frontiers in Ecology and Evolution

PERSPECTIVE
published: 19 March 2021
doi: 10.3389/fevo.2021.624084

Assessing People's Values of Nature: Where Is the Link to Sustainability Transformations?

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The efforts to measure people's current preferences and values of ecosystem services raise questions about the link to sustainability transformations. The importance of taking social and cultural values of nature into account is increasingly recognised within ecosystem services research and policy. This notion is informing the development and application of social (or socio-cultural) valuation methods that seek to assess and capture non-material social and cultural aspects of benefits of ecosystems in non-monetary terms. Here, 'values' refer to the products of descriptive scientific assessments of the links between human well-being and ecosystems. This precise use of the values term can be contrasted with normative modes of understanding values, as underlying beliefs and moral principles about what is good and right, which also influence science and institutions. While both perspectives on values are important for the biodiversity and ecosystem services agenda, values within this space have mainly been understood in relation to assessments and descriptive modes of values. Failing to acknowledge the distinction between descriptive and normative modes bypasses the potential mismatch between people's current values and sustainability transformations. Refining methodologies to more accurately describe social values risks simply giving us a more detailed account of what we already know—people in general do not value nature enough. A central task for values studies is to explore why or how peoples' mindsets might converge with sustainability goals, using methods that go beyond assessing current states to incorporate change and transformation.

Keywords: socio-cultural values, socio-cultural valuation, environmental values, ecosystem services assessment, social value

OPEN ACCESS

Edited by:
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Specialty section:
This article was submitted to Conservation and Restoration Ecology, a section of the journal Frontiers in Ecology and Evolution

Received: *30 October 2020*
Accepted: *22 February 2021*
Published: *19 March 2021*

Citation:
Stålhammar S (2021) Assessing People's Values of Nature: Where Is the Link to Sustainability Transformations? Front. Ecol. Evol. 9:624084. doi: 10.3389/fevo.2021.624084

INTRODUCTION

The importance of focussing on a diversity of people's relations with nature has gained ground in environmental governance, planning and discussions around Ecosystem Services (ES) and Nature's Contributions to People (NCP) (Pascual et al., 2017; Díaz et al., 2018). Along with this development, there is an emphasis on the need to build more elaborate narratives in assessments that involve viewing individuals not as either economic or moral agents, and to include perspectives and methods from the broader social sciences and humanities to understand the links between ES to human well-being (Chan et al., 2016; Stenseke, 2016; Braat, 2018). The idea of assessing social

values now extends beyond the field of environmental valuation and is increasingly recognised as crucial in ES and NCP research (Christie et al., 2019; Kenter et al., 2019). The applications of ES and NCP assessments involve an increased focus on categorisation, systematic assessment and measurement of human–nature relations and values. This raises questions about how measuring current perceptions and preferences relate to transformations toward sustainability.

It is difficult to think of a more normative notion than value. However, within assessments of ES and NCP, and specifically within socio-cultural valuation, value often refers not to normative notions but to empirical and descriptive accounts of how people 'ascribe' or 'assign' value to particular aspects of nature (Burkhard and Maes, 2017; Hejnowicz and Rudd, 2017; Asah and Blahna, 2019). Value is also used as an umbrella term with various interpretations such as, e.g., a phenomenon, a preference, a principle, a method, or an indicator (IPBES, 2016; Kenter et al., 2019). The idea of 'social' or 'socio-cultural values' often refers to those values that are not captured by ecological or monetary assessments of ecosystem services (ES). Within the (NCP) framework, these aspects are referred to as "non-material" contributions (Díaz et al., 2018). This includes aspects of people's relationship with nature and land, such as identity formation, learning, inspiration, physical and psychological experiences and spiritual significance (ibid.). These aspects are also associated with cultural ES, and are considered especially unsuitable for monetary valuation since they deal with not easily quantifiable notions of e.g., identity, sense of place, cultural heritage, perceptions, spirituality, psychological wellbeing (Abson and Termansen, 2011; Chan et al., 2012; James, 2015; Cooper et al., 2016; Stålhammar and Pedersen, 2017). Overall, the field of socio-cultural valuation seeks to capture non-material or intangible social and cultural aspects and preferences in non-monetary terms (Kelemen et al., 2016), and has grown significantly in the recent years (Chan and Satterfield, 2020).

Transformation for sustainability requires systemic shifts in worldviews and mental models that at a collective level shape norms, institutions, structures (Westley et al., 2013; Abson et al., 2017; Ives et al., 2018). This perspective on transformation highlights the importance of recognising the realignment of values that can enable sustainability (McAlpine et al., 2015). In contrast, efforts to assess ES and NCP are focussed on measuring and eliciting people's current states of values, preferences and perceptions of nature. The idea of 'capturing' values and 'eliciting' people's preferences in order to determine the values of nature is influential. How would it be done otherwise, one might ask, because the whole point of valuation seems to be to elicit preferences. My point here is not that valuation is faulty or useless as such. It is that valuation has been given a needlessly large focus when it comes to understanding (social) values of nature, to the point where it can come to overshadow the need and potential for sustainability transformation.

DESCRIPTIVE VS. NORMATIVE MODES OF VALUES

Socio-cultural valuation, belonging to the ES paradigmatic perspective in research and practice, relies on the idea that increased measurement and description of values will lead to more sustainable outcomes (MEA (Millennium Ecosystem Assessment), 2005; TEEB, 2010; Turnhout et al., 2014; Pascual et al., 2017). The idea is that generating more precise knowledge of the values of nature through assessments, and incorporating this knowledge into decision-making, will ultimately lead to a more desirable ordering of social-natural relations. Even though the ES concept was developed for sustainability purposes, it has not been conceptualised with regard to specific sustainability principles or criteria, such as justice or ecological integrity (Schröter et al., 2017). The focus in ES assessments is often not on how to manage for sustainability transformations, but on how to measure current or past states of specific ES (Costanza et al., 2017; Rau et al., 2018; Chan and Satterfield, 2020). While biophysical assessments of current states can show dependence on ecosystems, and be conducted within a transformative framework, there is reason to believe it does not work as well for the social sphere of assessments.

Although value is a highly discussed topic, we have inherited a kind of 'value-neutral' idea of value within the ES assessment paradigm. This idea of social value should be understood in relation to its close affiliation with high-powered initiatives such as the Millennium Ecosystem Assessment (MEA) and The Economics of Ecosystem services and Biodiversity (TEEB). Within these initiatives, and with the mainstreaming of ES, value as an object of study has mainly been addressed through environmental valuation. This implies a focus on assessments and the systematic mapping of ES in monetary and non-monetary terms, where the subjectivist notion of value as pertaining to preferences is influential (Gómez-Baggethun et al., 2010; Costanza et al., 2014). Here, value is not necessarily related to underlying moral beliefs, but studied as the measure of a preference or an indicator (TEEB, 2010). Moreover, according to a subjective theory of value, value of nature is seen to originate in the minds of individuals and not in the structures of ecosystems themselves (see Haines-Young and Potschin, 2010; Spangenberg and Settele, 2016). The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem services (IPBES) is now making a step change and considerable efforts to move away from how value was initially used in a narrow and utilitarian sense, to include more diverse and plural understandings, as well as to outline the relations between values, institutions and pathways toward sustainable futures (IPBES, 2016, 2018, 2019a; Jacobs et al., 2020). Within IPBES, the scope of conceptualising values of nature is focussed on "the values that people associate with nature (principles, importance, and preference) and the measures and indicators used to elicit these values" (IPBES, 2016, p. 3). In ES research, value has often been defined based on the contribution to human wellbeing, and operationalised through assessment (Costanza et al., 2017; Hejnowicz and Rudd, 2017; Chan and Satterfield, 2020). Thus, in discussion around values of nature within ES and NCP, the term 'values' often

refers to the products of descriptive scientific assessments of the links between human-wellbeing and ecosystems. However, this descriptive use and the operationalisation of the term is not how other established scholarly traditions have generally conceived of (social) values. These have instead been understood as underlying beliefs and moral principles about what is good and right (Hirose and Olson, 2015), that claim the validity of imperatives of different standpoints in society, and influences science and institutions (Johnson and Cureton, 2019). These normative and philosophical understandings of value are not 'varieties' of values that can be aggregated alongside monetary or non-monetary values or indicators. Value concepts in different fields deal with entirely different questions—for example, in psychology values refer to stable individual principles, whereas in ethics value deals with normatively significant questions regarding, for instance, why and how something (like nature) has value. These broad differences between descriptive and normative modes could be more easily distinguished if closer attention is payed to how different accounts of value often result from particular disciplinary framings (see Kenter et al., 2019).

The term 'value' is thus problematic, as it refers both to descriptive scientific assessments of the links between human well-being and ecosystems, as captured through ES valuation, and to underlying normative beliefs and moral principles in society that influence science and policy. In ES (or NCP) valuation, ontological questions regarding what values of nature are tend to merge with axiological issues of moral and ethical values in society, and how these should be accounted for in science and policy (see similar argument by Maier and Feest, 2016; Thorén and Stålhammar, 2018). More simply put, we are intermixing what currently is, with what should be. Needless to say, it is not desirable to make sharp distinctions between descriptive and normative modes of values, since all assessment processes are in a sense 'normative,' influenced by various choices including framings of value, the methodological tools and measurements (Jacobs et al., 2016). The argument here is rather that the difference between the two modes is underemphasised.

This underemphasis is demonstrated through the idea of "relational value" (Chan et al., 2016). Relational value as a values category is supposed to better describe and take into account people's current perceptions and behaviour *as well as* provide answers to the normative question of why and how we should value and protect nature (Stålhammar and Thorén, 2019). The problem with this conflation is that there is no reason, in theory, to believe that descriptions of people's current values, perceptions, and preferences with respect to nature reflect how we should value nature or that they resemble 'sustainable' values. In fact, there is reason to believe that it is the other way round. Current social values are also recognised by the IPBES global assessment as *underpinning* indirect drivers (such as 'economic and technical') of biodiversity and ecosystem loss (IPBES, 2019a). Refining methodologies to more accurately assess underlying social values will, seen from this perspective, simply give us a more detailed account of what we already know—people in general do not value nature enough.

Even if people do express 'high' values in assessments, or strong feelings of connectedness with nature, we cannot from these descriptive insights (alone) draw normative conclusions about how we should consider the importance of nature in policy and decision-making. The point here is that, despite methodological and conceptual advancements in assessing and integrating social values into policy and management—a focus on descriptive modes of values—we need additional justification for why or how people's mental states, preferences, or descriptions of human-nature relations coincide with sustainability goals. We need social criteria that are additional to the preferences or values themselves in order to decide what is optimal in terms of scale, fair distribution and efficient allocation in sustainable development (Sagoff, 1994; Norton et al., 1998; Costanza, 2000). Arguably, the focus on assessing people's stated preferences and values in ES, with its roots in environmental valuation, is an implication of economics, of giving legitimacy to consumer sovereignty, and as being tied to the fundamental economic mission of optimally satisfying (fixed and given) preferences (Farber et al., 2002). This is contrary to establishing new social criteria and to focussing on how current values should and can change in order to satisfy these (Norton et al., 1998; Costanza, 2000). Thus, observations about the problem of relying on existing preferences in relation to sustainability are not new. However, the focus on descriptive values and that a categorisation of current human-nature relations can direct sustainable change bring this concern into new light. A focus on current values, through an 'instrumental assessment paradigm' (Raymond et al., 2014), regardless of the disciplinary perspective and method applied, risks missing an important target for sustainability transformations, of allowing for changing perceptions and adaptations of ways of understanding nature's importance for society, both on the part of stakeholders and institutions.

A focus on value concepts *per se* within ES can also be delimiting. The preoccupation with the idea and concept of values can potentially prevent us from understanding the various ways in which nature matters to us. In order to clarify how different theoretical framings of values compare and overlap, different disciplines need to conduct extensive interdisciplinary analysis (see Kenter et al., 2019; Rawluk et al., 2019). Such analyses can provide necessary insights into how we can study and understand diverse human-nature relations from a plurality of methodological perspectives, and challenge dominant views of monistic monetary valuation. On the other hand, the focus on values as a concept can divert us from the 'original' task associated with ES assessments, that is, to understand how society is dependent on ecosystems. The preoccupation with value adds layers of theoretical complexity, especially with the inclusion of the broader social sciences, which requires interpretation of additional perspectives of what value is as a theoretical term, rather than analysis of the links and relations between people and ecosystems. The goal of increased interdisciplinary engagement and a focus around the term values then implies a loss of direction and of an overall goal within the ES paradigm.

It is not surprising that values have been a central focus within ES assessments, as these have been developed in close affiliation with environmental and ecological economics. However, I question attempts to fit the ways that the natural environment matters to people into concepts of value. For example, relational

values are explained as a foundational way of describing and understanding the relation between humans and nature (Chan et al., 2016). A focus on concepts of value is not exhaustive when it comes to the domain of understanding human–nature relationships; it is just one way of describing aspects of these.

NATURE AS VALUE-ABLE

Consideration of social values of ES can be important on all levels of decision-making. The form in which values are to be described, made known, and integrated into policy depends not only on scientific conceptualisations or accurate measurements, but of wider societal relevance. It is clear, with the current transdisciplinary efforts of IPBES, that a focus on legitimacy of knowledge (Cash et al., 2002), through stakeholder participation, is becoming increasingly important within the ES paradigm. IPBES strives to take into account the plurality of indigenous and local knowledge (ILK) systems and recognise that these reject universally applicable classifications, and require methods that are sensitive to context-specific perspectives (Díaz et al., 2018; IPBES, 2019b). The choices of concepts and methods are thus not only a question of accurate measurement or description, but also about justice and ontological politics (Blaser, 2012). It involves asking whose worldview is represented and reproduced. It is therefore important to emphasise that within the efforts of IPBES, the role of descriptive knowledge and descriptive modes of values is of crucial importance for the democratic inclusion and participation of diverse groups. Descriptive and context-specific investigations can be subversive through representing alternative and marginal perspectives in assessments, and challenge top-down scientific categorisations (Stålhammar and Brink, 2020).

Although descriptive knowledge can be crucial, we need to make more space in our approaches for social values (or perceptions, preferences, or whatever we want to call them) to shift and change, for the better. This is not to say that all ES and NCP research and practice operates based on descriptive modes of values, or that all involved researchers conflate descriptive and normative modes. Efforts within IPBES show considerable progress and a substantial body of work that both engages deeply with the conceptualisation of values, and produces policy options based on analysis of drivers and scenarios (IPBES, 2019a,b), which includes exploring more positive future relationships with nature (Lundquist et al., 2017). Social-ecological research also often draws on more normative understandings of values and transformation, when applying frameworks and approaches such as adaptive governance, social-learning, co-production and network formation (Olsson et al., 2004; Hahn et al., 2006; Österblom and Sumaila, 2011; Norström et al., 2017). Novel scenario approaches such as the Seeds of a Good Anthropocene include visioning and the creation of transformative spaces as central components (Pereira et al., 2018). However, the distinction between descriptive and normative modes of understanding social values needs to be further emphasised, and analysed in relation to transformation. For example, social learning is sometimes used for stakeholder engagement with no requirement of transformation or changes in understanding (Reed et al., 2010). Deliberate valuation approaches can include normative modes of values, but is also commonly advocated as an alternative that does a better job at capturing existing values than monetary assessments (Kenter et al., 2016).

It is important to clarify if applications of socio-cultural valuation and assessments are intended to be, for instance, statistical representation of individuals' use and preferences, or if the goal is more in line with creating legitimacy, and the effective involvement of all stakeholders (Raymond et al., 2014). As a way to outline more refined conceptualisations and operationalisations of social values in relation to assessments we can, instead of starting from definite positions of 'what values are,' focus on what we want the placeholder of value to represent, and what 'job' it is supposed to do.

There is a need for approaches that can take the current and future potential of natural environments into account. This includes objectivist biophysical assessments, as well as the *capacity* of natural environments to contribute to e.g., social learning and citizen building in the social realm. IPBES assessment of Europe and Central Asia explicitly include socio-cultural valuation and ILK systems and demonstrate the importance of how nature currently supports various non-material NCP (Christie et al., 2019). While this shows promising directions, and a more holistic approach, these assessments focus on how different societies value NCP. My concern is that more generally, current expressions of social value is not necessarily aligned with perceptions, views and values required for transformation. There is still room to further consider not only current ways that nature supports non-material NCP, but capacities and future potential. This can involve an understanding of nature to carry value, and to be "value-able" because it is *able* to produce value through its evolutionary processes, of which humans form a sub-set (Rolston, 1988, p. 4). Within the IPBES framework, the NCP category "maintenance of options," includes "the capacity of ecosystems, habitats, species, or genotypes to keep options open in order to support a good quality of life (Díaz et al., 2018, 2019; IPBES, 2019a,b)." This category is recognised to span all groups of NCP including the non-material, which covers various social and cultural contributions such as supporting identities and learning (IPBES, 2019b). The category of maintenance of options deserves more attention and engagement. In order to further align the work around social values with sustainability transformations, approaches that include the potential of a maintenance of options when it comes to non-material contributions are needed. This involves extending the focus from assessing the current flows of benefits or contributions, to the transformative potential that natural ecosystems can provide for people when it comes to perceptions, behaviour, ethics and experiences. This is in line with what Horcea-Milcu et al. (2019) refer to as 'transforming through values', which focus on processes that enable, stimulate, nurturing, or shift values as a means of facilitating transformative societal change. Further exploration of values change and deliberation (Eriksson et al., 2019; Kendal and Raymond, 2019; Masterson et al., 2019), as well as of normative economics (Ravenscroft, 2019), can challenge

and expand the focus on descriptive modes of values. Further distinctions and analysis of how approaches can be conceptualised and operationalised in relation to various interpretations of transformation are needed.

The mainstreaming of the ES concept and approach implies an increased focus on taking peoples preferences and perceptions into account for understanding and managing ecosystems. Efforts to assess the ways that nature matters to people is in a way a contradictory endeavour, since the fundamental importance of how people relate to and depend on nature is immeasurable and infinite. The ES assessment paradigm implies a lens of measurement, quantification and description of human-nature relations that is now difficult to 'unsee'. This poses challenges to conceptualising, assessing, and including values of nature in decision-making without reducing their meaning and representations. There is a need to examine how more elaborate or detailed description of the ways that nature is important to people relates to the need to change underlying social values that currently are indirect drivers of the ecological crisis. Moreover, there is a need to examine the interpretation of values assessments in policy and governance in relation to how a focus on values capture potentially overshadows (the need for) values change. Assessments do not just describe and capture human-nature relations, they also actively manifest and re-produce certain values and certain versions of the world, and direct attention and courses of action (Vatn, 2005; Law, 2009). There is an opportunity here to go beyond the focus on measuring current states, while further recognising nature's potential to sustain our values. The recent attention to justice and a right's based approach to nature (Chapron et al., 2019) marks an opportunity to engage more deeply with the practical implications of normative modes of social values. The bottom line is that transformation toward sustainability will not be realised by relying on measurements of current mindsets. We need new ways of seeing, relating to and valuing our place in the natural world. Should this not be a starting point for how to think about social values of nature?

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

AUTHOR CONTRIBUTIONS

The author confirms being the sole contributor of this work and has approved it for publication.

FUNDING

The research benefitted from funding from the Lund University Centre of Excellence for Integration of Social and Natural Dimensions of Sustainability (LUCID) funded by the Swedish Research Council Formas (Linneaus Centre LUCID; grant 259-2008-1718).

ACKNOWLEDGMENTS

This article presents discussions held in my Ph.D. thesis: "Reconnecting with nature through concepts: on the construction of values within the ecosystem services paradigm" (Stålhammar, 2020). I want to thank Henrik Thorén, Anne Jerneck, and John Piccolo for support and encouragement. I also want to thank the two reviewers for thoughtful comments.

REFERENCES

Abson, D. J., Fischer, J., Leventon, J., Newig, J., Schomerus, T., Vilsmaier, U., et al. (2017). Leverage points for sustainability transformation. *Ambio* 46, 30–39. doi: 10.1007/s13280-016-0800-y

Abson, D. J., and Termansen, M. (2011). Valuing ecosystem services in terms of ecological risks and returns. *Conserv. Biol.* 25, 250–258. doi: 10.1111/j.1523-1739.2010.01623.x

Asah, S. T., and Blahna, D. J. (2019). Involving Stakeholders' knowledge in co-designing social valuations of biodiversity and ecosystem services: implications for decision-making. *Ecosystems* 23, 324–337. doi: 10.1007/s10021-019-00405-6

Blaser, M. (2012). Ontology and indigeneity: on the political ontology of heterogeneous assemblages. *Cult. Geogr.* 21, 49–58.

Braat, L. C. (2018). Five reasons why the Science publication "Assessing nature's contributions to people" (Diaz et al. 2018) would not have been accepted in Ecosystem Services. *Ecosyst. Serv.* 30, A1–A2. doi: 10.1016/j.ecoser.2018.02.002

Burkhard, B., and Maes, J. (2017). *Mapping Ecosystem Services*. Sofia: Pensoft Publishers.

Cash, D., Clark, W. C., Alcock, F., Dickson, N. M., Eckley, N., Jäger, J., et al. (2002). *Salience, Credibility, Legitimacy and Boundaries: Linking Research, Assessment and Decision Making* (SSRN Scholarly Paper ID 372280). Social Science Research Network. doi: 10.2139/ssrn.372280

Chan, K. M., Balvanera, P., Benessaiah, K., Chapman, M., Díaz, S., Gómez-Baggethun, E., et al. (2016). Opinion: why protect nature? Rethinking values and the environment. *Proc. Natl. Acad. Sci. U.S.A.* 113, 1462–1465. doi: 10.1073/pnas.1525002113

Chan, K. M., Satterfield, T., and Goldstein, J. (2012). Rethinking ecosystem services to better address and navigate cultural values. *Ecol. Econ.* 73, 8–18. doi: 10.1016/j.ecolecon.2011.11.011

Chan, K. M. A., and Satterfield, T. (2020). The maturation of ecosystem services: social and policy research expands, but whither biophysically informed valuation? *People Nat.* 2, 1021–1060. doi: 10.1002/pan3.10137

Chapron, G., Epstein, Y., and López-Bao, J. V. (2019). A rights revolution for nature. *Science* 363, 1392–1393. doi: 10.1126/science.aav5601

Christie, M., Martín-López, B., Church, A., Siwicka, E., Szymonczyk, P., and Sauterel, J. M. (2019). Understanding the diversity of values of "Nature's contributions to people": insights from the IPBES Assessment of Europe and Central Asia. *Sustain. Sci.* 14, 1267–1282. doi: 10.1007/s11625-019-00716-6

Cooper, N., Brady, E., Steen, H., and Bryce, R. (2016). Aesthetic and spiritual values of ecosystems: recognising the ontological and axiological plurality of cultural ecosystem 'service'. *Ecosyst. Serv.* 21, 218–229. doi: 10.1016/j.ecoser.2016.07.014

Costanza, R. (2000). Social goals and the valuation of ecosystem services. *Ecosystems* 3, 4–10. doi: 10.1007/s100210000002

Costanza, R., de Groot, R., Braat, L., Kubiszewski, I., Fioramonti, L., Sutton, P., et al. (2017). Twenty years of ecosystem services: how far have we come and how far do we still need to go? *Ecosyst. Serv.* 28(Part A), 1–16. doi: 10.1016/j.ecoser.2017.09.008

Costanza, R., de Groot, R., Sutton, P., Ploeg, S., van der, Anderson, S. J., et al. (2014). Changes in the global value of ecosystem services. *Glob. Environ. Change* 26, 152–158. doi: 10.1016/j.gloenvcha.2014.04.002

Díaz, S., Pascual, U., Stenseke, M., Martín-López, B., Watson, R. T., Molnr, Z., et al. (2018). Assessing nature's contributions to people. *Science* 359, 270–272. doi: 10.1126/science.aap8826

Díaz, S., Settele, J., Brondízio, E. S., Ngo, H. T., Agard, J., Arneth, A., et al. (2019). Pervasive human-driven decline of life on Earth points to the need for transformative change. *Science* 366:eaax3100. doi: 10.1126/science.aax3100

Eriksson, M., van Riper, C. J., Leitschuh, B., Brymer, A. B., Rawluk, A., Raymond, C. M., et al. (2019). Social learning as a link between the individual and the collective: evaluating deliberation on social values. *Sustain. Sci.* 14, 1323–1332. doi: 10.1007/s11625-019-00725-5

Farber, S. C., Costanza, R., and Wilson, M. A. (2002). Economic and ecological concepts for valuing ecosystem services. *Ecol. Econ.* 41, 375–392. doi: 10.1016/s0921-8009(02)00088-5

Gómez-Baggethun, E., De Groot, R., Lomas, P., and Montes, C. (2010). The history of ecosystem services in economic theory and practice: from early notions to markets and payment schemes. *Ecol. Econ.* 69, 1209–1218. doi: 10.1016/j.ecolecon.2009.11.007

Hahn, T., Olsson, P., Folke, C., and Johansson, K. (2006). Trust-building, knowledge generation and organizational innovations: the role of a bridging organization for adaptive co-management of a wetland landscape around Kristianstad, Sweden. *Hum. Ecol.* 34, 573–592. doi: 10.1007/s10745-006-9035-z

Haines-Young, R., and Potschin, M. (2010). "The links between biodiversity, ecosystem services and human well-being," in *Ecosystem Ecology: A New Synthesis*, eds. D. G. Raffaelli and C. L. J. Frid (Cambridge: Cambridge University Press), 110–139. doi: 10.1017/CBO9780511750458.007

Hejnowicz, A. P., and Rudd, M. A. (2017). The value landscape in ecosystem services: value, value wherefore art thou value? *Sustainability* 9:850. doi: 10.3390/su9050850

Hirose, I., and Olson, J. (2015). *The Oxford Handbook of Value Theory*. New York, NY: Oxford University Press.

Horcea-Milcu, A., Abson, D. J., Apetrei, C. I., Duse, I. A., Freeth, R., Riechers, M., et al. (2019). Values in transformational sustainability science: four perspectives for change. *Sustain. Sci.* 14, 1425–1437. doi: 10.1007/s11625-019-00656-1

IPBES (2016). Preliminary Guide Regarding Diverse Conceptualization of Multiple Values of Nature and its Benefits, Including Biodiversity and Ecosystem Functions and Services (Deliverable 3 (d)). Available online at: https://www.ipbes.net/diverse-values-valuation (accessed October 8, 2020).

IPBES (2018). *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))*. Report no. IPBES-4-INF-13-EN-1. Available online at: https://ipbes.net/document-library-catalogue/ipbes4inf13 (accessed December 26, 2020).

IPBES (2019a). in *Summary for Policymakers of the Global Assessment Report on Biodiversity and Ecosystem Services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*, eds S. Díaz, J. Settele, E. S. Brondízio, H. T. Ngo, M. Guèze, J. Agard, et al. (Bonn: IPBES secretariat), 56. doi: 10.5281/zenodo.3553579

IPBES (2019b). in *Global Assessment Report on Biodiversity and Ecosystem Services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*, eds E. S. Brondizio, J. Settele, S. Díaz, and H. T. Ngo (Bonn: IPBES secretariat), XXX.

Ives, C. D., Abson, D. J., von Wehrden, H., Dorninger, C., Klaniecki, K., Fischer, J., et al. (2018). Reconnecting with nature for sustainability. *Sustain. Sci.* 13, 1389–1397. doi: 10.1007/s11625-018-0542-9

Jacobs, S., Dendoncker, N., Martín-López, B., Gomez-Baggethun, E., Boeraeve, F., McGrath, F. L., et al. (2016). A new valuation school: integrating diverse values of nature in resource and land use decisions. *Ecosyst. Serv.* 22, 213–220. doi: 10.1016/j.ecoser.2016.11.007

Jacobs, S., Zafra-Calvo, N., Gonzalez-Jimenez, D., Guibrunet, L., Benessaiah, K., Berghöfer, A., et al. (2020). Use your power for good: plural valuation of nature – the Oaxaca statement. *Glob. Sustain.* 3, e8, 1–7. doi: 10.1017/sus.2020.2

James, S. P. (2015). Cultural ecosystem services: a critical assessment. *Ethics Policy Environ.* 18, 338–350. doi: 10.1080/21550085.2015.1111616

Johnson, R., and Cureton, A. (2019). "Kant's moral philosophy," in *The Stanford Encyclopedia of Philosophy*, Spring 2019 Edn. ed. E. N. Zalta. Available online at: https://plato.stanford.edu/archives/spr2019/entries/kant-moral/ (accessed November 15, 2019).

Kelemen, E., García-Llorente, M., Pataki, G., Martín-Lopez, B., and Gómez-Baggethun, E. (2016). "Non-monetary techniques for the valuation of ecosystem service," in *OpenNESS Ecosystem Services Reference Book*. EC FP7 Grant Agreement no. 308428, eds M. Potschin and K. Jax. Available online at: www.openness-project.eu/library/reference-book (accessed August 2, 2019).

Kendal, D., and Raymond, C. M. (2019). Understanding pathways to shifting people's values over time in the context of social–ecological systems. *Sustain. Sci.* 14, 1333–1352. doi: 10.1007/s11625-018-0648-0

Kenter, J. O., Raymond, C., van Riper, C. J., Azzopardi, E., Brear, M. R., Calcagni, F., et al. (2019). Loving the mess: navigating diversity and conflict in social values for sustainability. Sustainability science special feature: theoretical traditions of social values for sustainability. *Sustain. Sci.* 14, 1439–1461. doi: 10.1007/s11625-019-00726-4

Kenter, J. O., Reed, M. S., Irvine, K. N., O'Brien, E., Bryce, R., Christie, M., et al. (2016). Shared values and deliberative valuation: future directions. *Ecosyst. Serv.* 21, 358–371. doi: 10.1016/j.ecoser.2016.10.006

Law, J. (2009). Seeing like a survey. *Cult. Sociol.* 3, 239–256. doi: 10.1177/1749975509105533

Lundquist, C. J., Pereira, H. M., Alkemade, R., den Belder, E., Carvalho Ribeiro, S., et al. (2017). *Visions for Nature and Nature's Contributions to People for the 21st Century, NIWA Science and Technology Series Report No. 83*. Auckland: NIWA, 123.

Maier, D. S., and Feest, A. (2016). The IPBES conceptual framework: an unhelpful start. *J Agric. Environ. Ethics* 29, 327–347. doi: 10.1007/s10806-015-9584-5

Masterson, V., Vetter, S., Chaigneau, T., Daw, T., Selomane, O., Hamann, M., et al. (2019). Revisiting the relationships between human well-being and ecosystems in dynamic social-ecological systems: implications for stewardship and development. *Glob. Sustain.* 2, 1–14. doi: 10.1017/sus.2019.5

McAlpine, C., Seabrook, L. M., Ryan, J. G., Feeney, J. F., Ripple, W. J., Ehrlich, A. H., et al. (2015). Transformational change: creating a safe operating space for humanity. *Ecol. Soc.* 20:56.

MEA (Millennium Ecosystem Assessment) (2005). *Ecosystems and Human Well-Being –Synthesis*, Vol. 5. Washington DC: Island Press.

Norström, A. V., Balvanera, P., Spierenburg, M., and Bouamrane, M. (2017). Programme on ecosystem change and society: knowledge for sustainable stewardship of social-ecological systems. *Ecol. Soc.* 22:47. doi: 10.5751/ES-09010-220147

Norton, B., Costanza, R., and Bishop, R. C. (1998). The evolution of preferences: why 'sovereign' preferences may not lead to sustainable policies and what to do about it. *Ecol. Econ.* 24, 193–211. doi: 10.1016/S0921-8009(97)00143-2

Olsson, P., Folke, C., and Hahn, T. (2004). Social-ecological transformation for ecosystem management: the development of adaptive co-management of a wetland landscape in southern Sweden. *Ecol. Soc.* 9:2.

Österblom, H., and Sumaila, U. R. (2011). Toothfish crises, actor diversity and the emergence of compliance mechanisms in the Southern Ocean. *Glob. Environ. Change* 21, 972–982. doi: 10.1016/j.gloenvcha.2011.04.013

Pascual, U., Balvanera, P., Díaz, S., Pataki, G., Roth, E., Stenseke, M., et al. (2017). Valuing nature's contributions to people: the IPBES approach. *Curr. Opin. Environ. Sustain.* 26–27, 7–16.

Pereira, L. M., Karpouzoglou, T., Frantzeskaki, N., and Olsson, P. (2018). Designing transformative spaces for sustainability in socialecological systems. *Ecol. Soc.* 23:32. doi: 10.5751/ES-10607-230432

Rau, A., Bickel, M. W., Hilser, S., Jenkins, S., McCrory, G., Pfefferle, N., et al. (2018). Linking concepts of change and ecosystem services research: a systematic review. *Change Adapt. Socio Ecol. Syst.* 2018, 33–45. doi: 10.1515/cass-2018-0004

Ravenscroft, N. (2019). A new normative economics for the formation of shared social values. *Sustain. Sci.* 14, 1297–1307. doi: 10.1007/s11625-018-0652-4

Rawluk, A., Ford, R., Anderson, N., and Williams, K. J. H. (2019). Exploring multiple dimensions of values and valuing: a conceptual framework for mapping and translating values for social ecological research and practice. Theoretical traditions in social values for sustainability. *Sustain. Sci.* 14, 1187–1200. doi: 10.1007/s11625-018-0639-1

Raymond, C. M., Kenter, J. O., Plieninger, T., Turner, N. J., and Alexander, K. A. (2014). Comparing instrumental and deliberate paradigms underpinning the assessment of social values for cultural ecosystem services. *Ecol. Econ.* 107, 145–156. doi: 10.1016/j.ecolecon.2014.07.033

Reed, M., Evely, A., Cundill, G., Fazey, I., Glass, J., Laing, A., et al. (2010). What is social learning? *Ecol. Soc.* 15. doi: 10.5751/ES-03564-1504r01

Rolston, H. (1988). *Environmental Ethics: Duties to and Values in the Natural World*. Philadelphia, PA: Temple University Press.

Sagoff, M. (1994). Should Preferences Count? *Land Econ.* 20, 127–144. doi: 10.2307/3146317

Schröter, M., Stumpf, K. H., Loos, J., van Oudenhoven, A. P. E., Böhnke-Henrichs, A., and Abson, D. J. (2017). Refocusing ecosystem services towards sustainability. *Ecosyst. Serv.* 25, 35–43. doi: 10.1016/j.ecoser.2017.03.019

Spangenberg, J. H., and Settele, J. (2016). Value pluralism and economic valuation – defendable if well done. *Ecosyst. Serv.* 18, 100–109. doi: 10.1016/j.ecoser.2016.02.008

Stålhammar, S. (2020). *Reconnecting with Nature Through Concepts: On the Construction of Values in the Ecosystem Services Paradigm*. PhD thesis, Lund University, Lund.

Stålhammar, S., and Brink, E. (2020). 'Urban biocultural diversity' as a framework for human–nature interactions: reflections from a Brazilian favela. *Urban Ecosyst.* 23. doi: 10.1007/s11252-020-01058-3

Stålhammar, S., and Pedersen, E. (2017). Recreational cultural ecosystem services: how do people describe the value? *Ecosyst. Serv.* 26, 1–9. doi: 10.1016/j.ecoser.2017.05.010

Stålhammar, S., and Thorén, H. (2019). Three perspectives on relational values of nature. *Sustain. Sci.* 14, 1201–1212. doi: 10.1007/s11625-019-00718-4

Stenseke, M. (2016). The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services and the challenge of integrating social sciences and humanities. *Bull. Geogr.* 33, 119–129. doi: 10.1515/bog-2016-0029

TEEB (2010). *The Economics of Ecosystems and Biodiversity: Mainstreaming the Economics of Nature: A Synthesis of the Approach, Conclusions and Recommendations of TEEB*. Nairobi: UNEP.

Thorén, H., and Stålhammar, S. (2018). Ecosystem services between integration and economics imperialism. *Ecol. Soc.* 23:44. doi: 10.5751/ES-10520-230444

Turnhout, E., Neves, K., and de Lijster, E. (2014). 'Measurementality'in biodiversity governance: knowledge, transparency, and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). *Environ. Plan. A* 46, 581–597. doi: 10.1068/a4629

Vatn, A. (2005). Rationality, institutions and environmental policy. *Ecol. Econ.* 55, 203–217. doi: 10.1016/j.ecolecon.2004.12.001

Westley, F. R., Tjornbo, O., Schultz, L., Olsson, P., Folke, C., Crona, B., et al. (2013). A theory of transformative agency in linked social-ecological systems. *Ecol. Soc.* 18:27. doi: 10.5751/ES-05072-180327

Conflict of Interest: The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.