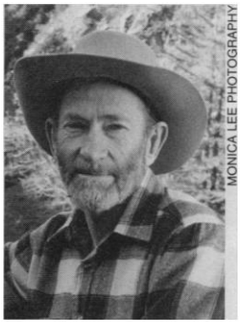
Conservation Biology in the Fast Lane

Funding for this new kind of study has zoomed up—along with the number of academic programs—but critics think it's more a fad than a new scientific discipline

IN 1978, AN ODD ASSORTMENT OF ACADEMICS, zoo-keepers, and wildlife conservationists came together for a banquet at the San Diego Wild Animal Park. As they dined within a few hundred feet of endangered lowland gorillas from Africa and listened to the roars of threatened Asiatic lions, University of California at San Diego biologist Michael E. Soulé took advantage of the setting to make a plea to his colleagues: The world was on the verge of the worst biological extinction in 65 million years, he said, and it was high time academics and conservationists overcame the barriers between their fields to work together and save plants and animals. Some of the different species of scientists were skeptical. Says Soulé: "The ecologists and the biogeographers didn't think geneticists had much to contribute to conservation, and the wildlife managers didn't think that the academic eggheads had anything relevant to say."



MONICA LEE PHOTOGRAPHY

New breed. *Biologist Michael Soulé.*

Nonetheless, many left Soulé's meeting—ambitiously called the First International Conference on Conservation Biology—with a sense that a new interdisciplinary movement was possible. And sure enough, within a few years, Soulé and a small group of prominent biologists, including Stanford University's Paul Ehrlich and the University of California, Los Angeles's Jared Diamond, had launched what they called a new "mission-oriented" discipline, which would marry basic science with practical conservation. "The mission," explains University of Wisconsin wildlife ecologist Stanley A. Temple, a founding member, was "to develop new guiding principles and new technologies to allow society to preserve biological diversity."

Today, having banded together and found a new ecological niche on the academic scene, conservation biologists are multiplying faster than many of the species they're trying to protect. More than 5000 scientists have joined the 6-year-old Society for Conservation Biology (rivaling the 6500 members of the 76-year-old Ecological Society of America); at least 16 new graduate programs in conservation biology have been formed, chiefly in the past 3 years; the National Science Foundation (NSF) has sponsored a $2.4-million annual competition for funding in conservation biology; and private foundations, such as the Pew Charitable Trusts and the MacArthur Foundation, are unabashedly trying to stimulate academic research addressing environmental problems. "The speed with which this idea has caught on has been nothing short of incredible," exults Temple, president of the Society for Conservation Biology.

But that exponential growth has not occurred without growing pains. A small but vocal band of critics complains that conservation biology is little more than a fad, driven by the availability of funding for global studies and endangered species. The most outspoken critics say there's little new here: just wildlife science, forestry, and ecology gussied up and repackaged to capitalize on buzz words and funding trends. Furthermore, the new breed is under attack by traditional wildlife management scientists for mixing up research from different disciplines in an almost cavalier fashion, for sacrificing depth for breadth, and for being too theoretical. A well-known joke among traditionalists is that "conservation biology is data-free analysis," says the Wildlife Society's president Richard J. Mackie (who is is quick to add that he does not share that view).

It's obviously going to take time before the scientific world decides whether the newcomer is a sturdy new discipline or a flash in the pan. Precedents exist for the latter—take the "environmental studies" programs. They were all the rage during the curricula revisionism of the 1970s. But by the early 1980s, many of these new programs were having trouble drawing outstanding faculty and the funds to sustain them. Students couldn't find jobs. Today, only a few of the best environmental studies programs survive. Says Mackie, "Now, we're experiencing the same thing in conservation biology." But Daniel Simberloff, a Florida State University ecologist, doesn't think the new field is a fad. "If anything, the problems we're dealing with are going to get worse."

At the heart of such debates is a tricky question: What, precisely, is conservation biology? Because the field is new and because it overlaps traditional disciplines such as ecology, population biology, and wildlife management, conservation biologists sometimes sound a little nonplussed when they have to answer the question: "Frankly, conservation biology is what we print in the journal," says Rutgers University ecologist David Ehrenfeld, editor of the 4-year-old peer-reviewed journal *Conservation Biology*.

The discipline is indeed more amorphous than most. But whether its immediate concern is the viability of Kentucky warbler populations or ways to allocate zoo space for tigers (both were subjects of articles in a recent issue of *Conservation Biology*), the common thread is to conserve biodiversity—whether it's species diversity, genetic variation, or ecosystem variety.

An oft-cited example of the best and most ambitious form of conservation biology is the comprehensive Desert Tortoise Recovery Plan. In the Mojave Desert, where the density of desert tortoises has dropped in some places from 800 to 40 per square mile in 20 years, half a dozen scientists from zoology, veterinary science, biogeography, and population ecology are trying to design a reserve. The main threat is from humans: "People just can't leave them alone," says Peter Brussard, chairman of the department of biology at the University of Nevada and leader of the project. "Either they want to pick them up, make them pets, shoot at them, or run them over."

The ambitions of the project, however, go beyond setting aside a few areas that would be off limit to humans. The draft plan to save the species, which is scheduled to go to the U.S. Fish and Wildlife Service in February for approval and funding, brings together in-depth studies from a variety of disciplines. Brussard has looked into the tortoises' genetic variability and distribution; Bureau of Land Management zoologist Cristine Berry has studied their reproductive and social behavior; veterinarian Elliott Jacobson has gathered data on a respiratory disease that is killing the reptiles in droves; Colorado State

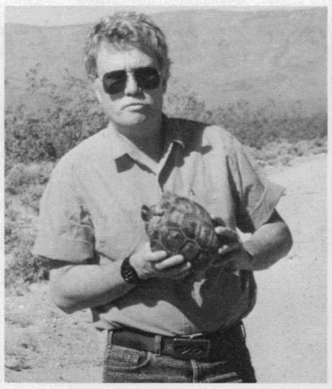
University ecologist Dick Tracy has analyzed the tortoise diet; California State University at Dominguez Hills biogeographer David Morafka has examined how tortoises use the landscape. Much of this information has been used by University of California, San Diego, population biologist Michael Gilpin as data for a computer model defining the minimum population size and habitat area for a network of reserves, each with a 50% probability of sustaining a viable tortoise population for 500 years.

Is this ambitious new computer-driven discipline really the answer to saving species like the desert tortoise or the spotted owl and biodiverse regions like the tropical forest of Panama (all targets of large conservation biology projects)? That's where the carping comes in. Some professional wildlife managers think all it amounts to is wildlife management with fancy computer models. "What the [conservation biology] society proposes to be, the profession of wildlife ecology and management has been for all of its history," wrote James Teer of the Welder Wildlife Foundation in 1989 in the *Wildlife Society Bulletin*.

Furthermore, traditional conservationists are skeptical of the new field's penchant for mixing data from different disciplines via computer—the very heart of the desert tortoise project. For decades wildlife studies, forestry, and fisheries management were separate specialties, and collaborative studies were unusual. Hence the traditional types look with suspicion on the work of conservation biologists, who have no qualms about using complex models and genetics to predict the changes in a species, complex of species, or habitat over time.

Then there's a second worry. And that is that the conservation biologists are too theoretical, and that they rely on evolutionary theory, for example, to back up their conclusions instead of providing in-depth data on a species or a habitat. For wildlife biologists and forestry scientists who have studied a single species for years, it is mind-boggling to see conservation programs designed without what they consider adequate data or precise methodology. "There's been a general feeling that they publish models without data to back them up," says the Wildlife Society's Mackie, who is professor of wildlife management at Montana State University. "The more complex the system, the more you have to generalize" without hard data.

But conservation biologists have answers to these charges. One, they often do research aimed at preserving endangered species, which by their very nature provide fewer subjects for in-depth or comparative studies. Two, they say analyzing data in terms of theory adds intellectual depth to traditional conservation work. Furthermore, conservation biologists are taking steps to improve the way they look at their data: In a recent issue of *Conservation Biology*, one card-carrying conservation biologist, Stanford University's Dennis Murphy, pleaded with his colleagues to use classical scientific methods—testing hypotheses with adequate data—before coming to conclusions.



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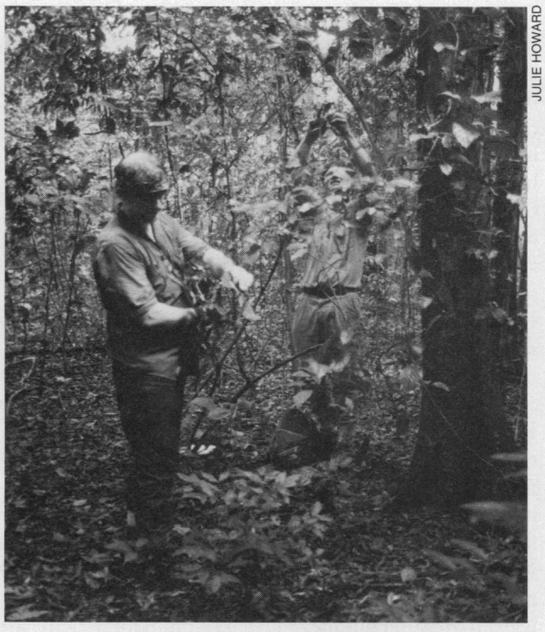


JULIE HOWARD

Field work. *Stephen Hubbell* (right) *studies tropical tree diversity in Panama, while Peter Brussard leads a team trying to rescue the desert tortoise.*

In turn, the new breed of researchers also has its own criticisms of the wildlife types: that the latter have always focused heavily on a select group of game species, an imbalance conservation biology aims to correct. A review of articles in the *Journal of Wildlife Management* found that 73% of the papers published there during 1988 focused on game species. Adds Brussard: "When we're talking about conserving wildlands, are we conserving ducks for people to shoot or are we talking about conserving all the things that live in wildlands, including the mosquitoes? A conservation biologist theoretically is blind to species: The butterfly is worth as much as an elk."

Such charges aren't likely to encourage a rapprochement between the disciplines—nor will it be easy to overcome feelings that developed almost at the outset, when the new young conservation biologists "came across as preaching from their ivory towers to the ignoramuses down in the trenches who didn't have a clue," recalls Society for Biological Conservation president Temple. He says the wildlife managers' response was to ask, "Who the hell are you to be telling a profession that has 100 years of tradition of managing forests or wildlife how to do our business?"

Still, such attitudes have softened somewhat over time, and ultimately there may well be a kind of collaboration between the new discipline and its counterparts in wildlife, forestry, and fisheries management. One sign is that the Wildlife Society and the Society for Conservation Biology are planning to hold their first-ever joint meeting in June.

But even as diplomacy heals wounds, attacks continue against the "upstarts" on a different front: academe. Department chairmen and tenure review committee members launch broadsides at conservation biologists because they are afraid the field doesn't have enough staying power. "There has been in the higher levels of universities in this country a reluctance to invest in this because of a failure of interdisciplinary programs in the 1970s," says Princeton University ecologist Stephen Hubbell.

One way conservation biologists deal with the problem is to make sure they have strong training in a traditional discipline—such as ecology or population biology—before branching out into problem-solving and interdisciplinary studies. Indeed, those who support the new field think that this also is an excellent safeguard against another concern in academe—that the field is too applied. Soulé, now at the University of California, Santa Cruz, responds: "Some of the best thinkers in the world of biology—E.O. Wilson and Jared Diamond—are applying their research to real world problems to preserve diversity."

In fact, the "E.O. Wilson" model is being eagerly taken up by many new graduate programs, which require a Ph.D.—or at least a strong emphasis—in one discipline, with additional course work in science policy, resource economics, natural resource management, forestry, and agriculture. Using such a model, "you can do extremely deep science on important applied problems," says Hubbell.

Some universities apparently have begun to overcome such reservations, because they

are now responding "enthusiastically" to the coming of conservation biology, says Temple. Their reasoning may involve self-interest: The field has proven capable of drawing in new—if small—sources of funding. For example, the Pew Charitable Trusts has a 1992 budget of $15.5 million to spend on research to preserve biological diversity, including an initiative that helps set up university programs to train students in "conservation and sustainable development." Likewise, the MacArthur Foundation is spending $17 million this year on conservation of biological diversity, and the NSF has a fund of $2.4 million that is part of its special "competition" in Conservation Biology and Restoration Ecology. "We're trying to stimulate the fearless biologist—one who is solidly rooted in ecology or systematics, for example, but who has no compunction whatsoever about running off to find a computer scientist or a molecular biologist to learn a new technique," says W. Franklin Harris, budget and operations officer for the NSF's directorate for biological, behavioral, and social sciences.

The supply of research dollars isn't the only thing that's pushing the new discipline forward. Demand—from students—is also playing a part. Students are filling conservation biology classes and clamoring for them if they don't exist. "Every day, there's something in the paper that emphasizes the importance of the environment, and the problems we're having," says John Payne, a graduate student in the conservation biology program at the University of Florida. "Conservation biology will only become more important. I don't think it's a fad at all."

But despite the burgeoning funding for conservation biology and the demand from students for more classes in the field, the real test of the vision Michael Soulé elaborated in 1978 is yet to come. That test is not whether conservation biology can convince its academic critics that it is "real science," or improve its diplomatic relations with traditional conservationists, or generate funding from federal and private sources. The true test will be whether the field can actually preserve biodiversity. And even insiders are realistic on this point: "Now that we've had a decade of fairly intense activity, we have to ask ourselves, How has this affected the treatment of these [real-world, conservation] problems?" says Florida State University's Simberloff. "Our record is a bit disappointing." Nonetheless, its adherents are hardly giving up. Armed with their interdisciplinary collaborations and their high-tech tools, they think they're in on the beginning of something special. Which is why Simberloff insists that "the promise of the field is yet to come." ■ ANN GIBBONS

Soviet Environment Slips Down the Agenda

Environmentalism is strong in the new republics, but most people are more worried about sausages than pollution

Moscow—THE COLLAPSE OF SOVIET COMmunism, which was finally played out with the dissolution of the former Soviet Union last month, has had a curious and largely unnoted impact on the Russian environmental movement. During the dark days of Soviet power, the movement provided political cover for all kinds of protests against the regime, and it became a powerful force in its own right. Ironically, now that the regime has collapsed and the former dissidents are in power, the movement "has lost some of its political edge. "Environmentalism," says Loren Graham, a historian of science at MIT, "has lost a little bit of its cachet."

It's also lost the central bureaucracy that in the final days of the Soviet Union was beginning to take stock of the huge environmental problems facing the republics. The Soviet Ministry of the Environment, for example, put together an ambitious cleanup plan for reducing pollution—with an estimated price tag of $140 billion. But the ministry was recently disbanded—only to be resurrected without any clear source of funding. As the old instruments of Soviet power are swept aside, the question is: What is going to be done to protect and repair the environment there?

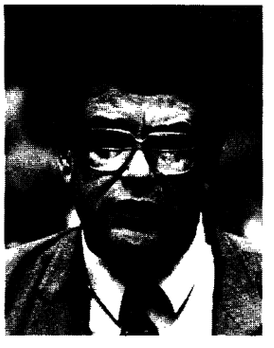
Clearly, it's going to take a while for the answer to emerge. One reason is that at the moment, most people are more concerned about where to find sausages than they are about levels of sulfur dioxide in the air. Says Douglas Weiner, a historian at the University of Arizona and an expert on Soviet ecology, "Even though people are concerned about the quality of the environment, the protests against environmental degradation will be muted. People will try to give (economic) reform a chance."

Getting enough food may rank higher than restoring the environment for the moment, but in the long term, the problems facing the nascent independent republics will have to be dealt with. What used to be called the Soviet Union is home to some of the most pristine regions in the world—and to some of the worst environmental disasters known to man. Take the following examples, which are only the tip of the iceberg of environmental degradation:

■ The explosion at Chernobyl in 1986 may have been the most notorious nuclear accident, exposing thousands to high levels of radiation, but it was just one in a string of power plant mishaps. Recently declassified information from the Soviet government describes 10 accidents at nuclear power stations from 1964 to 1985, including spilled radioactive water, a partial meltdown, and a fire in a turbine room.

■ Farm irrigation from rivers feeding the Aral Sea in South Central Asia in the last 30 years has reduced the sea's area by 40%, and its volume by 66%, destroying fishing and leading to sandstorms of salt and chemical fertilizers.

■ The so-called Green Book, or "Report on the State of the Environment in the USSR," published by the Ministry of the Environment, reports that as of 1988, 16% of the Soviet population lived in the 68 most polluted cities, including Alma Ata, Odessa, Novosibirsk, and Perm, where air pollutants exceed government-set limits.



TASS FROM SOVFOTO

MIT

Conference call. *Environment Minister Nikolai Vorontsov* (left), *MIT's Loren Graham.*

Environmentalism may have lost some of its political edge and immediacy now that the reformers are in power and grappling with economic crises, but does it still have popular support? Gauging how deep environmental sentiment still runs was one goal of a conference held in Moscow recently as part of an ongoing exchange between U.S.