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Two Propositions About Biodiversity

Clifford S. Russell*

ABSTRACT

In his opening statement, Professor Russell gives two reasons why humankind should worry about the diversity of life on earth: (1) diversity is thought to make ecological systems more resilient to natural and man-made shocks; and (2) diversity provides a library of genetic information upon which society may draw. Professor Russell nevertheless warns against the notion that a "safety-first" or safe minimum standard approach to environmental preservation is the correct response to these concerns. First, "safety" is impossible to define. And, second, preserving all systems at all costs demands that society forego significant current economic rewards that result from altering some ecological systems. Some judgments are necessary about specific preservation versus development alternatives, even though society will inevitably make such decisions in a condition of ignorance about both the future costs and the exact amount of the current gains. Professor Russell concludes by offering two suggestions on how preservation can be made to work better. First, species should be preserved indirectly by protecting the environment in which they exist. Second, local human populations should be given economic incentives to participate in the preservation efforts.

What is biodiversity? In qualitative terms, biodiversity refers to the variety of life on earth. What constitutes biodiversity, however, is not the focus of this Article, which instead states two propositions, each of which has a couple of subpropositions.

First, in the material that sets out the agenda for this Symposium, the word "crisis" appears fairly regularly; the "biodiversity crisis" is referred to as a fact. Whether it is a fact, or

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whether the word "crisis" is simply used, as it regularly is in our society, to denote anything to which society wants to call attention, there are at least two good reasons for worrying about the variety of life on earth.

The first reason society should be concerned about biodiversity is that more diverse systems are *thought to be* more resilient to nasty shocks—whether those are natural, as in fire, flood, freeze, or insects; or human, as in roads, timber cutting, or pesticide application. The Irish potato famine of the middle 19th century is an example of the dangers of a very nondiverse system. One pest, the cause of the Irish potato famine—which is making a comeback according to a recent *Wall Street Journal* article¹—was able almost to prostrate the human system it attacked, because that system depended so heavily on a single crop. Admittedly, the devastated system was not natural, as a rain forest would be. But even though it was the human element that was so vulnerable, it is the general notion of vulnerability that people worry about when they talk about diversity as a support for resilience—the ability to bounce back from adversity.

The hypothesis that diverse systems are more resilient (an ecological theorem of sorts) has not been proven true in any sense. That is, the diversity-equals-resilience hypothesis has not been tested in the way hypotheses are testable and tested in the laboratory sciences. It does, however, appear to be one that most ecologists would accept without argument or with very little argument. It may be a relationship that changes over the extent of biodiversity. But the conservative choice in society's current state of ignorance may well be to bet that the relationship exists, because the consequences of losing a bet against it are potentially catastrophic.

The second broad reason for worrying about biodiversity, one that is increasingly popular, is simply that losing species means losing genetic information—the templates for proteins that might turn out to be useful to humans at some time in the future. There is no scarcity of anecdotes to illustrate this concern. We are always discovering new plants that have beneficial uses. The popular (wishful) version of this anecdotal knowledge is: "Well, what if plant X contains a compound that is a cure for cancer, and we destroy it? We will have created an incalculable loss." Here the word "incalculable," which also is found in the introductory material for the Symposium, ought to be read to

1. Ron Winslow, "Fungus Fatale" Poses a Threat to Potato Crop, *WALL ST. J.*, Jan. 18, 1995, at B1.

convey as much about our ignorance, which is almost total, as it does about the vast but uncertain rewards for preservation. We simply do not know what is out there. So we cannot know what we are losing. And, as Ready and Bishop have shown, it matters for current decisionmaking when we expect to find out more.²

Intuitively, however, this second argument from ignorance also leads toward a safety-first approach³ to biodiversity. Even so, safety-first, or a "safe minimum standard,"⁴ cannot be taken as a magic spell or potion that puts the problem to rest. There are two reasons why the safety-first proposition should be viewed with caution. First, because no one knows how many species there are, what they do for a living, or how they function collectively as ecosystems, no one really can know what "safety" means. For example, assume that society aims to preserve all of whatever may be in a particular variety of tropical rain forest. That is, while we do not know what species exist in the forest, we would like to preserve them. And preserving the forest as a system seems the obvious way to achieve that. But, and this is where the policy rubber meets the political road, we do not know how much of that rain forest must be preserved in order to preserve "the system." Why is that important? Why not just preserve it all? The problem is practical, political and, in a narrower sense, economic. Efforts to preserve entire systems, for example, can adversely affect the people who live in or on the edges of these systems and who are trying to develop in one way or another, or are just trying to survive. The greater the efforts to preserve, the more conflict the efforts generate. Choices must be made, and the safety-first slogan does not help to make them.

The second reason to claim that safety-first is not the magic bullet is that intuition is not a perfect guide to making policy decisions in this area. As previously alluded to, the environmental economics literature shows that safety-first is not the conservative strategy in every context. Under some assumed situations—in effect, where we cannot know now or later what we

2. Richard C. Ready & Richard C. Bishop, *Endangered Species and the Safe Minimum Standard*, 73 AM. J. AGRICULTURAL ECONOMICS 309 (1991).

3. The phrase "safety first" denotes a policy that accepts prevention of a possible future catastrophe as an overriding goal, regardless of the size of the costs of that prevention or the probability of the occurrence of the catastrophe. A "catastrophe," in turn, is a word used to describe events as different as sudden dramatic rises in global sea level and a loss of one or more species of plants or animals. The latter qualifies as a catastrophe because it is irreversible and thus potentially produces losses as long as human society is expected to exist, by convention an infinitely long time.

4. A "safe minimum standard" is, in effect, a strategy for prevention of a catastrophe.

currently may be destroying—it can be conservative to opt for shorter term rewards.

As a supplement to the previous arguments for taking biodiversity seriously—and the caution about the safety-first prescription—the following two notions are worth considering. First, it does not make a lot of sense to try to preserve species as species. It makes much more sense to preserve systems as systems and thus to preserve the species in them by indirection. There are some cases in which the species are so visible and so important—wolves, grizzly bears, and so forth—that we really cannot play the game quite that way. We are forced politically to concentrate on the species. For example, the spotted owl came to dominate discussion when the real issue was about old growth forest ecosystems. It was a useful symbol for each side in the political war, but the focus on owl survival distorted the discussion of how much and which parts of the old-growth forests to preserve.

Second, if one wants to preserve an ecological system, the best way to do so is to give individuals or small groups on the ground, in or around the systems, some kind of incentive to do the preserving. The agreements that have been worked out between developing countries and pharmaceutical firms relating to species “prospecting” and to future drug discoveries are examples of attempts to work out such incentives and thus to encourage a country to take on preservation, even when that may go against the short term interests of some of its citizens. Under such agreements a country, or possibly a preservation agency within a country, has an incentive to try to preserve species in systems, where prospecting can go on for useful compounds. On a more pedestrian level, there are agreements in Zimbabwe that give part of the tourist profits related to wilderness areas to the tribal groups that surround the areas. Such contracts give these groups an incentive not to become part of the poaching problem but to become part of the policing action—the anti-poaching solution. It appears that the smaller the group and the closer the group to the system to be preserved, the better. Countries—or rather government bureaucracies—are notoriously bad at managing preservation efforts. But, if locals are involved, the chances of success are greatly increased.

Thus, biodiversity may seem to be an exotic policy context, involving complex arguments about DNA similarities, how ecological systems function, and how new drugs are discovered and marketed. But, because we are ignorant of all the relevant facts, preservation decisions must be made on grounds that often seem little better than cliché and anecdote. Moreover, it is often

the citizens of the developed world who are trying to make those decisions, without any good idea how to implement them in the other countries and other cultures in which the resources are actually to be found. In the end, the solution may be to rely on seemingly mundane arrangements aimed at influencing decidedly nonexotic behavior on the part of "the locals."

