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Author for correspondence:
Professor Kevin C Elliott,
Email: kce@msu.edu

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Thematic Section: Biodiversity Revisited

Framing conservation: 'biodiversity' and the values embedded in scientific language

Kevin C Elliott

Lyman Briggs College, Department of Fisheries and Wildlife, Department of Philosophy, Michigan State University, 35E Holmes Hall, 919 E Shaw Lane, East Lansing, MI 48825, USA

Summary

The global loss of biodiversity is one of the most important challenges facing humanity, and a multi-faceted strategy is needed to address the size and complexity of this problem. This paper draws on scholarship from the philosophy of science and environmental ethics to help address one aspect of this challenge: namely, the question of how to frame biodiversity loss in a compelling manner. The paper shows that the concept of biodiversity, like many scientific concepts, is value-laden in the sense that it tends to support some ethical or social values over others. Specifically, in comparison with other potential concepts, the biodiversity concept is tied more closely to the notion that nature has intrinsic value than to the idea that nature is valuable instrumentally or relationally. Thus, alternative concepts could prove helpful for communicating about biodiversity loss with those who emphasize different value systems. The paper briefly discusses five concepts that illustrate the potential for using different concepts in different contexts. Going forward, conservationists would do well to recognize the values embedded in their language choices and work with social scientists to develop a suite of concepts that can motivate the broadest swath of people to promote conservation.

Introduction

The recent publication of the Global Assessment Report from the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) has highlighted the loss of biodiversity as one of the grand challenges facing humanity (see Diaz et al. 2020). Unfortunately, current efforts have not been sufficient to stem the decline in biodiversity (Crist 2019). The magnitude of this challenge merits a wide variety of efforts to address the problem. Social psychologists have shown that one can potentially intervene on many different factors – including values, beliefs, norms, attitudes and behaviours – in order to promote conservation activities (Vaske & Manfredo 2012). This paper focuses on one particular intervention point: namely, the concepts and terms used for framing the entire conservation enterprise. Although there are likely to be a variety of intervention points that are efficacious (e.g., see Rounsevell et al. 2020), it is important to think clearly about the overall framing of conservation efforts (Cox 2007). This is especially important given the power of problem framing to influence policymaking. As Judith Layzer puts it, "The side that succeeds in crafting the authoritative problem definition has an enormous advantage because the way people think and talk about a policy problem determines which solutions they are likely to embrace" (Layzer 2016, p. 10; see also Nisbet & Mooney 2007).

Although biodiversity has been the central organizing concept in the field of conservation biology since its inception (Soulé 1985, Takacs 1996), critics have recently questioned its effectiveness in the policy domain (Escobar 1998, Dowie 2011, Santana 2019, Devictor & Meinard 2020). A coalition of non-governmental organizations and research centres recently launched a 'Biodiversity Revisited' initiative that summarizes many of these worries with the following problem statement: "Biodiversity has not, broadly speaking, proven to be a compelling object for sufficient action to halt the degradation of the diversity of life on earth" (Wyborn et al. 2019, p. 5). Faced with this worry, it makes sense to explore the strengths and weaknesses of this concept in comparison with other potential concepts that could inform conservation activities. As environmental ethicist Bryan Norton has emphasized, "[A]ll of our categories, including biological categories, develop from the need to communicate and to act together" (Norton 2008, p. 13). This does not mean that scientific categories are entirely 'socially constructed' or divorced from reality, but it does suggest that we can critically evaluate our language choices to determine how well they enable us to achieve both our scientific and social goals. Building on Norton's insight, this paper argues that conservation scientists and practitioners should recognize the values embedded in the concept of biodiversity and work with social scientists to develop a suite of concepts that can motivate the broadest swath of people to promote conservation. The argument is limited in scope; it focuses on a conceptual analysis of the biodiversity concept itself

rather than on a psychological or sociological analysis of how people actually respond to it. Nevertheless, this sort of conceptual analysis can encourage further sensitivity among conservation practitioners to the potential strengths and weaknesses of different concepts and prompt additional research on this issue.

To provide the background for this argument, I provide a brief overview of philosophical scholarship on the ways in which scientific language can support or encourage particular ethical or social value frameworks. Building on this literature, I then examine how the concept of 'biodiversity' is conceptually linked more closely with some value systems than others. This raises the worry that it may be less effective than other concepts for motivating individuals who adhere to different value systems. In response to this concern, I go on to explore the possibility of augmenting the biodiversity concept with alternative concepts: life support systems, food security, sustainability, environmental justice and caring for nature. Although none of these concepts is perfect, together they illustrate the potential for developing a combination of concepts that communicate the importance of conservation to the widest possible array of stakeholders. Thus, by recognizing the values embedded in the concepts they employ, conservationists can do a better job of addressing the grand challenge of biodiversity loss by framing conservation activities in ways that are compelling to as many stakeholders as possible.

Values embedded in scientific language

Philosophers of science have recently emphasized a wide range of ways in which scientific research is 'value-laden', in the sense that scientists make numerous choices or judgements that are not settled by the available evidence, but that can support particular social or ethical values (Longino 1990, Lacey 1999, Douglas 2009). For example, scientists have to decide what topics to study, what questions to ask about those topics, how to design their studies, what methods to use for collecting and analysing data, how to interpret ambiguous results and how to frame and conceptualize their findings (Elliott 2017a). When undertaking applied research that informs environmental decision-making, it is common that some research choices are more likely to generate results that support values like public and environmental health, whereas other choices are more likely to yield results that support different values, such as short-term economic growth.

Like many other elements of scientific practice, choices involving scientific language can be value-laden (Elliott 2009, Larson 2011, Johns & DellaSala 2017). First, scientists can end up supporting some values over others depending on how they *frame* the topics under investigation. For example, members of the public respond differently to climate change depending on whether it is framed as a matter of scientific uncertainty, unfair economic burden, religious morality or public accountability (Nisbet & Mooney 2007). Second, scientists often use *terms* that have metaphorical or otherwise value-laden connotations. For example, Brendon Larson (2011) argues that it is important to consider the metaphorical significance of terms like 'invasive', 'alien' or 'exotic' species, which may subtly encourage people to draw connections between biological issues involving these species and social issues such as military invasions or disputes over immigration. Similarly, John Dupré (2007) has argued that when scientists take terms such as 'rape' that are used in human social contexts and apply those terms in biological contexts, they may import ethical or social connotations into those non-human contexts. Third, choices about how to *define* the terms or categories used in scientific research are often value-laden. For example, the increasing use of the concept of 'wetlands' in the second half of the twentieth century helped prompt limited conservation of these areas, but major political and legal disputes have arisen about how to define what counts as a wetland because there are competing interests (e.g., *Rapanos v. United States* 547 US 715 (2006)). During the George HW Bush presidency, his administration tried to shrink the number of lands classified as wetlands – thereby facilitating his campaign promise of 'no net loss' of wetlands – but this plan came under intense opposition from environmental groups (Elliott 2017b).

These choices about frames, terms and definitions can have major social, policy and ethical consequences when dealing with environmental issues (Elliott 2009). For example, they can influence the future course of research by drawing scientists' attention to some problems and lessening their attention to other problems. Sheldon Krimsky (2000) has shown that developing a unifying concept such as 'wetlands' or 'endocrine disruption' or 'climate change' to describe a set of phenomena can be a powerful stimulus for promoting research efforts. Choices about language can also change the burdens of proof or the kinds of evidence required for taking action in response to environmental concerns, as illustrated by the Bush administration's efforts to influence environmental policymaking by changing the definition of wetlands. Finally, choices about language can influence the extent to which policymakers and members of the public pay attention to environmental problems, as Nisbet and Mooney (2007) have argued in the case of climate change. One way in which particular language choices can promote attention to environmental problems is by framing them in such a way that they connect or resonate with particular ethical theories, value frameworks or emotional attachments (Johns & DellaSala 2017). The following sections of this paper focus on this issue in detail, showing how concepts such as 'biodiversity' are conceptually linked more closely with some value frameworks than others, thereby potentially communicating the importance of environmental conservation more effectively to some stakeholders than others.

'Biodiversity' and environmental ethics

Biodiversity is notoriously difficult to define (Takacs 1996, Holt 2006), which contributes to both its strengths and its weaknesses. On the one hand, Georg Toepfer (2019) argues that it is particularly useful because it is an 'umbrella term' that is vague enough and rich enough in its connotations to mediate between many different disciplines and discourses (see also Burch-Brown & Archer 2017). On the other hand, Carlos Santana (2014) contends that the open-endedness of the biodiversity concept means that it is difficult to measure and that it does not clearly pick out the specific elements in nature that are valuable (see also Meinard et al. 2019). Another worry is that the slipperiness of the concept provides an opportunity for scientists to surreptitiously import their own values into policymaking. If biodiversity is assumed to be valuable and worthy of protection, but if scientists are the ones operationalizing the concept, then they end up with significant power to determine which elements of nature are prioritized for conservation (Morar et al. 2015).

The goal in this paper is not to revisit these debates about the ambiguity of the biodiversity concept, but instead to explore its connections to major value frameworks used in environmental ethics. The upshot of this analysis is that the biodiversity concept has conceptual features that are likely to make it more effective for working with communities who attribute intrinsic value to nature than communities who approach nature with instrumental or

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relational value frameworks. Historically, the major value frameworks employed in the field of environmental ethics have focused on 'instrumental value' and 'intrinsic value' (Afeissa 2009). Instrumental value is the value that something has because of the ways in which it serves other interests. For example, biodiversity has instrumental value to humans insofar as it contributes to other things of value, such as economic benefits and ecosystem services. Building on this instrumental value, one can construct an 'anthropocentric' ethic that justifies concern for the environment because of the ways it serves human interests. During the final decades of the twentieth century, however, a number of figures challenged anthropocentric approaches to ethics as inadequate for addressing environmental problems. They argued that elements of the environment should be appreciated for their intrinsic value (i.e., the value that they have 'in and of themselves', independently of the ways they serve human interests; White 1967, Routley 1973, Rolston 1989). This notion that entities in the environment have intrinsic value provides the basis for 'non-anthropocentric' approaches to environmental ethics, which have roots in many sources, including Daoism, Hinduism, Buddhism and a variety of environmental writings.

Biodiversity clearly has value. As Toepfer puts it, "The impressive success of the concept 'biodiversity' in the last decades, in particular in the arena of politics, is in a large part due to its power to amalgamate facts and values: the fact that living beings show variety on every level of their existence, and the assumed values that are associated with this variety" (2019, p. 341). Some philosophers have gone so far as to say that biodiversity should be defined primarily as a normative concept (Sarkar 2019). Taken to the extreme, this view would define biodiversity simply as whatever the field of conservation biology aims to protect (Sarkar 2002). Thus, the concept of biodiversity is value-laden in at least two interrelated senses. First, as Toepfer emphasizes, it is a concept that incorporates both factual and normative elements. Second, it is conceptually tied more closely to some value systems than to others, thereby framing environmental discourse in ways that encourage some ways of thinking about nature over others.

Given that biodiversity has value, the deeper question is what kind of value it has and to which kinds of value systems it is most closely connected. The argument in this paper is that biodiversity has conceptual features that tie it particularly closely to the notion that nature has intrinsic value. The reason for this is that it refers primarily to entities in nature rather than to the usefulness of those entities or their relationships with humans. As noted in the previous paragraph, one can argue that biodiversity has other forms of value, but the concept itself does not explicitly draw attention to those other forms. Consider, for example, the classic definition of biodiversity in the Convention on Biological Diversity (CBD): "[T]he variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems" (CBD 1992). This definition focuses scientific and public attention on many elements of nature that merit conservation: genes, individuals, populations, species and ecosystems. However, it does not explicitly include the *connections* between humans and these elements of nature. Because it focuses solely on these entities and their differences rather than the ways they relate to human beings, the concept's primary focus appears to be the intrinsic value of these entities.

Commentators on biodiversity have consistently affirmed this intrinsic value. For example, in his influential essay laying out much of the groundwork for the field of conservation biology, Michael Soulé explicitly stated that the most fundamental normative postulate of the field is that "*Biotic diversity has intrinsic value*, irrespective of its instrumental or utilitarian value" (Soulé 1985, p. 731, emphasis in original). Similarly, the first line of the Preamble to the CBD states that biological diversity has intrinsic value, and one of the five organizational values of the Society for Conservation Biology (SCB) is as follows: "There is intrinsic value in the natural diversity of organisms, the complexity of ecological systems, and the resilience created by evolutionary processes" (SCB 2011). A number of other legal and policy statements also affirm the intrinsic value of biodiversity or other aspects of nature (Vucetich et al. 2015). And Georg Toepfer, who emphasizes how biodiversity brings together both facts and values, emphasizes that "the term maintains its strong non-instrumental ethical dimension: it expresses a non-anthropocentric value of plants and animals" (Toepfer 2019, p. 342).

Of course, as noted earlier, biodiversity can have intrinsic value while also having instrumental value for achieving other goals or purposes. For example, the Preamble to the CBD states that biodiversity also has "ecological, genetic, social, economic, scientific, educational, cultural, recreational, and aesthetic values." However, the concept of biodiversity does not inherently bring these other values to light; one must draw attention to them and, in some cases, argue for them. To take one particularly noteworthy example of how these arguments can play out, the stability–diversity debate among ecologists explored the extent to which reductions in biodiversity are likely to generate instability in ecosystems, which in turn has important implications for human well-being (McCann 2000). The huge amount of ink spilled over this debate illustrates how difficult it can be to take a concept like biodiversity and demonstrate the ways in which it has instrumental value (e.g., see Hooper et al. 2005, Hautier et al. 2015, Wang & Loreau 2016, De Boeck et al. 2018). One might object that the tendency among ecologists to analyse biodiversity in a quantitative way could still promote instrumental perspectives that connect biodiversity with ecosystem services and human well-being (e.g., see Worm et al. 2006, Cardinale et al. 2012, Sandifer et al. 2015). However, the tendency to analyse biodiversity in a highly quantitative way does not seem inherent to the concept itself; in many cases, biodiversity is analysed in very simple terms as a matter of the number of species present in a given location. Norton quotes biodiversity expert Thomas Lovejoy as stating that "the term is really supposed to mean diversity at all levels of organization. But the way it's most often used is basically relating to species diversity" (Norton 2008, p. 18). Norton emphasizes that this simple approach to the concept is especially prominent when it is used in popular, non-scientific contexts.

A promising new approach to environmental ethics is to focus on 'relational values', which have the potential to transcend conflicts over whether nature has intrinsic value or only instrumental value. As the term suggests, relational values are grounded in the relationships between humans and nature. For example, relational values can stem from the ways in which nature contributes to the identity of a person or a community of people, or they can stem from the ways in which being in nature strengthens the ties between people (Chan et al. 2016). Proponents of the relational value framework argue that it effectively captures the ways in which many people value nature; in other words, they view nature neither as a resource to be exploited nor as something that has value completely independently of its connections with human life. An important strength of this approach is that it can encompass

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traditional Western philosophies while creating more space for contemporary feminist approaches, Eastern philosophies and Indigenous worldviews. Thus, relational values have the potential to capture the lived experiences of many different people and their connections with nature. Although it might seem like relational values perpetuate a dualistic distinction between humans and nature, with humans being treated as superior, this is not necessarily the case. Relational values could emphasize the interconnections between all living things while starting from the lived experiences of humans in nature.

Just as biodiversity can be justified for its instrumental value, it can be defended based on relational values as well. For example, the recent report from IPBES includes the concept of 'nature's contributions to people' (NCP), which explores the many ways in which biodiversity contributes to people's quality of life (Diaz et al. 2018). These contributions can include ecosystem services such as the provision of food, water and materials, but they can also involve social relationships, opportunities for recreation or inspiration and spiritual experiences. An advantage of the NCP framework is that it can capture local, context-specific ways in which people relate to biodiversity that are sometimes missed by analyses drawn from the natural sciences and economics (Diaz et al. 2018). Stephen Kellert has documented a host of ways in which human beings relate to the natural world, including "attraction and curiosity, affection and kinship, knowledge and understanding, mastery and control, moral and spiritual relation, even fear of and aversion to the natural world" (Kellert 2010, p. 375). Of course, there are tensions among these ways of relating, and some may be ethically preferable to others, but they illustrate the multifaceted ways in which different stakeholders connect with nature.

Nevertheless, while it is possible to identify ways in which the protection of biodiversity can be supported based on relational values, the biodiversity concept itself does not capture relational connections between humans and nature; one must deliberately draw attention to these connections. This is because the concept of biodiversity describes elements of nature (such as genes, individuals, populations or species) and the differences between them (i.e., diversity) rather than the relationships between humans and nature. In fact, contemporary critics of traditional approaches to biodiversity conservation argue that biodiversity has too often been conceptualized as being in conflict with human activities (Kareiva et al. 2012). For example, journalist Mark Dowie (2011) contends that conservation groups have frequently pushed Indigenous peoples off their historic lands because those groups felt it was easier to achieve their goal of preserving biodiversity in the absence of human interference. Dowie cites a speech by Martin Saning'o, a Maasai leader from Tanzania who addressed the Third Congress of the World Conservation Union in 2004, claiming that "in the interest of a relatively new vogue in conservation called 'biodiversity' … more than one hundred thousand Maasai pastoralists have been displaced from their traditional homeland" (Dowie 2011, p. xv). Saning'o asserted that "'We [the Maasai] were the original conservationists,' but 'now you [conservationists focused on biodiversity] have made us enemies of conservation'" (Dowie 2011, p. xv).

In sum, although the biodiversity concept can be employed in conjunction with multiple approaches to environmental ethics, the concept itself focuses on the intrinsic value of nature. Because the concept does not draw explicit connections between humans and nature, arguments are needed to establish the instrumental and relational value of biodiversity. Of course, this does not mean that biodiversity fails to have these additional forms of value; they are just not immediately captured by the concept itself. Thus, from the perspective of the philosophy of science, the concept of biodiversity is 'value-laden' insofar as it is conceptually tied more closely to some ways of approaching environmental ethics than others. This embedding of values within the biodiversity concept is significant because some people can appreciate instrumental or relational approaches to valuing nature more than intrinsic approaches. Thus, if conservationists want to frame their efforts in ways that will motivate as many different stakeholders as possible, they should work with social scientists to explore whether other concepts could be effectively employed alongside or in place of biodiversity.

Other ways of framing conservation

The notion that the biodiversity concept could be replaced or augmented with other concepts is not new. For example, Norton has argued that different definitions of biodiversity could be used in the scientific and political spheres, and he has suggested that other productive terms should be investigated as well: "Rather than clinging to definitions that don't work, we can investigate which terms and linguistic forms are conducive to communication and cooperative behavior within the community seeking to protect the wonders of the biologically diverse world" (Norton 2008, p. 19). Similarly, building on the work of Sahotra Sarkar (2002), Carlos Santana has argued that conservation science operates via a series of representations: "estimator surrogate → true surrogate → biodiversity → biological value" (Santana 2014, p. 762). In other words, when conservationists focus on particular entities, they may be useful primarily because they represent something else that is of more fundamental importance. According to figures such as Sarkar and Santana, biodiversity is a general concept that is used to represent the many different biological entities and processes that are valuable in nature. Thus, if 'biodiversity' does not turn out to be the best way to refer to those valuable things, we can and should pursue alternative terms and concepts for representing them (Santana 2019). The novel contribution of this paper is to focus specifically on exploring how alternative terms and concepts relate to the major value frameworks employed in environmental ethics so that conservationists can think more deeply about the potential ramifications for conservation of making different language choices.

Before proceeding to consider the ethical ramifications of alternative concepts, however, it is important to address two potential objections to pursuing a project such as this one. First, one might think it would be more effective (and perhaps more ethically satisfactory) to convince people to value nature intrinsically rather than shifting to terms that are conceptually tied to instrumental and relational value systems (e.g., see Crist 2019). This objection might be supported by evidence from social psychology, which indicates that people are more likely to engage in pro-social and environmentally friendly behaviour when they are motivated by intrinsic values (e.g., see Crompton 2011, Sheldon et al. 2011, Cetas & Yasué 2017). However, this research should be interpreted carefully. These studies do not define intrinsic values in exactly the same way that environmental ethicists do; they tend to define these values as "those pursuits that are generally congruent with the psychological needs for relatedness, autonomy, and competence proposed by self-determination theory" (Grouzet et al. 2005, p. 801). Under this definition, intrinsic values include things such as community feeling, self-acceptance and physical health, as opposed to extrinsic values such as money or popularity (Grouzet et al. 2005, p. 801). Thus, this research does not establish that the intrinsic values

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discussed in this paper are more motivationally efficacious than all instrumental or relational values. Rather, it shows that community-orientated instrumental and relational values, as well as what environmental ethicists call intrinsic values, are more efficacious than shallow, self-centred instrumental and relational values. This conclusion is supported by the empirical evidence that many Indigenous cultures have held relational value frameworks and have conserved significant amounts of biodiversity for millennia (Dowie 2011, Chan et al. 2016). Thus, it would be premature to conclude that concepts associated with intrinsic value systems (in the sense used by environmental ethicists) will typically be more motivationally efficacious (or ethically superior) in comparison with other concepts. Given the ambiguity of the available evidence and the complexity of shifting people to different value orientations, it makes sense to engage in further social science research to determine what suite of concepts is likely to be most effective at promoting biodiversity conservation in response to the range of values that people currently hold.

Another objection is that it might seem manipulative for conservationists to choose terms and concepts with the express goal of convincing people to engage in conservation activities. By employing this approach, one might think conservation scientists fall into a stance of 'stealth issue advocacy' that is inappropriate for scientific researchers (Pielke 2007). This is an important concern, but it is not a compelling reason to avoid using value-laden language designed to promote conservation. Given that conservation biology is a highly policy-relevant discipline, it is doubtful that any language employed in this field could be completely value-neutral; any terms and concepts used in the public sphere are likely to have some connotations, either positive or negative (Elliott 2017a). Philosophers of science have argued that scientists should respond to the inevitability of these value-laden choices both by making the most responsible choices they can and by trying to be transparent about them (Kourany 2010, Elliott 2018, Brown 2020). With this advice in mind, and given the importance of biodiversity conservation to the future well-being of humanity and all other living things, there appear to be good ethical reasons for scientists to make value-laden choices in ways that promote conservation rather than detracting from it (Cox 2007). It is also noteworthy that the use of multiple terms and concepts in the context of biodiversity conservation could actually be a productive way to promote greater transparency among information recipients by helping them to recognize the value-laden connotations and nuances of different terms (McKaughan & Elliott 2013). Focusing on the single concept of biodiversity could actually detract from transparency because of its vagueness; different groups could be using the same term without realizing that they have very different value orientations and intentions (Meinard et al. 2019).

Assuming, then, that it makes sense to explore alternative language choices, the remainder of this section briefly explores the strengths and weaknesses of five terms that could be used either as additions or as alternatives to the biodiversity concept: life support systems, sustainability, food security, environmental justice and care for nature. The section focuses especially on how these concepts relate to intrinsic, instrumental and relational value frameworks. This group of terms is intended neither to be exclusive nor exhaustive. Rather, it provides a sampling of terms with different strengths and weaknesses in relation to the major value frameworks. For example, life support systems and sustainability resemble biodiversity in that they are somewhat vague umbrella terms, but they have a stronger instrumental and relational focus than biodiversity does. The concept of food security also has very strong instrumental and relational connotations, but it has a much narrower focus. The concept of environmental justice is another term with a narrower focus, and it illustrates how conservation can be conceptualized in ways that resonate with broader social movements. Finally, the concept of respect for nature illustrates that not all alternatives to the biodiversity concept must have a strong instrumental focus; respect for nature bridges relational and intrinsic value systems. Taken together, these terms exemplify major avenues open to conservationists interested in exploring linguistic choices that resonate with different value frameworks.

Life support systems

The concept of life support systems has played an important role in major international conservation documents. For example, the 1980 World Conservation Strategy focused on three major principles: protection of Earth's life support systems, protection of biodiversity and sustainable use of natural resources (IUCN et al. 1980). The Agenda 21 document released by the 1992 Earth Summit in Rio de Janeiro also referred to Earth's life support systems. The United Nations Educational, Cultural, and Scientific Organization (UNESCO) has a project called the Encyclopedia of Life Support Systems (UNESCO-EOLSS), which provides the following definition of this concept:

> A life support system is any natural or human-engineered (constructed or made) system that furthers the life of the biosphere in a sustainable fashion. The fundamental attribute of life support systems is that together they provide all of the sustainable needs required for continuance of life. These needs go far beyond biological requirements. Thus life support systems encompass natural environmental systems as well as ancillary social systems required to foster societal harmony, safety, nutrition, medical care, economic standards, and the development of new technology. The one common thread in all of these systems is that they operate in partnership with the conservation of global natural resources. (UNESCO-EOLSS 2020)

On the one hand, an important strength of the 'life support system' concept is that it explicitly highlights the relationships between humans (and other living things) and the broader environmental context in which they find themselves. In contrast to the concept of biodiversity, the importance of maintaining life support systems is readily apparent because it refers to something (life) that is almost universally valued. If one cares about human life (or life in general), it is obviously important to maintain the systems that support life. The UNESCO-EOLSS project explicitly draws comparisons to the life support systems that function in the intensive care units of hospitals, which facilitates exploring how other themes and concepts from the healthcare context could be applied to environmental conservation (e.g., see Wilson & Law 2016). Thus, the use of this concept can highlight the ways in which the well-being of all living things, including humans, depends on conservation, just as human well-being depends on medical care. On the other hand, a disadvantage of the concept is that it has the potential to draw people's attention to only one way in which humans relate to nature: namely, obtaining what is needed for our survival. Thus, talking about life support systems does little to highlight the range of spiritual, aesthetic and cultural ways in which human beings relate to nature.

Sustainability

Like the notion of life support systems, the concept of 'sustainability' or 'sustainable development' has played a major role in international documents related to conservation, and sustainability has been far more widely discussed than life support systems in recent years. Thus, it has the advantage of being widely recognized

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not only in the environmental community, but throughout society. For example, the concept of sustainability is already widely discussed in the business world (Svensson et al. 2016), which makes it a promising lever for influencing corporate decision-making. In addition, sustainability cuts across all aspects of social life, including not only the provision of basic needs such as food production, but also wider economic and cultural systems. The concept of sustainability clearly links the environment with human well-being, both now and in the future.

Unfortunately, the concept of sustainability has been so widely adopted and has so many different potential meanings and definitions that it has the potential to become vacuous (Faber et al. 2005, Glavic & Lukman 2007, Thompson 2007). As Vucetich and Nelson put it, "[S]ustainability could mean anything from 'exploit as much as desired without infringing on the future ability to exploit as much as desired' to 'exploit as little as necessary to maintain a meaningful life'" (Vucetich & Nelson 2010, p. 539). Thus, different stakeholder groups are likely to talk past each other when discussing sustainability (Peterson et al. 2005). Whereas it is relatively clear when discussing the preservation of biodiversity that the focus is on maintaining species and ecosystems, business leaders who discuss sustainability could be focused primarily on long-term economic viability and social responsibility rather than environmental conservation (Svensson et al. 2016). Therefore, although the concept of sustainability could prove very valuable in some contexts, it might not work well as a complete replacement for the concept of biodiversity.

Food security

Another concept that immediately highlights the relationships between humans and nature is 'food security'. In the course of his discussion of Indigenous groups and their ambivalent or hostile attitude towards the concept of biodiversity, Dowie (2011) suggests that they are much more likely to resonate with concepts that view nature as being intertwined with human well-being, including as a source of food. He points out that concepts such as 'wild', 'wilderness' and 'biodiversity' – all of which tend to distinguish humans from nature – do not even make sense in many Indigenous cultures, as illustrated by the perspective of a Khomani hunter who said, "The Kalahari is like a big farmyard … It is not wilderness to us" (Dowie 2011, p. 19). Indeed, the O'odham Native American tribe's word for wilderness is related to their terms for health, wholeness and livelihood, and the closest approximation for the word 'biodiversity' among the Yupik people of Alaska is their word for 'food' (Dowie 2011, p. 19). Given the discussion of relational values in the '"Biodiversity" and environmental ethics' section above, it is noteworthy that terms such as 'livelihood', 'food', 'health' and 'wholeness' all foster more or less explicit links between human and environmental well-being. Dowie argues that many Western conservation organizations have gone astray when working in other parts of the world because they have not understood the ways in which concerns for food security and other basic human needs have fostered effective environmental conservation in local communities for centuries.

Nevertheless, as with the concept of life support systems, the concept of food security focuses only on a limited range of ways in which humans relate to nature. It would be a mistake to think that people around the world care about the environment only because of the ways in which it supplies basic needs, such as food. Especially in wealthy Western societies, most people's access to food is so disconnected from the natural systems that produce it that they may not appreciate the importance of protecting the environment for the sake of ensuring adequate food production. In fact, contemporary industrial agricultural systems are themselves major threats to conservation (Thompson 2017). Thus, food security could work very effectively when there are clear connections between biodiversity protection and the food supply, but it might not work well as a general replacement for the biodiversity concept.

Environmental justice

In recent years, the concept of environmental justice has garnered a great deal of attention (e.g., see Shrader-Frechette 2002, Mohai et al. 2009, Schlosberg 2009). Robert Bullard defines environmental justice as the notion that "*all people and communities are entitled to equal protection of environmental and public health laws and regulations*" (Bullard 1996, p. 493, emphasis in original). The current focus on environmental justice arose largely because of a growing realization in the 1980s that people of colour in the USA faced disproportionate risks from landfills, incinerators and other sources of pollution (Chavis & Lee 1987, Bullard 2000). Since then, the environmental justice movement has broadened to address global issues as well, including the transfer of waste from the Global North to the Global South, as well as the global injustices associated with climate change (Mohai et al. 2009). The concept of environmental justice can be used to capture many of the same concerns as the concept of biodiversity because biodiversity loss often disproportionately impacts poor, marginalized and Indigenous communities around the world; they are often the most dependent on environmental resources for obtaining food, shelter, fibre and other basic needs.

A benefit of this concept is that justice is one of the most important ethical values in most societies. Speaking in terms of justice demonstrates that environmental issues are central to human well-being and not merely peripheral 'side issues'. It also brings attention to the concerns of historically marginalized groups and helps to correct for a history in which environmental issues were too often framed in terms of the interests of relatively privileged groups who wanted to conserve nature primarily for recreational purposes (Shrader-Frechette 2002). During a time of global protests against racial injustice, it is advisable from both an ethical and a pragmatic perspective to draw connections between environmental injustices and the many other forms of injustice in society. However, a potential weakness of this concept is that there are likely to be a variety of cases in which biodiversity losses are not clearly tied to environmental injustice. In fact, disadvantaged groups might face pressures in the short term to use natural resources in ways that are not sustainable or that threaten species populations (e.g., see Rolston 1998). In addition, it can be difficult to establish the existence of disproportionate risks for different groups of people, which can make it more difficult to document environmental injustice than to demonstrate the loss of biodiversity. One potential way to alleviate these weaknesses is to extend the concept of environmental injustice in a non-anthropocentric direction and to identify injustices in the ways humans relate to other living beings.

Caring for nature

Another alternative to focusing on the conservation of biodiversity is to encourage 'caring for nature'. Whereas most of the other concepts discussed in this section emphasize the ways in which the environment can benefit humans, this concept reverses the focus and considers how humans appreciate and desire to benefit the

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environment. 'Care for nature' can involve feelings of awe, wonder, love, emotional closeness, interconnectedness and responsibility towards the environment (Perkins 2010). It is also often associated with the ascription of intrinsic value to nature (Rolston 2006, Perkins 2010). Research suggests that developing an attitude of care towards elements of nature, such as a charismatic species, can make people more willing to take action on behalf of the things they care about (Skibins & Powell 2013).

An advantage of the 'caring for nature' concept is that it resonates with the relational ways in which many people, including many Indigenous cultures, connect with nature (Chan et al. 2016, Diaz et al. 2018). Whereas many of the other concepts discussed in this paper take the human-focused perspective that is typical of Western ethics, the notion of caring for nature has the potential to resonate with a broader array of worldviews. Nevertheless, the idea of caring for nature also has weaknesses. Those who do not have a significant emotional connection with nature are likely to have difficulty resonating with it. In addition, like the concept of sustainability, it is sufficiently vague that it might generate some conservation-related activities while leaving others neglected, or it could be used as a cover for activities that do not actually preserve biodiversity. For example, Skibins and Powell (2013) found that visiting a zoo could increase people's level of care for particular species. That feeling of care translated into a willingness to take action on behalf of those species, but it did not translate into a willingness to take action on behalf of biodiversity in general. Thus, the notion of caring for nature might not work well as a complete replacement for the biodiversity concept, but it could be a more appropriate concept for communicating with those who focus on relational values in nature.

The upshot

A brief conceptual analysis like this one is only a starting point for investigating different conceptual schemes. Further social scientific analyses are needed to determine how these terms influence people's attitudes and motivations in different contexts. Nevertheless, this analysis suggests some promising ways in which different terms could augment or replace discussions of biodiversity in specific settings. For example, concepts such as life support systems or sustainability might be especially useful as a replacement for the biodiversity concept in settings where there is little appreciation for the intrinsic value of nature. Similarly, when conservationists are working with groups that emphasize relational value systems and that have become suspicious of Western conservation efforts focused on biodiversity (see Dowie 2011), terms such as food security and care for nature might prove particularly valuable. And when social movements arise around specific issues (e.g., racial justice, healthcare or worker rights), conservationists should be ready to employ concepts such as environmental justice that highlight potential connections between conservation and these other pressing issues. Conservation scientists and practitioners should not be afraid to explore different conceptual schemes; rather, they should look for opportunities to employ concepts that reach the widest possible array of stakeholders.

Conclusion

The global loss of biodiversity is one of the most important challenges facing humanity. A wide variety of efforts are needed to address this problem. One step that conservationists can take is to make sure they are framing biodiversity loss in ways that communicate effectively to as many stakeholders as possible. This paper has argued that the concept of biodiversity may have limitations in this regard because of its strong conceptual ties to the intrinsic value of nature. Thus, conservation scientists and practitioners should work in a collaborative manner to develop a suite of concepts that can help reach people who approach nature with alternative value frameworks. As a starting point for this task, the paper briefly analysed five alternative concepts that illustrate some of the major avenues open to conservationists. For example, the concepts of life support systems and sustainability are broad concepts that have many similarities with the biodiversity concept, but they are more closely tied to instrumental and relational ways of valuing nature. Other concepts, such as food security and environmental justice, have a somewhat more narrow focus, but they could be particularly effective for motivating some aspects of biodiversity protection. The concept of caring for nature illustrates that one can employ terms that connect with alternative value systems while still emphasizing nature's intrinsic value. By attending to the value-laden features of the concepts they employ and the stakeholders with whom they communicate, conservationists can do a better job of framing biodiversity protection in ways that are compelling to people who hold different value orientations. This is a worthy effort, given the magnitude and significance of the problem they are working to address.

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