2

Conserving and Contesting Biodiversity in the Homogocene

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Abstract

Discussions of environmentalism frequently become considerations of biodiversity and its conservation. Arguably, the defining feature of our planet is the extent and diversity of life on Earth, and there is increasing recognition that in addition to representing a loss of culturally valued elements, the ongoing loss of the diversity of life will prejudice human development in a multitude of ways. However, the framing of the problem, the approaches to defining and achieving change, and even the very definition of the term "biodiversity" are vague and malleable. One consequence is that the conservation of life on Earth is often at odds with other environmental and economic growth priorities, and this can be further confounded by different values among different stakeholders. This chapter reviews the background to conserving and contesting biodiversity especially from the perspective of conservation and with reference to high-diversity areas such as tropical forests.

Introduction

Over the last centuries, and accelerating since World War II, there has been a simplification of human and natural systems in the pursuit of productivity and efficiency for human use and consumption. Such global activities have resulted in erosion of site-specific biological diversity, agrobiodiversity, linguistic diversity, and cultural diversity, earning the current century its name as the "Homogocene" (Rosenzweig 2001). Local diversity of all these types has largely been eroded due to overlapping causes—the global spread, intensification, and homogenization of industry, agriculture, and culture (Redford and Brosius 2006). This chapter uses the framing of "homogenization" as it is a powerful result of loss of diversity of all types.

In this essay, we focus on the biological component of diversity and argue that although biodiversity is thought of as a single thing, the term has multiple meanings which differ in technical and value-based ways. In the broader

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context of this volume, considering the different ways in which environmental problems are "framed" around different underlying values and explanatory theories, biodiversity considerations have a central role.

Biological diversity, or biodiversity in all its forms, is being eroded by economic and cultural globalization, extinction, and non-native species. Being lost everywhere are unique and locally distinctive assemblages of species and their ecological interactions. Globally, most dimensions of biodiversity are decreasing, and there are many who believe that humanity has caused the sixth great extinction (Ceballos et al. 2015). This term has, over the last few decades, become the rallying cry for many people and organizations.

Many have called for greater support for local, national, and global efforts to conserve biodiversity, such as may be achieved through the Intergovernmental Science–Policy Platform on Biodiversity and Ecosystem Services (IPBES). This broad-based support is often predicated on the understanding that biodiversity is something good, and its conservation is therefore desired. In a colloquial fashion, biodiversity is favored in opposition to such clear hallmarks of modern human impact: shopping malls, urban sprawl, vast monocultures, oil palm plantations, and ocean life overexploitation. Biodiversity is often thought of more for what it is not—the human-dominated world—rather than for what it is—a bricolage. Often undefined, but commonly extolled, biodiversity has become something easy to love and yet hard for which to be held accountable.

"High-diversity" areas, such as tropical forests or coral reefs, provide a particularly good focus from which to examine some core conservation ideals about richness, intactness, native-ness, wildness, and endemism, and how these ideals have played out with local versus international interventions. The values people hold for such places vary among different actors (e.g., conservation NGOs, international aid donors, local communities) and over time. Understanding and reconciling these differences is a crucial step in avoiding further homogenization of cultural, agricultural, and biological diversity.

We begin with a review of definitions and uses of the terms biodiversity and conservation, principally from the framework of natural science and conservation NGOs. We highlight some major areas where there are differences in understanding, interpretation, and underlying values, and how these affect attempts to conserve life on Earth. We believe that to rethink or rebuild environmentalism, it is essential to consider not only justice, sustainability, and diversity, but also to look carefully at the underlying biological diversity that has powered a significant part of human progress.

Defining Biodiversity

Biodiversity has replaced nature as the object of interest for the conservation community with tens of millions of dollars spent to conserve it, organizations founded to save it, and global conventions put into place to regulate

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its management. In many conservation discussions, the term "biodiversity" is taken for granted; the assumption is made that when using it, everyone is talking about the same thing. Yet, biodiversity is a fairly new term and is often not defined in the same way by different people, or not defined at all.

Norse (1990) summarized the early history of the term, locating its roots in the late 1950s in the work of Hutchinson and MacArthur (this account is summarized and updated from Sanderson and Redford 1997 as well as Takacs 1996; see these references for a full list of citations). In the 1970s, the richness of species was called "natural diversity" by The Nature Conservancy while others described "genetic diversity." In 1980, Thomas Lovejoy used the term "biological diversity" without defining it, and the 1980 Annual Report of the U.S. Council on Environmental Quality also used a definition of biological diversity that included the concepts of genetic diversity and species richness.

Despite the lack of a specific definition, the term was picked up by the U.S. Government, which convened a "Strategy Conference on Biological Diversity," and in 1983 it became the goal of legislation passed by the U.S. Congress. By the mid-1980s, the first full definitions of the term were published by Burley (1984) and Norse et al. (1986). In 1988, E. O. Wilson edited the book *Biodiversity* based on a U.S. National Academy of Sciences meeting entitled "The National Forum on BioDiversity." This meeting focused on the value of biodiversity with talks from development experts, economists, and ethicists joining natural scientists in outlining what became known as the biodiversity crisis (Wilson 1988).

Article 2 from the Convention on Biological Diversity[1] provides a formal definition:

> "Biological diversity" means the 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.

Biological diversity is usually interpreted as occurring at three major levels (Redford and Richter 1999)—genes, species, and ecosystems—though some practitioners include populations, communities, ecosystems, and biomes as well. The specific ways of measuring biodiversity vary by different practitioners (see Mace 2014a) but often include the following:

- Diversity of the genetic component refers to the variability within a species, as measured by the variation in genes within a particular species, subspecies, or population.
- Diversity of the species component refers to the variety of living species and their component populations at the local, regional, or global scale.
- Diversity of the ecosystem component refers to a group of diverse organisms, guilds, and patch types occurring in the same environment or

[1] https://www.cbd.int/convention/articles/default.shtml?a=cbd-02 (accessed April 24, 2017).

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area, and strongly interacting through trophic, spatial biotic, and abiotic relationships.

In practice, any effort at biodiversity measurement faces enormous problems due to gaps and biases in the information available. Probably less than 10% of all the species on Earth have been described and named, and those that are known are strongly biased toward vertebrates, terrestrial, and temperate areas. Different disciplines favor different measures of biodiversity. Ecologists tend to think about biodiversity in terms of the forms and functions of organisms in a place, especially in a community or an ecosystem, because it is the structuring of varieties in space and time that leads to functions and dynamics that they seek to understand. Similarly, evolutionary biologists think about the dynamics, but with an increasing focus on the historical or inherited variation, and therefore the genetic and phylogenetic attributes. Conservation biologists are sometimes concerned with function and process, but often also with preservation of species or genetic diversity, seeking efficient and achievable solutions to the allocation of limited resources. For nature conservationists and wildlife managers, biodiversity often simply means the maintenance of wild habitats and species (Mace 2014b). In other disciplines, the concept of biodiversity often lacks the notion of diversity; for example, in economics, biodiversity is generally understood simply to mean species, natural resources, or forests (Kontoleon et al. 2007). Many people use the term biodiversity in one of two ways: either as a general word to refer to "all life on Earth" or as a measure of the number of species—species richness.

The ecosystem component of biodiversity has received significantly less attention and the genetic component hardly any at all. The focus on diversity within defined areas (such as hotspots) has also been a persistent theme despite the commonly held view that it is global biodiversity that is being discussed.

It is in the high-diversity areas of the world, especially those undergoing rapid economic development, where the lack of a common understanding of the multiple roles of biodiversity most often becomes an obstacle to planning and policy implementation. Here we consider the framing of the issue of biodiversity conservation from both the perspective of conservation science and conservation practice.

Conservation Science and the Measurement of Biodiversity

The measurement of diversity in ecological communities has a long and rich history in ecological and evolutionary science that is rather weakly linked to the conservation and policy activities described above. A suite of metrics has been developed for summarizing different dimensions of variability, over space and time, and across different hierarchical levels in the classification of species and of ecosystems. There are several monographs dedicated to

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biodiversity measurement in theory and in practice (Gaston 1996; Magurran 2004). Recognizing the difficulty that this lack of standardization poses for policy making, there has been a recent effort to identify a set of "essential biodiversity variables"; these are intended to constitute a more manageable set of metrics for policy makers, yet they represent the most important patterns in a range of policy-relevant contexts (Pereira et al. 2013). However, even this essential set contains six classes of metrics and over 25 categories of measurement (Brummitt et al. 2016). Without doubt, this complexity is an obstacle to the establishment of goals and targets, but it is also important to recognize that there is no single simple measure of biodiversity, especially given the very wide range of values, purposes, and contexts to which science and policy may be applied.

The ecological science metrics focus strongly on species richness as well as abundance. Abundance is important because many ecological processes are more affected by biomass than by diversity alone (Diaz et al. 2007). These measures vary over time and space, and recent reviews have focused on patterns of change in local diversity over time, changes in local diversity across the landscape, and combinations of these (McGill et al. 2015; Newbold et al. 2015), as well as changes to global diversity (Ceballos et al. 2015; Dirzo et al. 2014). These studies show how local (or small-scale) biodiversity change may be very different in both extent and nature from global (or large-scale) biodiversity change. Local diversity loss is variable but often smaller than global diversity loss, because local losses may be at least partially compensated for by non-native species migrating in, and generalist, wide-ranging species replacing local specialists. In some cases, this effect actually leads to no loss locally or perhaps even small increases (Sax and Gaines 2003). This may result in substantial changes to local ecological communities that may not be represented by metrics that count species but ignore species identity. These compositional changes driven by land-use change and intensification may be very profound (Newbold et al. 2015) and may have important consequences locally as well as globally, especially considering the potential consequences for ecological functions.

In practice, metrics used for biodiversity assessment in conservation do include other attributes of species. Especially important here is the state of the species assemblage in an area relative to some reference state, often predisturbance by industrialized humans. Measures of intactness (lack of disturbance), native-ness (species native to the area), and endemism (species that are only found in the local area) are thus all commonly prioritized in conservation planning. Levels of extinction risk are often important modifiers, especially in plans for protection and restoration with priority given to species closer to a risk of extinction.

In recent decades, with rapid improvements in the availability of both species and landscape occurrence data as well as remote-sensed observations and the analytical capability of Geographical Information System (GIS) tools (Jetz

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et al. 2012), there has been a proliferation of analyses of priority places and systems that consider ecological processes and patterns (Pressey et al. 2007) as well as future changes. However, whether these large-scale approaches embrace the full suite of locally and functionally relevant biodiversity components is unclear. In addition, though little recognized, GIS is not an entirely objective technology. Its use can entail significant assumptions about biodiversity distribution, in general, and human modified systems, in particular (Putz and Redford 2009). Local human needs and wants may be at odds with global or regional perspectives, and the biodiversity relevance for development is often contested, especially with respect to use and values.

Biodiversity and Conservation Values and Approaches

Biodiversity is often glossed as "the variety and variability of life"—a broad definition that makes the term of relevance to a very wide range of stakeholders.

Agricultural scientists and others concerned about the loss of crop and livestock breeds became advocates for biodiversity as well as the importance of agrobiodiversity (Jackson et al. 2007). Ethnobiologists working with agriculturalists growing traditional landraces joined the biodiversity bandwagon (Nazarea 2006), as did pharmaceutical companies prospecting for new drugs in wild species. Zoos, seeking new support for their traditional breeding of endangered species, joined indigenous and traditional peoples who positioned themselves as keepers of biodiversity.

When the possibility of a global treaty began to be discussed, all these and more interest groups lobbied to have their interests included. An early (1991) draft of the Convention on Biological Diversity (CBD) reflected this range of interests, as contained in the statement:

> Human cultural diversity could also be considered part of biodiversity.…Cultural diversity is manifested by diversity in languages, religious beliefs, land management practices, art, music, social structure, crop selection, diet, and any number of other attributes of human society.

Though not kept in the final text, this plethora of interests and interest groups remains an important legacy of the original enthusiasm for the broad nature of the concept and the lack of an operational definition. When working within the international political system, it has proved impossible to resist the inclusion of the positions of divergent stakeholders—a fact that continues to make biodiversity difficult to measure.

Early support for the newly emerging term of biodiversity came from a wide range of stakeholders, but most influential were a handful of U.S. and British academics and conservationists, in particular E. O. Wilson, Peter Raven, Norman Myers, and Thomas Lovejoy. What these people had in common was a deep affinity for species. Led by Wilson and Raven, taxonomists themselves,

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and united by a common love of tropical forests and deep concern about their destruction, biodiversity rapidly became cast as the number of species in an area—for which tropical forests were particularly notable. Myers took these interpretations and built the concept of conservation "hotspots" where global attention should be focused. Promulgated by Conservation International and funded by the MacArthur Foundation and Global Environment Facility, the hotspots approach became a global movement, influencing billions of dollars in spending toward "biodiversity hotspots" which were really areas of high, and threatened, species richness. By focusing attention on hotspots, one prominent goal for conservation became to reduce the rate of species extinction.

Hotspots were not, however, adopted by most other conservation organizations because of different underlying values. All priority-setting exercises are based on values, and the value-based nature of priority setting is important to tease out because it explains differences between organizational priorities, such as the difference between the ecoregional approach and the hotspot approach (Redford et al. 2003). Values underlying hotspots include (a) preventing extinction as the highest priority conservation action and (b) the total number of species saved is more important than what those species are. On the other hand, the ecoregional approach is based on the value of representation: it is important to preserve biodiversity within its natural distribution everywhere it occurs, from the tundra, to savannas, to tropical forest.

Such differing value positions have been combined with a lack of clear agreement on the role of human activity and diverse knowledge types in creating and/or maintaining biodiversity. Diverging views about what biodiversity is most important is reflected in the use of the concept of biocultural diversity within the new (2012) IPBES. Biocultural diversity refers to human cultural diversity linked to biological diversity through use, tradition, or practice. This includes forest types resulting from long-term human practices, traditional grazing practices, crop varieties intercrossing with wild relatives, and rotational agriculture. IPBES parties (countries) working together have developed a conceptual framing of the linkages between people and nature which reflect a wider set of knowledge and value systems than earlier efforts, such as the Millennium Assessment, which were more straightforward products of Western scientific methods and approaches (Diaz et al. 2015). As such, we are set to see implementation of global biodiversity conservation that returns to the earlier interpretation of biodiversity as including human activities.

Part of the legacy of this pattern of inclusiveness from the 1990s to the present day, and one little discussed, is the plethora of values represented by all those declaring their interest in biodiversity (Pascual et al. 2017). Unlike other international environment issues such as climate change or desertification, the precise objects of interest and targets for action in biodiversity conservation are broad and vague. Different values are embraced, often implicitly, and increasingly explicitly. Values are defined as trans-situational goals that serve as guiding principles in the life of a person or group (Schwartz 2011) and are

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used to contrast the foundational goals of groups involved in an issue, clarify the basis of conflict among stakeholders, and more generally provide for the understanding and prediction of human behavior (Manfredo et al. 2016). As such, the global conservation community does not necessarily have the same values as local conservation groups, indigenous people, national development officials, international aid donors, or multinational businesses. Yet given the vague ways in which biodiversity is used, these different groups can all seem to be in harmony with one another's values with no apparent trade-offs. It is only when specific actions are proposed that the veneer of biodiversity as all things to all people is torn, reflecting the need to have stakeholder values laid out early in all negotiating arenas and to consider the existence of trade-offs and the need to negotiate them explicitly. Biodiversity is seen by many as a subject whose study is pursued by scientists working in universities or conservation NGOs with tools like remote sensing, habitat modeling, radio tracking, and priority setting. As scientists, most of this group of stakeholders is not explicit about the values that underpin their work, often denying that their work is value-based, seeming to believe in the positivist view that science is objective and value free.

Yet, conservation biology is "inescapably normative" (Barry and Oelschlaeger 1996), and values are an important part of its study. There are other types of values that underpin work on biodiversity including social, economic, and cultural values. Decisions and positions that are argued on the basis of evidence may often be in disagreement due to lack of acknowledgment of divergent values.

The Focus of Conservation

Though often used to modify biodiversity, the word conservation has a much longer and more complicated history than biodiversity itself. To some, conservation is equivalent to preservation—keeping away from human exploitation. To others, conservation is equivalent to sustainable use—"conserving" the resource. Mace (2014b) outlined four framings of modal positions on conservation since the 1960s:

1. Nature for itself with an emphasis on species, wilderness, and protected areas
2. Nature despite people with an emphasis on extinction, threats and threatened species, habitat loss, pollution, and overexploitation
3. Nature for people with its emphasis on ecosystems, ecosystem approaches, ecosystem services, and economic values
4. People and nature with its emphasis on environmental change, resilience, adaptability, and socioecological systems

These four framings are not exclusive; they intertwine and overlap with some manifestations of each framing found at all times. Through time, the tension

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between biocentric values and anthropocentric values has been woven into the fabric of conservation, surfacing at times and submerging at others.

In previous decades, the single strongest axis of tension in the biodiversity community was between preservation and use. The preservation camp has driven the world's focus on protected areas and has turned into the world's largest coordinated single land-use effort and been a critical tool in conservation's tool chest. The coverage of protected areas globally has increased, especially over the last decade, and is arguably the single greatest success of the conservation movement. Yet, the focus of the protected-area community is on how detrimental human activities have been to biodiversity with a simple response to ameliorate these activities: separate key biodiversity from use and change detrimental use patterns. The call for more protected areas persists and reached its apogee in E. O. Wilson's quixotic recent call for half of the Earth's lands and seas to be set aside as protected (Wilson 2016).

A very different view comes from those who view biodiversity as essential for sustainable use and the betterment of human kind. For example:

- The CBD states that "biodiversity is the basis of agriculture."[2]
- The United Nations Environment Programme (UNEP) states that "biodiversity provides the basis for ecosystems and the services they provide, upon which all people fundamentally depend" (UNEP 2007).
- The United States Agency for International Development states that "conserving the diversity of life on Earth is fundamental to human well-being."[3]

In all of these examples, biodiversity is assigned worth in that it helps humans—the anthropocentric value. Following this view, one approach is to estimate the total economic value of ecosystems with biodiversity intact to those that have been converted or otherwise simplified for agriculture or industrial use (Balmford et al. 2002; Costanza et al. 2014). This approach has been applied globally, nationally, and locally and generally leads to the conclusion that unconverted areas can have high total economic values but that crucially these values lie outside standard market mechanisms and so cannot be realized under current market-based economic systems. This market failure of public goods and services is pervasive, and a key reason why market mechanisms cannot deliver successful conservation, at least in the absence of effective regulation.

The tension most evident in the last several years in the United States has been (once again) between biocentric and anthropocentric approaches, with the self-styled "new conservation" advocates maintaining that a sharp turn toward human-centric conservation is essential because biocentric conservation has failed (Hunter et al. 2014). This distinction is much less clear in the European context, though there are rising calls for re-wilding in Europe—a

2 https://www.cbd.int/ibd/2008/basis (accessed April 24, 2017).

3 https://www.usaid.gov/biodiversity (accessed April 24, 2017).

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marked biocentric approach. As is clear from this brief overview, there is no such thing as a single approach to "conservation"; practitioners display divergent and overlapping sets of values and norms that change over time.

Different Stakeholders Differentially Calculate the Effects of Direct and Indirect Human Action on Biodiversity

Most people would agree on the global trends showing losses in biodiversity—as measured in all its components and attributes. However, different stakeholders have different perspectives on this loss. To some, the clearing of a forest for an oil palm plantation is a triumph in regional development but to others it is the loss of prime habitat for orangutans and other tropical rainforest plants and animals. To illustrate this diversity, we briefly describe how five different stakeholder groups might think about biodiversity use and loss. Not all members of each group will hold the same views, but we use a modal perspective to emphasize the differences between groups. There have also been fads in funding that have changed values and politics.

First, to those committed to biodiversity conservation, there are generally considered to be five major threats to biodiversity:

1. Habitat loss and degradation
2. Introductions of invasive alien species
3. Overexploitation of natural resources
4. Pollution and diseases
5. Human-induced climate change

To conservationists, there are only downsides to most major human activity, as indicated by the losses of genetic variation, species, and ecosystems. Protected areas are the prime tool being deployed globally to minimize such losses (Ferraro and Pressey 2015).

Large, global NGOs, like World Wildlife Fund, The Nature Conservancy, and BirdLife International, largely share a focus on certain groups of threatened species and distinctive, diverse habitats. The values underpinning these organizations are largely overlapping and not necessarily the same, as local or national conservation organizations may have more of an emphasis on the needs of local populations (Redford et al. 2003). While there are a few clear areas of overlap in interests, such as wildlife tourism), there are more often conflicting interests. In truth, there is significant variation within the conservation community, partially because there is no single definition of "conservation," with differences mostly arrayed around whether conservation is for the sake of biodiversity itself or for sustainable use by humans.

Second, for indigenous or traditional groups there is a long cultural tradition of interaction between biodiversity and culture. Culturally embedded rules may govern the management of certain genetic resources, species, and ecosystems

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that are important for subsistence or for sociocultural reasons. There is often no difference between use and conservation, and "biodiversity" can be defined as including human beings (Redford and Mansour 1996). Strong political positions have been taken by some of these groups and their advocates who claim that biodiversity is conserved, or in some cases even created, by such groups. Evidence assessing such claims is mixed, but the power of the argument has proved strategically effective. Recent work done under IPBES has reached a consensus framework that includes a wide variety of views (Diaz et al. 2015). Additionally, the establishment of protected areas by conservation advocates has in some cases displaced human communities and/or resource uses causing many to claim that protected areas are bad for indigenous and traditional peoples (cf. Hutton et al. 2005).

Many indigenous and traditional groups are experiencing strong pressure from externally driven forces focused on markets for species or converting native ecosystems to commercial plantations. Many have also been displaced from their lands. As a result, and despite the strong rhetoric referred to above, there have been alliances by such groups and conservationists to establish protected areas that serve to inhibit negative development and secure land rights (Redford and Painter 2006).

Third, national development officials responsible for increasing economic activity and decreasing poverty often view biodiversity as either a resource to be exploited through activities like lumbering and fishing or converted to significant use like agriculture and mining. There are oft-cited examples where biodiversity itself can be used for economic progress as in ecotourism, though this is often more vaunted than proven.

Fourth, urban dwellers are often disconnected from the immediate natural world of biodiversity and conservation is not seen as relevant to their lives. Built infrastructure buffers them, decreasing interaction with, and often appreciation for, the natural world. However, there is a broadly increasing appreciation of the need for cities to be more active in ensuring supplies of fresh water that has caused a rise in connectivity between the city and the watershed on which it relies. In some cases this has resulted in cities paying to conserve watersheds. There is also growing interest in the public health benefits of urban green spaces. Urban biodiversity is becoming a focus for city planners that is often quite disconnected from biological and conservation objectives, and is influenced by green-ness, including green and blue infrastructures on roofs, walls, and in waterways.

Fifth, bilateral and multilateral aid for biodiversity from wealthy countries has varied according to country and current fashion. There have been large investments in programs that explicitly tied sustainable human development and conservation, and others that have been directed exclusively at protected areas, and yet others that funded human well-being programs with an expectation that they would generate biodiversity benefits. Though there is no single pattern, in general, this group of stakeholders views biodiversity through the lens of

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human development, a position summed up in the March 2016 posting from the Center for International Forestry Research: How forests and trees contribute to the global development agenda.[4] In sum, biodiversity conservation is not a single entity with a single constituency but a name for a broad set of beliefs, policies, and practices based on underlying values. When questioning a given conservation intervention or policy, key questions to answer early on include:

- What are the underlying values?
- How do these influence the desired purpose of biodiversity?
- Which components and attributes are of interest?
- Over what time period?
- At what scale (local, regional, global)?
- What loss will be tolerated and who will feel this loss?

Major Contemporary Tensions in Biodiversity Conservation

A set of issues in conservation and biodiversity is currently drawing significant attention and funding. It is worth highlighting these issues because they serve as heuristics that help shed light on a set of tensions underlying the practice and illustrate many of the points made above. They may also become, or already are, part of the way biodiversity conservation is defined. Below we provide only sketches of the complicated issues, values, and science that underlie each of these pairings:

- *Access and benefit sharing*: CBD is not only designed to conserve biodiversity but also to ensure access to and benefits from the use of biodiversity, particularly to local/indigenous peoples. These twin objectives sometimes work in concert with one another but at other times are in opposition. Their pairing in the Convention is further evidence of the social nature of conservation.
- *Biocultural diversity*: As discussed above, the practice of conservation sits uncomfortably astride the arguments about the role of human activity in creating biodiversity. Positions on this issue vary with the historical patterns of human use and the target component or attribute of biodiversity. For example, if genetic diversity of crops is the target, as is the case of the Potato Park in the Peruvian Andes, then ongoing human farming is necessary. Or if grassland biodiversity is the target in Southern Europe, then continued grazing by domestic species is also required. This differs from many settings where human activity must be restricted to maintain desired biodiversity, as is the case with Asian elephant conservation.

[4] http://us7.campaign-archive2.com/?u=68cb62552ce24ab3c280248d7&id=14d18d74b6&e=930f0acdf2 (accessed April 24, 2017).

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- *Biodiversity and poverty*: One of the dominant forcible pairings in the last decade has been between biodiversity conservation and poverty alleviation (Roe et al. 2013). The complicated ways in which biodiversity is defined and deployed are matched by the complications inherent in defining and measuring poverty. Despite this, major funders have created funding streams based on assumptions such as that poor people were mostly found where biodiversity conservation is a priority or that alleviating poverty would result in poverty alleviation. Neither of these has proven to be true across the board.
- *Payment for ecosystem services*: Another popular trend in the last decade has been payment for ecosystem services, based on the assumption that if properly priced in the marketplace, those goods and services of use to humans that were produced by "nature" could be conserved. The most common manifestation is in urban water funds where clean water from a neighboring watershed is ensured through payments to conserve vegetation in the watershed. Though working reasonably well for water, it is not clear if "natural" biodiversity is necessary for clean water, if the model applies to many other services, or if it works where there are no "services" at all.
- *Urban nature*: Recent work is showing that urban parks may play important roles in public and mental health for urban dwellers. Though some evidence shows that more diversity in these green spaces is better, it is not clear that a handful of exotic trees and a monospecific sward of grass (aka lawn) might not serve equally well. So, although the results are promising for green space conservation, it may be less promising for biodiversity conservation.
- *Synthetic biology*: The rise of synthetic biology—the ability to engineer genomes to cause organisms to produce goods and services for humans—is still in its early stages. These technologies offer the possibility of dramatically changing the relationship between humans and biodiversity since the genetic code itself can become domesticated for human purposes (Redford et al. 2013).

Conclusion

In 2001 Rosenzweig (attributing to Gordon Orians) laid out the concept of the Homogocene before the rise in popularity of a term that largely overwrote it, the Anthropocene (Rosenzweig 2001). Both terms describe Earth as it has become impacted by broadscale and pervasive human actions. The former term describes the result whereas the latter, the main actor. Agriculture, industry, fishing, hunting, urbanization, mining, commerce, and attendant climate change have combined to thrust humankind into the spotlight as the dominant ecological and evolutionary actor on our planet.

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The rise of nature conservation has been a response to the threat and loss of local diversity—biodiversity conservation is only its most recent manifestation. One of the reasons that biodiversity has met with such widespread and immediate use is that the term "nature" was no longer considered an acceptable target for conservation efforts, though in the last couple of years, through the work of IPBES, it is coming back into fashion (Diaz et al. 2015). The other term in widespread use, "wilderness," had encountered strong opposition for its lack of relevance to more populated parts of the world and its tacitly antihuman perspective. As a new term, biodiversity has no baggage and if left vaguely defined as "all life" could be all things to all people. Who could be against conserving all life?

But despite its pretensions to the contrary, biodiversity is not a term with a universally agreed-upon definition. Rather it is a value proposition: diversity is good and should be maintained. As such, the definition shifts like a skin over the underlying social values, and those stakeholders whose values are taken into consideration. Lack of appreciation for this living, value-based use of the term biodiversity underlies frustrated critiques like that of Maier (2012). Politics is the public contestation of values and in that regard, biodiversity conservation is politics (Sanderson and Redford 1997).

Thinking of biodiversity conservation as inextricably linked to a living political discourse allows us to ask why it doesn't include clean water, urban living, and soils; why there is virtually no attention to environmental justice in the biodiversity conservation world; and how, or whether, agriculture and culture should be included in biodiversity conservation efforts. The challenge is to acknowledge the worth of these other initiatives and to support those who champion their persistence, without diluting the vital job of ensuring the persistence of the truly voiceless—the rest of life on Earth.

As such, important questions remain as to the operational definition of biodiversity and why it is viewed so separately from other human concerns such as clean water, urban living, climate, and soils. One explanation is that biodiversity conservation projects are sometimes seen as a "nice-to-have" rather than as "essential-to-have," as is the case with water and soils, for example. There are large, influential, and well-funded NGOs operating at national and global levels to secure conservation priorities and targets, to an extent unmatched by other environmental concerns. These two factors may often put biodiversity conservation at odds with other environmental issues in development projects. Instead of being central to them, biodiversity can become an awkward addition with contested and hard to estimate values. This is not a good outcome because there is plenty of evidence that securing local and global biodiversity, at least in some forms and configurations, is critical to sustainable development and underpins many of the other more straightforward environmental resources.

The fluid definition of biodiversity has also allowed a climate of "win-win" solutions where human uses are claimed to be achieved while simultaneously conserving biodiversity. Once such arena is payment for ecosystem services,

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but careful examination (Howe et al. 2014; Sikor 2013) reveals that most declared "win-wins" are in fact trade-offs with values held publically and often lost in exchange for privately held values.

While the values attached to biodiversity and its conservation are more diverse than these other environmental priorities, many of the issues are similar. In particular, the considerations of local versus global, present versus future, public versus private, and monetary versus intrinsic are similar. The lack of clarity over the term simply adds another layer of confusion to what is already a complicated and interacting set of issues.

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