of plural values of nature, with a dominant focus on nature's contribution to societal (as opposed to individual) aspects of well-being. Furthermore, the paper identifies research gaps and illustrates the key importance of acknowledging not only people's specific values directly related to nature, such as instrumental, intrinsic, and relational human-nature values and relationships, but also broad values and worldviews that affect the interactions between nature and society, with resulting impacts on Nature's Contributions to People and opportunities for a good quality of life.

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Introduction

With pressing social and environmental challenges across local to global scales, there is a need to urgently shift human development toward more sustainable and just trajectories [1]. In this context, achieving social–ecological transformations (i.e. fundamental shifts in human–environmental relationships [2]) relies on people's decisions and actions, which in turn depend on their different motivations, including values[16] [3–5].

Assessments by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) indicate that different types of futures, spanning from just and sustainable ones to those burdened by social and environmental challenges and inequalities, may be underpinned by different combinations of values motivating the decisions and actions of the imaginary actors included in the scenarios[17] and other types of futures-related works [6,7]. In spite of previous research interest in the role of values in scenario-development processes within the field of futures studies [8–11], the exploration of related findings in the context of current sustainability science has been only fragmentary, and the role of values in shaping different futures remains understudied (cf. e.g. [6]). Furthermore, there is increasing interest in understanding the role that values can play in transformations to sustainability [12]. To address these issues, the IPBES Values Assessment conducted a comprehensive structured review of the role of values in over 460 scenarios and other types of futures-related works (13–15,91; Supplementary material). Since IPBES focuses primarily on social–ecological dynamics related to the state of nature (including ecosystems and biodiversity) and nature's contributions to people (including ecosystem services) [16], the focus of this review was on people's values that are generally related to nature.

This work builds on the IPBES structured review and presents a synthesis of the combinations of values that underlie different types of scenarios, based on evidence from academia, private sector, governmental and non-governmental strategies, science-policy reports, and arts-based evidence. With implications for both policy and research, we highlight which types of values co-occur in futures that are normatively described as desirable or undesirable by their authors, while also reflecting on gaps for future exploration.

What role do values play in future scenarios?

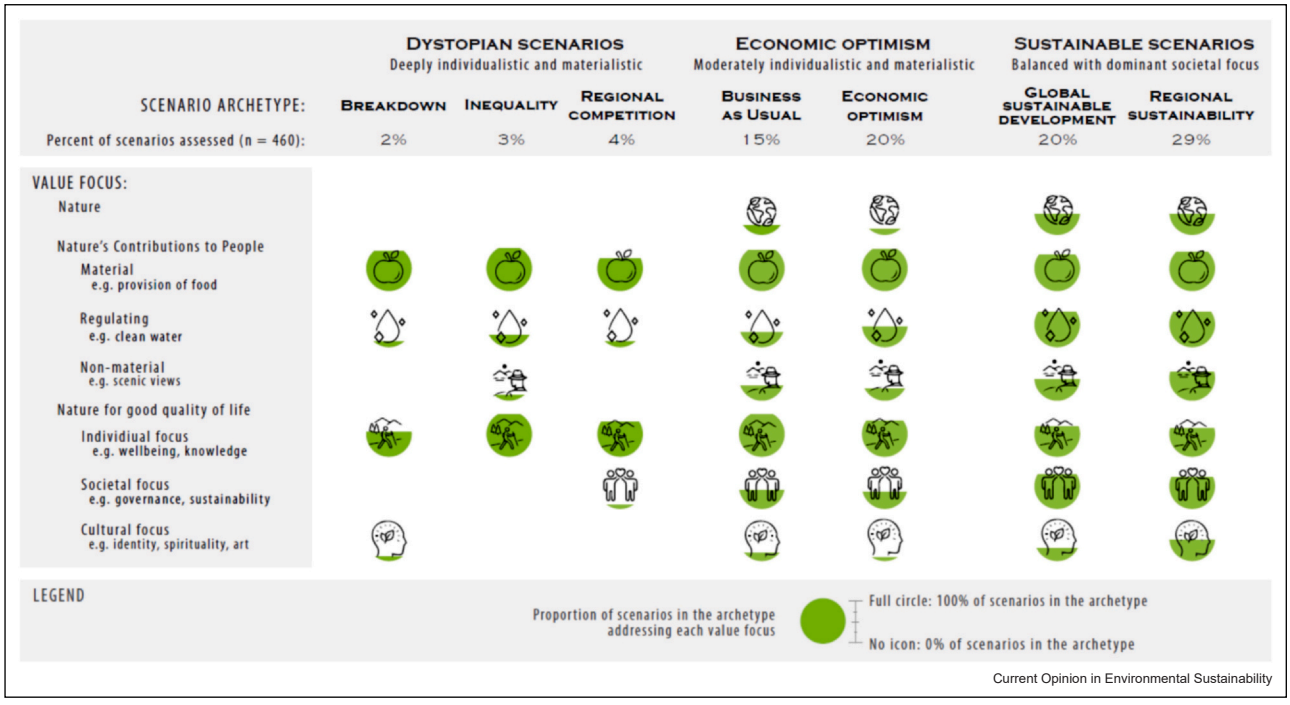
Values of nature, held by the envisioned people, groups, and societies acting within co-developed futures and scenarios, play a crucial role, as they shape the dynamics of the imagined futures in several ways [17]. Importantly, in this review, we focus on the values held by imaginary actors within future scenarios; reflecting on the values implicitly imprinted into scenarios by people taking part in their development (researchers, experts, public sector representatives, etc.) arguably requires a different set of methods and is thus beyond the scope of this study [18].

First, values held by different scenario actors underlie what aspects of the current world these actors find desirable or undesirable. Thus, values can impact decisions across scales, from individual decisions and behaviors to the functioning and goals of society and the larger social–ecological system [19]. This, in turn, influences the decisions and actions people take, driving the directions in which future pathways unfold [20]. For instance, actors who place high value on material abundance and comfort may prefer consumption-oriented lifestyles, potentially triggering future pathways with greater environmental sustainability- or justice-related challenges [21]. Second, actors in different contexts as well as across spatial, temporal, and political scales, hold different values shaping their vision of what the world should look like in the future [22]. These values, with associated relational dynamics and inherent power asymmetries, can influence the type of future outcomes that they consider desirable and thus worth pursuing. For

[16] (In this study, we understand values as a general term to describe "what is important to people and why" [74], incl. life "goals, beliefs and general guiding principles" as well as "judgements or measurements of the importance of specific things in particular situations and contexts" [23,24].)

[17] (For the purpose of this study, we define scenarios broadly as qualitative or quantitative descriptions of potential future development, including both its environmental and social dimensions) [88,89]. Hereafter, the paper refers to scenarios in this broad sense, including multiple types of futures-related works such as future visions and pathways [90].

Figure 1



Value foci by scenario archetype. Each type of a value focus is rendered by a different icon. The proportions of reviewed future scenarios addressing different focal values related to nature, nature's contributions to people, and good quality of life are symbolized by proportional shading of the circle underlying each icon (see legend). Global Sustainable Development and Regional Sustainability are characterized by a larger value plurality compared with the other scenario archetypes. (Figure based on the IPBES Values Assessment [14]; see the Supplementary material for the underlying data).

instance, some actors may value individual freedom and prioritize steering their world to a state where individuals do not feel responsible for others, while other actors may value collaboration, care and reciprocity, and seek to steer the world toward a state where people feel collective responsibility for each other, with implications for societal and environmental governance [23].

A number of frameworks have been developed to unpack different types of values, from more categorical to more holistic ones [23–29]. In this respect, to better understand the role of plural values in future scenarios, we adopted the value approach gradually developed within IPBES [24,30] and applied two perspectives: first, the perspective of *value foci*, which shows whether nature is valued for itself (e.g. in the case of species protection), for its role in the provision of nature's contributions to people (e.g. material, nonmaterial, and regulating), or for supporting different aspects of human good quality of life (understood in IPBES as a context-dependent, nonprescriptive set of qualities related to individual, societal, or cultural well-being [16,30,31]; Figure 1). Second, we embraced the perspective of *value justification*, which elucidates whether actors value nature for its own inherent worth (intrinsic values of nature), for its function in achieving desired outcomes (instrumental values of nature), or for its unique human–nature interactions (relational values of nature) [30]. These two perspectives are related but distinct, for instance, value focus on nature itself may be justified by intrinsic, instrumental, and relational values, or their combination. A complementary IPBES-related perspective on values distinguishes between *broad values* as held, first-order preferences transcending contexts and guiding people's evaluation of events (also referred to as core values [12,32]), and *specific values*, as assigned, second-order preferences relating to the worth or importance of a particular object, or state of the world (also referred to as contextual values [12,33]) [24,29,34,35]. In this study, we draw upon this perspective in the discussion part below.

Although numerous social–ecological scenarios exist at different scales and encompass various geographic contexts, they tend to adhere to a small number of general storylines and assumptions, often referred to as scenario families or *archetypes* [7,36,37]. The main purpose of scenario archetypes is to amalgamate the variety of available scenarios into a smaller number of scenario narratives that illustrate the most important differences in how future pathways may unfold [38]. IPBES science-policy assessments build on several seminal scenario

archetype classifications and apply these deductively to categorize reviewed futures works [7,39]; for the purpose of this review, in order to comply with the IPBES context, we have used the scenario archetypes formulated by the IPBES Regional Assessment for Europe and Central Asia, namely the archetypes of Business as Usual, Economic Optimism, Regional Competition, Inequality, Breakdown, Regional Sustainability, and Global Sustainable Development (see the Supplementary material and [6,36] for detailed characteristics of the archetypes). Categorizing reviewed scenarios into scenario archetypes has demonstrated benefits in terms of conciseness and synthetic power; however, it is important to note that this approach may partly conceal the nuance and level of detail incorporated in the original scenarios [7].

Which combinations of values underpin different futures?

Our structured review identified a pattern of value combinations in the evidence provided by available future scenarios (Figure 1), illustrating what combinations of value justifications and foci may underlie different pathways and lead to different futures [13] (see Supplementary material section A — Review Methodology). The following summary highlights that the focus of most of the reviewed scenarios was primarily on specific values related to nature, their focus, and justification, rather than broad values (of nature and beyond), which represents one of the key points further discussed below.

Values in dystopian scenario archetypes

The first group of scenarios characterized by similar value patterns are scenarios often normatively described as dystopian by their authors. These scenarios generally fall into three archetypes: 'Regional Competition', 'Inequality', and 'Breakdown'. In general, such scenarios depict a world in which inequalities in wealth, power, and knowledge increase both between and within countries. They assume a deterioration of societal bonds, whether between elites and the masses, within international bodies and countries, or communities and individuals. These scenarios typically suggest negative impacts on nature and the environment due to loosening regulation, dysfunctional governance, or increasing exploitative use of natural resources stemming from people's full dependence on local resource base resulting from conflicts and growing barriers to trade [36,40,41].

The underlying values in the dystopian scenario archetypes tend to be a combination of deeply individualistic and materialistic instrumental values. The actors whose values are implemented in these scenarios are generally driven by the preference for individual aspects of good quality of life, including individual wealth, individual access to healthcare and education, and individual livelihood security, which may be interpreted as a reaction to the harsh conditions of the dystopian scenarios combined with the lack of societal structures supporting solidarity and collaboration [42]. It is crucial to note that actors and societies in these scenarios tend to strongly favor individual solutions over collective ones; at the same time, scenarios rarely provide insights into the envisioned power dynamics among scenario actors and their implications for whose values get to be enacted. From the perspective of a value focus, these scenarios assume a preference for material benefits from both nature (in the form of material nature's contributions to people) and anthropogenic assets, over non-material benefits [43].

Values in economic optimism archetypes

The second group of scenarios resembles the continuation of current trends in various ways, particularly with regard to relying on technological solutions to environmental challenges and reactive policies to tackle sustainability crises. These scenarios fall into the 'Business as Usual' and 'Economic Optimism' archetypes, where dominant assumptions are that economic growth will remain a strong driver of future development, and challenges resulting from the use of fossil fuels, environmental pollution and degradation, and public health deterioration will be tackled by rapid adoption of technological developments. Similarly to the previous group, these scenarios are rooted in individualistic and materialistic instrumental values [44]. However, an important difference to the previous group lies in the presence (be it weak) of additional types of value foci (e.g. appreciating regulating and non-material contributions of nature such as clean water or scenic views), leading to a more diverse mix of underlying values compared with the first group of scenarios [45]. Still, available modeling studies highlight potential negative consequences of these scenarios, particularly on the state of nature, including ecosystems and biodiversity [6,46].

Values in sustainability scenario archetypes

The final group of scenarios includes pathways leading to a future world that is more sustainable and just compared with current trajectories, according to the respective authors of the reviewed scenarios. These scenarios can be classified into two archetypes: 'Global Sustainable Development' and 'Regional Sustainability', both of which assume the achievement of sustainable and just futures, but they differ in the pathways to reach associated sustainability and justice goals. The 'Global Sustainable Development' archetype includes relying on international cooperation, strong governance, and high-level dedication to address global sustainability challenges, while 'Regional Sustainability' scenarios assume a transformation toward sustainability through less material- and energy-intensive lifestyles, a shift in values

toward non-material, convivial aspects of life such as good relationships, and a strong turn to more localized governance.

The 'Global sustainable development' and 'Regional sustainability' archetypes share a common feature with the previous scenario groups, which is a strong representation of values for material nature's contributions to people. However, unlike the previous scenario groups, these archetypes also strongly value regulating contributions (e.g. regulation of climate, erosion or water quality and quantity) and non-material contributions (e.g. nature-based recreation or inspiration).

One of the key characteristics of both of the sustainability archetypes is their emphasis on the contribution of nature to societal aspects of good quality of life, such as sustainability and resilience, cultural diversity, care, distributional justice, and equity [30,47–50]. In addition, they highlight values for nature's contribution to cultural aspects of good quality of life, such as sense of place and community, historical values, stewardship, interactions between people and nature (in some cases seeing humans as inseparable to nature, or humans as nature), and artistic and spiritual inspiration, which sets this group of scenarios apart from the rest of the reviewed scenarios.

The scenarios in both of the sustainability archetypes reflect a greater plurality of values than the previous two scenario groups. This plurality occurs not only in terms of the focus of the values, but also in terms of higher representation of intrinsic and relational values, particularly in the case of the 'Regional sustainability' scenarios. This highlights a significant difference between the scenarios reaching sustainable and just outcomes, the dystopian scenarios, and the business-as-usual and economic optimism scenarios.

Remaining gaps and directions for future research

The structured review points to several significant gaps that hinder our current understanding of the role of values in future development.

Developed futures-related works (including scenarios, visions, etc.) tend not to explicitly unpack the values motivating the decisions and actions of the imaginary people, groups, and societies acting within the scenarios [6,14]. While futures-related works often include an economic, biophysical, or sociocultural valuation of their outcomes (e.g. economic value of a potential future landscape resulting from a certain decision-making pathway, its biophysical function, or aesthetic appreciation) [51], this type of analysis should not be confused with the underlying values that guide actors' behavior in scenarios. Although initial work has developed frameworks facilitating the explicit articulation of values in scenarios (such as the Nature Futures Framework [52] or the Life Framework of Values [53]), further research needs to focus on both understanding the causal connection between actors' values and actions (e.g. the value-action gap) in future scenarios [54], and identifying methods that coherently connect actors' values, actions, and their impacts on sustainability and justice outcomes [55]. To this end, there is the need for sustainability research to embrace the full potential of approaches facilitating these connections, for example, by building on the long-term engagement of futures studies in issues related to values [10,18] through techniques such as causal-layered analysis [56], artistic research methods and serious games [57–61], as well as futures studies' discussions on imaginaries and worldviews [11]. Further exploration and reflection of these approaches can help us better understand why top-down scenario assessments and processes tend to feed to decision-making processes more often than game-based and learning-based approaches, despite the call for their more widespread use [57].

The available evidence indicates a clear skew toward designing scenarios assuming sustainable development, business-as-usual, or economic optimism trajectories among the current research and practitioner communities. Scenarios depicting a dystopian future characterized by societal fragmentation along political, cultural, wealth, or access axes have been notably underrepresented in the review, as the identified futures works tended to focus rather on business-as-usual types of futures, or futures closer to the Economic Optimism or sustainability archetypes. This limitation hinders the ability to reflect on the role of values that may underlie undesirable future development in which sustainability and justice goals are not met. Although some recent studies suggest a potential increase in the use of dystopian scenarios in research [62], they remain scarce in both peer-reviewed and gray literature, and remain more represented in other sources of future visions such as speculative fiction and science fiction [63].

Most future scenarios tend to aggregate across different types of imaginary future societal actors featuring in the scenarios, without providing a nuanced understanding of whose values are prioritized and put into action, and whose values are neglected and how (i.e. via processes of the exertion of power and privilege) [64]. As a result, potential trade-offs between different interest groups or societal groups, and the implications for their types of livelihoods and opportunities remain unclear. This is further related to the general absence of explicit consideration of justice and equity issues in future scenarios across peer-reviewed and gray literature, including even implicit dimensions of distributional, procedural, and recognitional aspects [65–67].

The reviewed scenarios generally explicitly or implicitly ascribe different value types and their combinations to actors, without reflecting on the role of institutions and governance systems in shaping values dominant in each of the futures, that is, which values are favored and supported by the institutions and societies and thus more likely to be displayed or expressed by actors in the imaginary future societies [68–70]. Consequently, typical scenario exercises commonly fail to identify the specific actors responsible for the actions assumed within the scenario and that decisions are not made within sociopolitical vacuums devoid of power asymmetries [71,72]. In this respect, futuring techniques such as future personas may present a suitable tool to tease out values of people, groups, and societies acting within future scenarios [73]. In this respect, it is vital to acknowledge that the value portfolios of different types of imaginary scenario actors, whether aggregated or nuanced across different actor groups, are shaped by the projections of value patterns dominant in scenario co-developing groups and the scenario field as such, including its internal power dynamics [72].

Finally, the review illustrated that if our societies aspire to achieving sustainable and just futures similar to those outlined in the Global Sustainable Development or Regional Sustainability archetypes, related decision pathways need to be nested in futures values grounded on societal and cultural aspects of good quality of life, potentially as opposed to individual ones. This highlights a significant concern that arises when scenarios prioritize solely the focus on specific values (e.g. those associated specifically with nature), rather than considering the deeper level of broad values [74,75]. Such scenarios may overlook the pivotal role of broad values that are not directly linked to our relationship with nature, but which may have a closer connection to the underlying motivations that shape our interactions with nature, both individually and collectively.

These gaps emphasize the need for greater attention to the plural engagement of actors and knowledge-holders in scenario co-development and other futuring processes [76] in order to leverage different types of experience and knowledge (including formal and informal knowledge, local and generalizable knowledge, novice and expert knowledge, and traditional, experiential, scientific, and indigenous knowledge) [77]. Scenario developers further need to consider whether the dominant representation of instrumental values is due to the prevailing methods used for scenario co-development processes, and find ways to shift the focus from instrumental values to a more nuanced representation of plural values [78–80]. This highlights the need to address the power dimensions of which and whose values shape the development of imagined futures, as these futures have the potential to become socially performative through guiding policy-making, or occupying places in social imaginations [81]. As such, the continued representation of the dominance of instrumental values as opposed to more pluralistic representation of values in future scenarios may prevent our collective abilities to design and choose pathways toward more sustainable and just futures, including failing to identify the need to disrupt the dominance of sustainability non-aligned types of values [82–84].

This review finds that those who construct future scenarios and other types of futures-related works tend to agree that values need to be diversified and balanced to achieve transformations to sustainability. However, research into how to intervene to shift the balance of values remains in its infancy [83,85]. While the primary proposal of the IPBES Values Assessment is to incorporate greater diversity of values, there is an important complementary question about how people balance this diversity: which values do we want more of and which we need less of? [83].

Conclusions

Collectively building a sustainable future that is just for all human and non-human actors requires a concerted and transformative effort. Values play a fundamental role in determining the general direction of our collective pathways, and understanding their role is crucial for developing policies and strategies for promoting a shift toward more just and sustainable trajectories [92]. The gaps identified by this review highlight that even scenarios primarily focusing on sustaining nature and its contributions to people urgently need to pay attention, not only to specific values of nature, but also to the broad values of different actors [86]. Such broad values influence actors' preferences toward different modes of societal functioning. These include responsibility for others versus responsibility for self, or level of individualism versus preference for collective solutions, which may have deeper influence on sustainability- and justice-related outcomes than values related to nature itself. Co-developing such knowledge requires plural ways of engagement between scientists and stakeholders and paying higher attention to causal links between actors' values, decisions, actions, and outcomes in scenarios and futures-related works in general [87].

Data Availability

The core part of the data is shared in the Supplementary material.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.cosust.2023.101343.

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- • of special interest
- •• of outstanding interest

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The paper postulates five principles key for societal transformation to more just, equitable, resilient, and sustainable futures, namely rethinking growth, efficiency, the state, the commons, and justice. It showcases the potential to coordinate actions across all five principles and initiate systems-level transformation.

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The study argues that in order to meaningfully engage with values as transformative leverage points, transformation research needs to distinguish between two distinct modes of knowledge production and mobilization. The study reacts on the critical knowledge gap related to the value-related mechanisms potentially triggering sustainability transformations.

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The chapter reviews and synthetizes state-of-the-art knowledge on the influence of values on the process of enabling, triggering and nurturing transformations towards just and sustainable futures. It summarizes resulting knowledge gaps and frontiers for further value-related research.

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