Biodiversity and Biotechnology

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Abstract The maintenance of biodiversity is urged from many quarters and on grounds ranging from aesthetic considerations to its usefulness, particularly for biotechnology. But regardless of the grounds for preserving biodiversity, writers are generally in agreement that it should be preserved. But, in examining the various references "biodiversity," such as species diversity, genetic diversity, and habitat diversity, it is apparent that we cannot aim to preserve biodiversity as such, since there are a number of conflicts in any such undertaking. In preserving one aspect of biodiversity, we damage another aspect. Five arguments which attempt to ground our moral concern for biodiversity are reviewed and critiqued, not only for their consistency but also for their power to move us to action. The final section of the paper shows how conflicts in the values of personal and environmental health can impair ethical action and especially policy formation.

Keywords: Biodiversity, biotechnology, ecology, ecosystem, environment, ethics, evolution, genetics, health, medicine

Introduction

"Biodiversity" (or "biological diversity") is a general term which refers to the complexity and number of living things and their interactions in ecosystems; and such ecosystems also include nonliving elements, such as oceans and mountains. Writings on biodiversity often refer to specific aspects of biodiversity such as species diversity, genetic diversity, and habitat diversity. "Species diversity" is the term used to refer to the wide variety of individuals which exist either within a particular species (intraspecies diversity) or the wide variety of different species and subspecies themselves (interspecies diversity). "Genetic diversity" refers to the variety of chromosomes and their arrangements and to DNA sequences, i.e., to the variety of genes and genetic combinations among individuals and species. In the language of genetics, species diversity refers to phenotypes and genetic diversity refers to genotypes. Genetic diversity is linked to species diversity since rearrangements of genes and of chromosomal structures are thought to be associated with speciation, and are certainly partially responsible for individual phenotypic variation. "Habitat diversity" refers to the wide variety of ecological systems within which organisms exist and of which they are composed, but since this term seems to unduly emphasize animal interactions, I will adopt the term "ecosystem diversity" to discuss this aspect of biodiversity.

The point of reflecting on these particular terms is to see how they relate to the general arguments being made for preserving biodiversity. Some of biodiversity's most eloquent spokespersons argue for the simultaneous maintenance and enhancement of
species diversity, genetic diversity, and ecosystem diversity\(^2\) and claim that we have moral duties (on various grounds), individually and collectively, to accomplish these goals. Since these spokespersons rarely, if ever, discuss the conflicts in furthering these various aspects of biodiversity, readers could think that the writers assume that biodiversity is an unqualified good, i.e., that diversity is good in every situation in all its aspects. But, biodiversity is not a good in itself and may be good or bad, depending upon one’s position in an ecosystem and/or in relation to other individuals.

In this paper I first discuss the ways in which some of the various aspects of biodiversity conflict. Moreover, since these aspects do conflict with one another, it will be apparent that we cannot reasonably hope to further biodiversity \textit{per se}, and we do not have general duties to do this. Instead, we will have to make choices about which aspects of biodiversity—intraspaces/interpecies, genetic, ecosystem—we wish to further. Woven into this discussion, too, is a reflection on the kinds of considerations which are important in ethical decision making.

Second, since whatever means we choose to advance biodiversity must be limited by considerations of other values such as freedom, equality, health, and justice, I will examine the several arguments which attempt to ground our moral concern for biodiversity, and I will point out the philosophical difficulties with each of them. My discussion places the arguments into two groups: those arguing for the intrinsic value of biodiversity, which I consider first; and those claiming biodiversity as having instrumental value, including the arguments linking the importance of biodiversity to biotechnology and so to the value of human health.

In the section, “Conflict of Values,’’ I show how conflicts in the values of personal and environmental health can impair ethical action and especially policy formulation.

Throughout the paper, I also analyze these arguments for their power to move us to action. Any ethical argument should present us not simply with reasons for believing a particular action to be right or wrong, but should also give us reasons for doing the right thing. Moreover, because the present rate of species extinction is so high, and dire consequences are so close in time and are so irreversible,\(^3\) policymakers today must make choices quickly, and so pragmatic considerations become important.

**Conflicts in the “Good” of Biodiversity**

If furthering biodiversity at the species, genetic, and ecosystem levels is simultaneously possible, biodiversity should be an unqualified good for humans at both the species and individual levels. That is, it should benefit the living beings who exist in the diverse milieu. If biodiversity benefited \textit{all} individuals of \textit{all} species, then we would have duties to preserve it. An important principle of ethics is that we, by our choices, should not sacrifice the good of the few to benefit the many. The rights and lives of minorities and the disadvantaged should be protected, for instance. That nature does not operate on \textit{this} principle is all too clear. What is good for a species may be detrimental to certain of its individuals. Take, for example, the problem of sickle cell disease. The presence of one copy of this recessive gene confers resistance to malaria.\(^4\) A small number of individuals are affected with the anemia, but a much larger number of individuals who are heterozygous carriers are protected from a life-threatening protozoan. This particular type of genotypic variation, known as heterosis, benefits some individuals and harms others, but at the same time protects the group, and so the species, against extinction. It multiplies the odds of continuation of more members of the subpopulation of heterozygotes into the