SCIENCE

16 AUGUST 1991
VOLUME 253
NUMBER 5021



# Preserving Biodiversity

The preservation of species diversity is a problem that must today be confronted by one species, *Homo sapiens*. That one species has become so efficient at reproducing itself and dominating all other forms of life that it is in the act of endangering all species, including itself. Thus, in the long, evolutionary battle, *Homo sapiens* has prevailed, by using its brains, but will win only if it can now use the same brains to limit its victory and ensure its own survival.

As Ehrlich and Wilson point out in an article in this issue, there may now be as many as 100 million species, but if current rates of development continue, one quarter of them could be eliminated within 50 years. The human population is projected to double in the next half century, with a possible five- to tenfold increase in global economic activity projected to meet the demands of the growing population. Such uncontrolled growth would threaten all the species of the earth.

For this issue of *Science* we also invited a number of scientists interested in the area of biodiversity to define the crisis and suggest solutions. No consensus is reached, but a number of steps in the right direction are mentioned, all of which require political courage. Jablonski puts the problem in paleontological perspective. In the past, species extinction and recovery occurred over relatively long periods. Nine thousand years, the estimated time of the extinction of large mammals in the Pleistocene, is a short period in terms of evolutionary time, which is measured in millions of years, but an extremely long period in terms of political time, which is usually measured in $4 \pm 2$ years. The dilemma for the saving of species is therefore that politicians, listening to the anguish of farmers, homeowners, and even scientists, must put off present crises in order to help future constituents who would at best vote for their great-grandchildren. Moreover, there is no obvious solution to which all the biodiversity advocates can point.

Yet a pattern does emerge from the points of view expressed in this issue. Soulé neatly divides the subject into five areas of knowledge about biological diversity, six major classes of human interference, seven areas of biotic degradation, and an eightfold road to possible solutions. Morowitz takes the side that not all species can be saved. He argues that the uniqueness of a particular species should be a component of priority setting and that emphasis should be shifted to priority for habitat preservation. Erwin places priority on evolutionarily dynamic lineages that will create future biodiversity. Charles Mann interviews paleontologists and others who question the pervasiveness of the extinction data.

What emerges from these papers, which provide an excellent starting point for focusing on possible solutions, is that the diversity of species is worth preserving because it represents a wealth of knowledge that cannot be replaced. Moreover, today's extinctions are unlike those in previous eras, in which long periods of recovery could follow extinctions. The present situation is an inexorably irreversible one in which human overpopulation will destroy most species unless we plan for protection immediately.

Accepting that the goal is worthwhile requires that more energy be devoted to planning and priorities and less to emotionalism and indignation. It seems obvious that an attempt to save every species will irritate loggers, dam-builders, astronomers, and eventually all others, and is an impossible chore. Numbers alone are not the answer. Millions of new beetles do not compensate for the loss of lions, tigers, and elephants. As these scientists point out, however, a multi-pronged approach—expanding the list of protected areas, judiciously choosing certain species for preservation, providing artificial environments such as zoos, botanical gardens, germ plasm storage, seed banks, and so on—are parts of a program that is feasible.

Once agreement is reached on the measures that must be taken, the political and moral problems must be faced. Some of the most obvious solutions involve preserving wild natural areas in developing countries, where the land is cheap, but the human need for it is desperate. In the developed countries, the humans are better off, but the land has become very valuable, and important habitats may border on densely populated areas.

We may need to select politicians whose time scale is in Pleistocene epochs rather than terms of elective office. Southwood has explained the hyperdiversity of insects as based on "size, metamorphism, and wings." *Homo sapiens* even without wings has expanded more effectively than any other species because of its brains. It is time we use them for the benefit of posterity.—DANIEL E. KOSHLAND, JR.