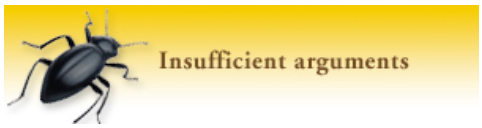
Only 1,600 pandas are thought to still be living in the wild. Do you care?

Do you worry about the tulotoma, a gill-breathing, operculate snail, now on the endangered species list? About the sensitive joint vetch, a relative of the string bean that may face extinction?

In the past 500 years, more than 800 species have died out. Should you be concerned?

Geoffrey Bowker thinks you should, although no more about the panda than about the snail or the bean. The executive director of SCU's Center for Science, Technology, and Society thinks preserving biodiversity is one of the central problems that confronts us—and not necessarily for the reasons you'd think.

Bowker has been interested in this issue since 1996, when he was appointed to the Biodiversity Subcommittee of the U.S. President's Committee of Advisors on Science and Technology (PCAST). Although he was invited to participate because of his background in informatics—the science of gathering, manipulating, storing, and classifying information—Bowker approaches biodiversity in a distinctly spiritual way.



Viewed purely from a scientific perspective, he suggests, one might argue that there is no biodiversity crisis. We are losing larger species, such as the panda, but huge diversity remains at the level of bacteria and other small organisms. So, to Bowker, the case for preserving biodiversity cannot rest solely on science.

Neither is his argument largely pragmatic. One of the standard rationales for preserving biodiversity is what he calls "use value." As a simple example, salmon are good to eat, so it is not in our interest to take actions, such as the destruction of spawning grounds, that threaten the existence of salmon.

Use value is well described in "Teeming With Life: Investing in Science to Understand and Use America's Living Capital," the 1998 report of the PCAST Panel on Biodiversity and Ecosystems on which Bowker served. As the introduction to the report puts it:

> The tremendous natural wealth with which the United States has been endowed contributes greatly to its strength and prosperity and remains the foundation for the well-being of current and future citizens. This wealth exists in the form of fertile land, abundant fresh water, a diversity of biological species adapted to many different ecological habitats, productive forests, fisheries and grasslands, and favorable climatic conditions. From these, society derives an array of important life support goods and services, including medicine, clothing, shelter, agricultural products, seafood, timber, clean air and water, and flood control.

Bowker does not disagree with this argument; he does, however, find it insufficient. Use value makes a good case for salmon, but not necessarily for sensitive joint vetch. To protect the vetch, you might make an argument for "option value." This rationale says

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About Geoffrey Bowker

Bowker's field, social informatics, looks at the social aspects of how we store and share data.

Read more about SCU's executive director of the Center for Science, Technology, and Society

that while the vetch might not be valuable now, it may prove useful in the future for food, medicine, or some other currently undreamed-of purpose. Bowker gives the example of the potato. We might think one or two types are sufficient, but, he says, "If we get something like the blight that wiped out the potato in Ireland, then having only a single variety is a huge danger."

Yet even option value has its limits, especially in the press of real-life conflicts between human needs and the protection of esoteric species. It's easy to see the breakdown of support for this argument in recent fights over the snail darter. Does the option value of a tiny fish outweigh the real benefits to people that might arise from the construction of a dam, for example?

Bowker believes the need to protect biodiversity goes beyond these purely practical considerations. He also thinks it's not contained by the aesthetic rationale many people offer for their eagerness to "save the whales" or "adopt a panda." While Bowker is as moved as the next person by the beauty of nature, he feels that such aesthetic arguments favor the panda and Bengal tiger, and do not do justice to forms of life such as the Kretschmarr Cave mold beetle or the Lord Howe Island skink. Also, purely aesthetic judgments, he argues, have led to follies like the propagation of such beautiful species as the Delicious Apple—lovely to look at but not very tasty.

A full account of biodiversity's importance, Bowker argues, must offer "a spiritually based answer to the question, 'What is our relation to nature?'" He has explored various religious traditions in his search for that answer, looking at Buddhist, Shinto, and Christian views of the connection between humans and the rest of creation.

In the Christian tradition, he finds a long history of wrestling with the moral status of other creatures: "There are theological arguments over the question, do animals have souls? Should we treat them as moral entities?" As an example, Bowker cites the trial of a sow and pigs at Lavegny, France, in 1457. The animals were accused of having killed and eaten a human child. As Chamber's *Book of Days* (1856) recounts the outcome, "The sow was found guilty and condemned to death; but the pigs were acquitted on account of their youth [and] the bad example of their mother." While the story may make us smile, it shows, according to Bowker, that animals can be taken seriously as moral agents.

Not all Protestant traditions recognize the moral status of animals, however. A strain of Protestant thinking on the issue, which Bowker calls "wise use," believes that the rest of creation has no moral status, but is simply a resource left by God for humans to rule over. Bowker finds the least interest in biodiversity in this school, especially among millenarian groups. "If the end of the world is nigh," he says, "you don't have much interest in preserving endangered species."

Do animals have moral status? In 1457, a sow and her litter were put on trial in France for having killed a human child. *Photo: From Book of Days, by R. Chambers, Gale Research, © 1967. Reprinted by permission of the Gale Group.*

Wise use is one of several types of stewardship-based attitudes that Bowker finds in Protestantism. In all of them, God has assigned humans the task of husbanding the natural world. They range from "anthropocentric stewardship," where humans are the center of creation, to "servanthood stewardship," where humans are servants of the rest of creation. The responsibilities each approach implies range from the obligation to pass on the resources God gives us to the recognition that animals and plants have intrinsic value, which is separate from their usefulness to people.

But each stewardship approach shares the notion that humans are separate from the rest of creation. Bowker is a firm believer that humans are part of nature, not just because we are, ourselves, animals, but also because each individual is actually a "commonwealth" that includes the rest of creation. We are inhabited by other creatures, from our mitochondria (which are genetically different from the rest of our cells) to the flora and fauna that live in our

intestinal tracts.

Bowker finds his own views more closely paralleled by the Catholic concept of solidarity with the rest of creation, expressed by Pope John Paul II in his message on the occasion of World Food Day 2004. John Paul wrote:

> The mandate that the Creator gave to human beings to have dominion over the earth and to use its fruits (cf. Gn 1:28), considered in the light of the virtue of solidarity, entails respect for the plan of creation through human action that does not imply challenging nature and its laws, even in order to reach ever new horizons, but on the contrary, preserves resources, guaranteeing their continuity and availability to the generations to come.

Bowker does not believe that a person has to be religious to feel solidarity with the rest of creation. He cites the work of Norwegian philosopher Roger Wendell, who coined the term "deep ecology," which now defines an environmental movement. Deep ecologists talk about "walking softly on the earth," respecting the diversity of nature, and trying to live in such a way as to minimize our impact on other living things. To Bowker, though deep ecology is not religiously based, it is highly spiritual.

As we develop this spiritual approach, Bowker says, we begin to think outside of the economic model, which asks, "Of what use is this species? Can I get by without it?" Instead, we begin to pose the spiritual questions: "Do I have a right to use up all the resources in my area, or should I be sharing them—with other people, or with mosquitoes, or with bats? Understanding and respecting diversity has to come from values, from relationships with other people and with animals," he explains.

However one gets to a concern about biodiversity, science can then help figure out the best ways of preserving it, Bowker says. "Science can help us flesh out our spirituality and move us to action in the world."

So what does Bowker's own scientific discipline—informatics—have to say about the "how" of species preservation? Bowker's work with the Subcommittee on Biodiversity began by exploring the question, "What knowledge should we be preserving about biodiversity?" When he started, many groups were already looking at species loss and doing inventories, an approach Bowker questions, given the urgency of the problem. "If your house is on fire, is the best thing to do to make an inventory?" he asks.

Still, accepting that list-keeping is at the heart of many scientific strategies, Bowker believes that a closer look at the systems for collecting and storing those lists is particularly important in the field of biodiversity. These database systems themselves may influence what researchers discover and the policies that arise from the research.

Returning to our example of the panda, Bowker points out that certain species are more likely to attract favorable attention than others. As he writes:

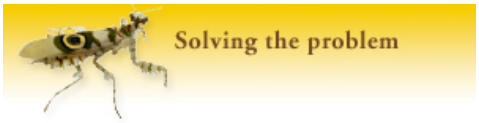
> Many more care about the fate of the cuddly panda, the fierce tiger, or indeed the frequently drunk and scratchy koala bear than about the fate of a given species of seaweed.... And this attention has very direct consequences. On the one hand, scientists are more likely to get funding for studying and working out ways of protecting these charismatic species than others; and on the other, people are more likely to become scientists with a view to studying such entities—another feedback loop which skews our knowledge of the world.

These preferences prejudice what information is collected, to the point, Bowker says, that some less sexy species become invisible because scientists do not have access to data about them.

Bowker adds to that the skewing of databases that arises from the history of the categories we use. Carolus Linnaeus, the 18th-century botanist who laid the foundation for the classification system scientists still employ, was dependent for his taxonomy on the folk classifications available to him at the time. For obvious reasons, these described

more economically useful plants, such as carrots, than they did weeds, such as chickweed. These distortions persist in the genera and species terminology we have available, and, thus, in the categories we use to sort information in databases.

"The database itself," Bowker argues, "will ultimately shape the world in its image."



Bowker's skepticism about categories—indeed about received wisdom of any kind—leads him to some provocative approaches to solving the problem of endangered species. First, he does not advocate the creation of preserves where endangered species are protected. "There are two warring camps on this," he says. "One group wants to sequester nature. I think this is wrong-headed. There is good evidence that biodiversity is preserved better when we live in conjunction with nature. We need to focus on our relationship with wildness, not wall it off in a park."

As an example, he points to the Kenyan system, developed by paleontologist Richard Leakey, where elephants are protected in parks. The arrangement works, Bowker allows, until drought hits and the elephants want to move toward water in wetland areas outside the preserves (an argument made by David Western, head of the Kenya Wildlife Service). That sort of migration will only increase with global warming, when, Bowker predicts, "all species will be marching north—some 50 to 100 kilometers in the next 100 years."

Second, Bowker is not so sure that saving the panda, or other charismatic but highly depleted species, should be a high priority. "From a scientific angle, if an animal is down to so few living in the wild, the effort to save it is probably not going to work," he says. "It's not clear that's where resources should be placed."

Bowker is in favor of putting more support behind endangered species that have close relatives, a policy that might increase the possibility of biodiversity through new speciation of if the two interbreed.

Miriam Schulman
Photo: Charles Barry

The important thing about protecting species, Bowker argues, is not so much preserving the particular animals and plants we currently have; instead, the focus should be on preserving the possibility that they can evolve. This we accomplish by supporting a range of life forms so that they can combine in adaptive, new ways. Life, he insists, "needs the ability to change in order to allow creation to develop." Every species that disappears closes off an avenue to this development. "Our duty to the future," Bowker says, "is to make certain we preserve the possibility of change."

Ultimately, he believes, "Diversity in and of itself is not necessarily a virtue. Do we want maximal number of species? Well, we could get by with less." But the world would be a poorer place as a result. To Geoffrey Bowker, the panda and the mold beetle, the vetch and the skink bring us something irreplaceable: "wonder, excitement, and joy."

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