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Biodiversity, conservation biology, and rational choice

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ABSTRACT

This paper critically discusses two areas of Sahotra Sarkar's recent work in environmental philosophy: biodiversity and conservation biology and roles for decision theory in incorporating values explicitly in the environmental policy process. I argue that Sarkar's emphasis on the practices of conservation biologists, and especially the role of social and cultural values in the choice of biodiversity constituents, restricts his conception of biodiversity to particular practical conservation contexts. I argue that life scientists have many reasons to measure many types of diversity, and that biodiversity metrics could be value-free. I argue that Sarkar's emphasis on the limitations of normative decision theory is in tension with his statement that decision theory can "put science and ethics together." I also challenge his claim that multi-criteria decision tools lacking axiomatic foundations in preference and utility theory are "without a rational basis," by presenting a case of a simple "outranking" multi-criteria decision rule that can violate a basic normative requirement of preferences (transitivity) and ask whether there may nevertheless be contexts in which such a procedure might assist decision makers.

1. Introduction

Environmental Philosophy From Theory to Practice is a welcome, compact statement of Sahotra Sarkar's unique approach to environmental philosophy. This approach is informed as much by philosophy of biology and ecology, economics, and conservation biology as it is by environmental ethics and politics. Sarkar covers much ground for such a slim volume, discussing, among other topics, debates in environmental value theory (ch. 3), biodiversity and conservation biology (ch. 5), the integration of values in policy-making using decision protocols (ch. 4), environmental restoration (ch. 6), sustainability (ch. 7), climate change (ch. 4, 8), and environmental justice (ch. 8). My constructive comments below will focus primarily on two areas that the book discusses in some detail: biodiversity and conservation biology and roles for decision theory in incorporating values explicitly in the environmental policy process. However it is worth stating one general criticism of the book at the outset: Sarkar attempts to cover too many fascinating topics in too few words. A paragon of the virtue of concision, the book's brevity can also be frustrating. (For example, the papers in Gardiner, Caney, Jamieson, and Shue (2010) could usefully supplement Sarkar's limited discussion of climate change ethics.)

My criticisms proceed as follows. In Section 2, I characterize the value-laden constituents-based approach to biodiversity taken in Chapter 5. Sarkar's emphasis on the practices of conservation biologists, and especially the role of social and cultural values in the choice of biodiversity constituents, restricts his conception of biodiversity to particular practical conservation contexts. Whether or not Sarkar's skepticism about the explanatory power of species diversity in ecology is justified, I argue that life scientists more generally have many reasons to measure many types of diversity. There are also other practical contexts where metrics of biodiversity might be important, and these are ruled out by Sarkar's adequacy conditions. I also suggest that biodiversity metrics could be value-free, in a limited sense analogous to Boorse's (1977) biostatistical theory of health: once biodiversity is specified, operationalized, and estimated in a geographical area, it remains an open question whether and how that biodiversity should be conserved or managed.

In Section 3, I argue that Sarkar's emphasis on the limitations of normative decision theory, especially their paradoxes and the

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idealizations built into the standard, static notion of individual preference, is in tension with his statement that decision theory can "put science and ethics together." (80) I also question his claim that multi-criteria decision tools lacking axiomatic foundations in preference and utility theory are "without a rational basis." (91) I present the case of a simple "outranking" multi-criteria decision rule (the so-called Regime method; Hinloopen, Nijkamp, & Rietveld, 1983) that can violate a basic normative requirement of preferences (namely transitivity) and ask whether there may nevertheless be contexts in which such a procedure might assist decision makers.

2. What is biodiversity? Life sciences and human values

Sarkar's work on biodiversity (2002, 2005, 2007, 2008, 2012) has defended the view that 'biodiversity' should be defined by the practices of conservation biologists. As he puts it most recently (2012, p. 99): "biodiversity is simply the goal pursued by the practice of conservation biology." Sarkar has also emphasized the normative problems inherent to defining the concept, noting that since it is impossible to conserve all of life's diversity, any practical attempt at biodiversity conservation must operationalize 'biodiversity' in terms of particular populations, species, higher taxa, biological "events" (e.g. migrations), etc. that society deems worth conserving. These are "constituents" of biodiversity. Furthermore, considerations of *economy* are always on the table, for conservation biologists and planners as much as for society more broadly. This choice of biodiversity constituents and the associated tradeoffs clearly involve value judgments.

A philosopher might initially wonder whether this approach to defining 'biodiversity' makes success inevitable.[1] That is, if biodiversity just is whatever goal is pursued by conservation biology, then conservation biologists cannot be wrong about its definition. Analogously, if we take 'health' to be defined as the goal pursued by doctors, then doctors, as long as they consistently pursue this goal, cannot fail to pursue health. Sarkar's likely response would be to note that though there are conventional elements in the definition of 'biodiversity,' our practices and the biological world impose general adequacy conditions on any acceptable definition.[2] Sarkar offers the following adequacy conditions for sets of biodiversity constituents (116):

(1) "They must be *biotic* features;
(2) Variability must be captured...we are dealing with bio*diversity*;
(3) Taxonomic spread is important;
(4) Concern should not be limited to material resource use."

Beyond the many values that may be involved in an initial choice of biotic features for conservation, these constraints explicitly incorporate values, particularly constraint (4), which, as Sarkar notes, is consistent with both anthropocentric and non-anthropocentric theories of the value of biodiversity. However this constraint might rule out a metric of, say, genetic or phenotypic diversity in an agroecosystem from being a metric of biodiversity *per se*, as long as the goal is to maximize resilience or yield of economically valuable food crops, to the exclusion of goals related to non-resource value. Sarkar explicitly restricts biodiversity to practical contexts where at least one goal is conservation for non-resource value. It is unclear whether constraint (4) rules out conservation for option value, where option value might in some cases be limited to option value for future material resource use. Presumably this would depend on the intentions of the conservation biologists and ecosystem managers. An obvious consequence of this view is that the same set of constituents might count as biodiversity constituents in one context and not in another.

Not only does Sarkar rule out practical contexts where biodiversity is being measured for reasons that exclude conservation for non-resource value, his value-laden approach does not explicitly embrace the possibility of value-free theoretical concepts and operationalizations of biodiversity. Consider a value-free specification and operationalization of biodiversity as *vertebrate species richness*. Given some taxonomic theory of vertebrate species, we could estimate vertebrate species richness in different areas. Here, one might think, we are measuring a kind of biodiversity. However, it certainly remains an *open question* whether vertebrate species richness ought to be conserved, or maximized, etc. For example, we might be measuring vertebrate species richness with an eye toward questions in biogeography or ecology, or even evolutionary biology.

Constraint (3) also places a value on taxonomic spread. In a footnote Sarkar admits that constraint (3) might be entailed by constraint (2), but variability can be cashed out in a number of ways, including the genetic or phenotypic variability within, say, a single higher taxon, for example as limited to vertebrates, or limited to a single species. Biologists have also devised many metrics of phylogenetic diversity. Indeed, life scientists have a general interest in diversity, as Sarkar's discussion of diversity concepts and metrics in ecology as well as any perusal of life science oriented (as opposed to ethical) discussions of biodiversity, will attest (see, e.g., Gaston, 1996; Magurran & McGill, 2011). One might go so far as to argue that a central problem of the life sciences is the explanation of the diversity of living systems.

Whether or not Sarkar's skepticism of the diversity-stability relationship in ecology is justified, a philosophical account of biodiversity should not exclude the practices of many life scientists. This is an important difference between Sarkar's approach and Maclaurin and Sterelny's (2008) "units-and-differences" approach to biodiversity. Maclaurin and Sterelny argue that biodiversity concepts (especially species richness supplemented by various accounts of disparity—morphological, phylogenetic, ecological) play important roles in specifying causes and consequences in biological explanations. Based on their reading of previous work (especially his 2002 and 2005), Maclaurin and Sterelny accuse Sarkar of holding the view that biodiversity is "whatever we think is valuable about a biological system." (8) While the adequacy conditions enumerated above go some way toward answering this charge by restricting sets of constituents, I have argued here that they are actually *too* restrictive. Dropping constraints (3) and (4) would accommodate the practices of both conservation biologists and other pure and applied life scientists interested in various kinds of biological heterogeneity.

There is a deeper philosophical problem looming, which I will motivate without resolving. This problem would apply particularly to my suggested broad conception of biodiversity contained only in Sarkar's constraints (1) and (2), as well as Maclaurin and Sterelny's pluralistic units-and-differences approach. The problem is whether there is any such thing as biodiversity in general such that bringing together these concepts of biological heterogeneity is theoretically useful or interesting. DeLong's (1996) "consensus" definition of biodiversity, based on consulting more than 80 published definitions, defined biodiversity extremely broadly:

[1] I owe this point to discussion with Laura Franklin-Hall.

[2] Odenbaugh mentions in his comments that Sarkar's conventionalist approach to biodiversity cannot rely on Lewis's (1969) account of convention. He is right, since Lewis only considers games where individuals are indifferent between coordinative equilibria. But a generalized version of Lewis's game-theoretic approach where individual utilities for different equilibria differ, perhaps contextually, could work.