

that they cannot be replaced by artificial surrogates—for example, plastic trees, man-made waterfalls, and Disneyland gorges?

In “What’s Wrong with Plastic Trees?” Martin Krieger questions the preservationist thesis that we must preserve original natural objects. He challenges us to state precisely why artificial objects may not serve us as well as natural ones. We must not worship nature but examine the cost/benefits of preserving natural objects and “wildernesses” (a human designation) in relation to other economic and social needs.

In our fifth reading, “Faking Nature,” Robert Elliot considers the views of Krieger and other antipreservationists who hold the “restoration thesis.” The restoration thesis argues that a restored, artificial replica of natural objects would preserve their full aesthetic value. Elliot, while granting that the restoration thesis carries some weight, argues that it leaves out too much. Comparing natural objects to art, he maintains that fakes or replicas have less value than the original. Our understanding of the origins of these objects affects our evaluation of them, so something is lost in the replication process.

In our next reading, “The Call of the Wild,” Eric Katz goes even further than Elliot in rejecting the restoration thesis. He is suspicious of using *technology* to “improve” nature and argues, to the contrary, that value inheres in nature to the extent that it avoids mod-

ification by human technology. Natural objects should not be evaluated according to their human uses but seen as possessing inherent autonomy. Furthermore, we have a duty to fight against technological incursions into nature.

**Legal Standing.** We usually seek to protect valuable objects that are threatened by human intervention. While our legal system covers such inanimate objects as corporations and states, it has not widely been extended to cover natural objects.

In our final reading in this section—“Should Trees Have Standing?”—Christopher Stone argues that from both anthropocentric and holistic perspectives, we should assign natural objects (rivers, oceans, trees, the atmosphere, animals) legal rights. He points out that we already grant such inanimate objects as corporations and municipalities such rights, so why not extend the rights further, using the idea of “legal guardian” to cover these objects?

Stone agrees that the idea of granting natural objects legal standing will seem “unthinkable” to many, but he notes, quoting Darwin on the expanding circle of our moral sentiments, that at one time the idea of granting equal rights to women, blacks, and children was thought to be unthinkable. He asks us to consider the arguments on their merits

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### Biodiversity: The Key to Saving Life on Earth

DONELLA H. MEADOWS

*Donella Meadows is an adjunct professor of environmental and policy studies at Dartmouth College and the author of several works in environmental studies, including Limits to Growth. In this essay, Meadows sets forth three reasons for preserving biodiversity: economic, environmental, and informational. She appeals both to our enlightened self-interest and wider moral sensitivity for nature and its phenomena in calling on us to leave nature alone so that biodiversity may not be threatened by us.*

The ozone hole and the greenhouse effect have entered our public vocabulary, but we have no catchy label for

the third great environmental problem of the late 20th century. It’s even more diffuse than depletion of the ozone layer or global warming, harder to grasp and summarize. The experts call it “the loss of biodiversity.”

Biodiversity obviously has something to do with pandas, tigers and tropical forests. But preserving biodiversity is a much bigger job than protecting rain forests or charismatic megafauna. It’s the job of protecting all life—microscopic creepy-crawlies as well as elephants and condors—and all life’s habitats—tundra, prairie and swamp as well as forests.

Why care about tundra, swamp, blue beetles or little blue-stem grasses? Ecologists give three reasons, which boil down to simple self-interest on three levels of escalating importance.

- Biodiversity has both immediate and potential economic value. This is the argument most commonly put

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forward to defend biodiversity, because it's the one our culture is most ready to hear. It cites the importance of the industries most directly dependent upon nature—fisheries, forestry, tourism, recreation and the harvesting of wild foods, medicines, dyes, rubber and chemicals.

Some ecologists are so tired of this line of reasoning that they refer wearily to the "Madagascar periwinkle argument." That obscure plant yields the drugs vincristine and vinblastine, which have revolutionized the treatment of leukemia. About a third of all modern medicines have derived from molds and plants.

The potential for future discoveries is astounding. The total number of species of life is somewhere between 10 million and 30 million, only 1.7 million of which we have named, only a fraction of which we have tested for usefulness.

The economic value of biodiversity is very real, but ecologists hate the argument because it is both arrogant and trivial. It assumes that the Earth's millions of species are here to serve the economic purposes of just one species. And even if you buy that idea, it misses the larger and more valuable ways that nature serves us.

- Biodiversity performs environmental services beyond price. How would you like the job of pollinating trillions of apple blossoms some sunny afternoon in May? It's conceivable, maybe, that you could invent a machine to do it, but inconceivable that the machine could work as elegantly and cheaply as the honeybee, much less make honey on the side.

Suppose you were assigned to turn every bit of dead organic matter, from fallen leaves to urban garbage, into nutrients that feed new life. Even if you knew how, what would it cost? A host of bacteria, molds, mites and worms do it for free. If they ever stopped, all life would stop. We would not last long if green plants stopped turning our exhaled carbon dioxide back into oxygen. Plants would not last long if a few genera of soil bacteria stopped turning nitrogen from the air into nitrate fertilizer.

Human reckoning cannot put a value on the services performed by the ecosystems of Earth. These services include the cleansing of air and water, flood control, drought prevention, pest control, temperature regulation and maintenance of the world's most valuable library—the genes of all living organisms.

- Biodiversity contains the accumulated wisdom of nature and the key to its future. If you ever wanted to destroy a society, you would burn its libraries and kill its intellectuals. You would destroy its knowledge. Nature's knowledge is contained in the DNA within living cells. The variety of that genetic information is the driving engine of evolution, the immune system for life, the source of adaptability—not just the variety of species but also the variety of individuals within each species.

Individuals are never quite alike. Each is genetically unique mostly in subterranean ways that will only appear in future generations. We recognize that is true

of human beings. Plant and animal breeders recognize it in dogs, cattle, wheat, roses, apples. The only reason they can bring forth bigger fruits or sweeter smells or disease resistance is that those traits are already present in the genes carried by some individuals.

The amount of information in a single cell is hard to comprehend. A simple one-celled bacterium can carry genes for 1,000 traits, a flowering plant for 400,000. Biologist E. O. Wilson says the information in the genes of an ordinary house mouse, if translated into printed letters, would fill all the 15 editions of the Encyclopedia Britannica that have been published since 1768.

The wealth of generic information has been selected over billions of years to fit the ever-changing necessities of the planet. As Earth's atmosphere filled with oxygen, as land masses drifted apart, as humans invented agriculture and altered the land, there were lurking within individuals pieces of genetic code that allowed them to defend against or take advantage of the changes. These individuals were more fit for the new environment. They bred more successfully. The population began to take on their characteristics. New species came into being.

Biodiversity is the accumulation of all life's past adaptations, and it is the basis for all further adaptations (even those mediated by human gene-splicers).

That's why ecologists value biodiversity as one of Earth's great resources. It's why they take seriously the loss of even the most insignificant species; why they defend not only the preservation of species but the preservation of populations within species, and why they regard the rate of human-induced extinctions as an unparalleled catastrophe.

We don't know how many species we are eliminating, because we don't know how many species there are. It's a fair guess that, at the rate we're destroying habitat, we're pushing to extinction about one species every hour. That doesn't count the species whose populations are being reduced so greatly that diversity within the population is essentially gone. Earth has not seen a spasm of extinctions like this for 65 million years.

Biologists estimate that human beings usurp, directly or indirectly, about 40 percent of each year's total biological production. There is hardly a place on Earth where people do not log, pave, spray, drain, flood, graze, fish, plow, burn, drill, spill or dump. There is no life zone, with the possible exception of the deep ocean, that we are not degrading.

Besides "loss of diversity," biologists have another name for this problem—"biotic impoverishment." What is impoverished is not just biodiversity, it is also the human economy and human spirit.

Ecologist Paul Ehrlich describes biotic impoverishment this way: "Unless current trends are reversed, Americans will gradually be living in a nation that has fewer warblers and ducks and more starlings and herring gulls, fewer native wildflowers and more noxious weeds, fewer swallowtail butterflies and more

cockroaches, smaller herds of elk and bigger herds of rats, less edible seafood, less productive croplands, less dependable supplies of pure fresh water, more desert wastes and dust storms, more frequent floods and more uncomfortable weather."

Biodiversity cannot be maintained by protecting a few species in a zoo, nor by preserving greenbelts or even national parks. To function properly nature needs more room than that. It can maintain itself, however, without human expense, without zookeepers, park rangers, foresters or gene banks. All it needs is to be left alone.

To provide their priceless pollination service, the honeybees ask only that we stop saturating the landscape with poisons, stop paving the meadows where bee-food grows and leave them enough honey to get through the winter.

To maintain our planet, our lives and our future potential, the other species have similar requests, all of which add up to: Control yourselves. Control your numbers. Control your greed. See yourselves as what you are, part of an interdependent biological community—the most intelligent part, though you don't often act that way.

So act that way, either out of a moral respect for something magnificent that you didn't create and do not understand, or out of a practical interest in your own survival.

### Study Questions

1. What are Meadows's main reasons for protecting biodiversity? Do her conclusions follow from her specific reasons? Explain.
2. Why can't we simply preserve species in zoos and national parks?
3. Some species are quite harmful to humans, like the smallpox virus. Shouldn't we destroy these altogether?
4. The U.S. Endangered Species Act of 1973 protects hundreds of species, preventing activities that might further threaten these species. In December 1992, the Bush administration yielded to pressures from environmental groups and agreed to add 400 species to its list of endangered (and protected) species over the next four years, bringing the total to 750 protected species. Business groups complain that such acts hurt business and threaten jobs. Should species be protected if such protection causes unemployment and is bad for the economy?

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### Why Do Species Matter?

LILLY-MARLENE RUSSOW

*Lilly-Marlene Russow teaches philosophy at Purdue University and is the author of several works in philosophy. In this essay, she first examines various test cases to show some of the complexities involved in any attempt to describe obligations to species. Next, she analyzes three arguments for obligations to protect endangered species and concludes that not only do they fail but that there is a conceptual confusion in any attempt to ascribe value to a species. Whatever duty we do have in this regard must rest on the "value—often aesthetic—of individual members of certain species."*

#### I. Introduction

Consider the following extension of the standard sort of objection to treating animals differently just because they are not humans: the fact that a being is or is not a member of species *S* is not a morally relevant fact, and

does not justify treating that being differently from members of other species. If so, we cannot treat a bird differently *just* because it is a California condor rather than a turkey vulture. The problem, then, becomes one of determining what special obligations, if any, a person might have toward California condors, and what might account for those obligations in a way that is generally consistent with the condemnation of speciesism. Since it will turn out that the solution I offer does not admit of a direct and tidy proof, what follows comprises three sections which approach this issue from different directions. The resulting triangulation should serve as justification and motivation for the conclusion sketched in the final section.

#### II. Species and Individuals

Much of the discussion in the general area of ethics and animals has dealt with the rights of animals, or obligations and duties toward individual animals. The first thing to note is that some, but not all, of the actions

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