

forests annually—a loss of 4,000 species per year if there are 2 million in the forests, and 40,000 if there are 20 million.

Biodiversity is important for more than moral and aesthetic reasons, they say; it provides “enormous direct economic benefits . . . in the form of foods, medicines, and industrial products.” To save “our fellow living creatures and ourselves in the long run,” Ehrlich and Wilson propose a radical worldwide ban on the development of “relatively undisturbed” land. That would require massive aid for the Third World and a “cooperative worldwide effort unprecedented in history.”

But some scientists, reports freelance writer Charles Mann, aren't so sure that ecological doomsday is just around the corner.

To begin with, nobody even knows how many species there are. Ehrlich and Wilson say the number might be 100 million. But scientists have actually identified only 1.4 million. That, writes Mann, puts doomsday prophets “in the awkward position of predicting the imminent demise of huge numbers of species nobody has ever seen.”

Moreover, Ehrlich and Wilson's extinction rates are based on the assumption that habitats are like islands; as the island shrinks, parts of the habitat and some of

the species in it are utterly lost. But the analogy is imperfect. Habitats only roughly resemble islands. One study showed that almost half of the more than 11 million hectares of virgin tropical forest cut each year did not become wasteland (i.e. “water” around the “island”) but secondary forest that still supported some plant and animal life. It does not support as much biodiversity as virgin forest, but it is not necessarily barren, either.

The assumed relationship between an area available for wild populations and the number of species that area can support also runs into criticism from some scientists. A loss of area, they say, may reduce just the *extent*—not the diversity—of an ecosystem. Some of today's habitat destruction may not translate into any loss of species.

The experience of Puerto Rico, one of the few tropical places where long-term biological records have been kept, gives further reason to doubt the doomsayers, Mann says. The island, now thickly covered with trees, “was almost completely stripped of virgin forest at the turn of the century. Yet it did not suffer massive extinctions.” Of 60 bird species, for example, only seven disappeared. This was a “painful” loss, he observes, but not “an ecocatastrophe.”

Fudging Or Fraud?

“Scientific Fraud” by David Goodstein, in *The American Scholar* (Autumn 1991), 1811 Q St. N.W., Washington, D.C. 20009.

In yet another highly publicized case of scientific fraud, Nobel Prize-winning biologist David Baltimore finally conceded last spring that a paper on transgenic mice he had been defending for five years might well contain false data concocted by a co-worker. The revelation gave more ammunition to politicians and journalists who contend that fraud in science is more common than we think. Even some scientists have begun to have doubts. Caltech physicist David Goodstein replies that science, like other areas of human activity, has little “hypocrisies and misrepresentations” built into the way it is done. They should

not be confused with fraud.

Journalists William Broad and Nicholas Wade fell into that trap in their 1982 book, *Betrayers of the Truth*. Among the scientists they implicated in “Known or Suspected Cases of Fraud” were Sir Isaac Newton (1642–1727) and American physicist Robert A. Millikan (1868–1953).

Newton was trying to explain the propagation of sound waves in air. His theory, Goodstein says, “was so good he was able to calculate the speed of sound and then compare it with measurements. When he did, they disagreed by about 20 percent.” Although this represented a great intellec-

Environmentalism's Limits to Growth

A Survey of Recent Articles

Greenpeace 20 years ago was just the name that a small band of activists in Vancouver, British Columbia, gave to an old fishing vessel they used in a failed attempt to block a U.S. nuclear-bomb test. Today, reports Tom Horton in *Rolling Stone* (Sept. 5, 1991), Greenpeace is the world's largest and wealthiest environmental organization—"a rich, planet-saving, lawbreaking, in-your-face, semi-anarchistic, multinational corporation." But for Greenpeace, as for other, less radical, environmental groups, growth and success have brought their own special problems.

Based in Amsterdam, Greenpeace now has offices in 23 nations, projected revenues for 1991 of \$160 million, and nearly five million contributors, half of them in the United States. It has a satellite communications network (Greenlink) and a companion database (Greenbase). It has a fleet of eight imposing ships. It even has a small diplomatic corps of specialists in international law and foreign policy, who represent the organization in treaty conferences and conventions that regulate such activities as whaling and ocean dumping.

Yet Greenpeace, Horton writes, is now "in a state of turmoil about its future, agonizing over whether success has dulled its cutting edge. Is it poised to become a truly global force . . . or is it in grave danger of becoming overextended? Is it becoming too comfortable and bureaucratic to take the risks that have been Greenpeace's stock in trade?"

The organization built its radical reputation with dangerous confrontational stunts. In 1985, Greenpeace's *Rainbow Warrior*, on a voyage to protest French nuclear tests in the South Pacific, was sunk in New Zealand by French-government agents, and one activist was killed. Recently, however, Greenpeace refused to endorse a boycott of tuna canners to protest the slaughter of dolphins caught in tuna fishermen's nets. Greenpeace held back, Horton says, because of its efforts to expand into Latin America, which depends on tuna exports for precious hard currency. (Even so, after large U.S. tuna canners agreed to market only "dolphin-safe" tuna, Greenpeace reportedly tried to claim credit.) Steve Sawyer, executive director of Greenpeace International, told

Horton: "Yes, life is more complicated when you look at the whole world, but that's what Greenpeace has to do now."

Other environmental organizations also have been facing the dilemmas of growth. The rising popularity that many of them experienced during the 1980s, *Newsweek's* (June 24, 1991) Sharon Begley observes, "brought a huge influx of members and donations, saddling the groups with gargantuan overheads and staffs." The recession has forced some groups to cut back. The National Wildlife Federation, for instance, laid off 56 employees—seven percent of its staff—early in 1991, *Outside's* (July 1991) Bill Gifford notes.

Expansion can lead to more than just financial woes. It also can mean a weakening of the special purpose for which the organization was set up. "The National Audubon Society used to be the strongest organization protecting birds and wildlife, and now it is not," Roger Tory Peterson, the well-known writer and painter of birds told Dyan Zaslowsky in *Harrowsmith Country Life* (Sept.-Oct. 1991). The 87-year-old society used to concentrate on such traditional conservationist activities as running bird sanctuaries, taking bird censuses, and leading efforts to save birds from extinction. But now, Peterson said, "It is deemphasizing nature and emphasizing trash and pollution because it just wants to grow larger. John James Audubon would be absolutely bewildered by it."

Peter A. A. Berle, president of the Audubon society, contends in *Audubon* (May 1991) that "Today nature is defined by human activity." Since he became the society's head in 1985, Zaslowsky reports, Berle "has involved the organization in the gamut of ecological causes." The elegant egret that had long been the society's symbol was replaced in 1991 by a small blue flag.

The environmental movement, declares former *Audubon* editor Les Line, fired by Berle after 25 years in the job, is "now more interested in collecting garbage and putting a brick in the toilet than in examining nature. The naturalists have been replaced by ecocrats who are more comfortable on Capitol Hill than in the woods, fields, meadows, mountains, and swamps."

tual triumph, Newton was not satisfied. He had elsewhere insisted that the test of a theory was its conformity with precise observations. And so he "came up with all kinds of arguments . . . now known to be wrong." He "made little fixes"—e.g., hypothesizing that there was water vapor in the air that for some reason affected sound waves—"until he finally got his theory in agreement with the experiment." Newton was not behaving very differently from theorists today, Goodstein says. "In hindsight, Newton's fixes are funny and his motive revealing." But they do not add up to fraud.

Millikan was measuring the electric

charges of drops of oil. He wanted to prove the charges came in definite units; a rival scientist contended otherwise and criticized Millikan's results. Millikan went back to his lab to get better data and later published a paper in which he claimed to be providing the data from all the drops observed. In fact, Millikan's notebooks show that he had *not* published everything. Data on drops that didn't fit his theory had been left out. "Millikan did not simply throw away drops he didn't like," Goodstein notes. "That would have been fraud by any scientist's standard. To discard a drop, he had to find some mistake that would invalidate that datum." So he did. It

was not fraud, Goodstein says, just exercise of scientific judgment.

The fine line between "harmless fudging" and real fraud is an important one, Goodstein maintains. If the work, and everything that flowed from it, of Newton, Millikan, Ptolemy, Hipparchus of Rhodes, Galileo, John Dalton, and Gregor Mendel—all accused by Broad and Wade of involvement in cases of fraud—were expunged from the body of scientific knowledge, "there would not be much left."



Pitdown man provided science with a "missing link"—until 1954, when it was exposed as a fake. The ape jaw and human cranium were "discovered" in an English gravel pit some 40 years earlier.

How to Limit Population Growth

The world's population is increasing by a quarter of a million people every day. Population-control advocates demand a global solution to what they see as a global crisis. But efforts to impose communal control on the fertility of parents keep running up against the European tradition of individual freedom and religious principles (Catholic and Hindu), not to mention the simple reluctance of many people the world over to limit family size to 2.3 children. No way out of this dilemma has been

"Conspicuous Benevolence and the Population Bomb" by Garrett Hardin, in *Chronicles* (Oct. 1991), The Rockford Inst., 934 N. Main St., Rockford, Ill. 61103.

found. But Garrett Hardin, author of the seminal 1968 essay, "The Tragedy of the Commons," says that even in the absence of a "total answer," progress can be made.

Hardin, a professor emeritus of human ecology at the University of California, Santa Barbara, recommends "the incremental approach, adopting partial measures that will slow the population growth, giving us more time to look for more general solutions." Fortunately, he says, the world is divided into nearly 200 nations: