

April 9, 2010 | [16 comments](#)

How to Preserve the Breadth of Life on the Planet

New tools attempt to capture the sixth extinction currently underway, while also highlighting ways to stop it

By [David Biello](#)



UNCHARISMATIC MICROFAUNA: Despite being the first multicellular organism to have its genome completely mapped, relatives of the nematode *C. elegans* are largely uncatalogued and unknown, despite being one of the most diverse forms of life on the planet.

National Human Genome Research Institute

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A barometer measures atmospheric pressure. Now a coalition of biologists is calling for a similar scientific tool to measure extinction pressure on Earth's [biodiversity](#)—a so-called "[barometer of life](#)".

After all, scientists have conclusively identified only a fraction of the species that exist on Earth; the roughly [1.9 million species catalogued to date](#) may represent only 20 percent of the total biodiversity on the planet. "Species disappear before we know they existed," wrote biologists Simon Stuart, chair of the Species Survival Commission at the International Union for Conservation of Nature (IUCN), Edward O. Wilson of Harvard University, and others in the April 9 issue of *Science*, calling for an international effort to fund the [creation of such a bio-barometer](#). Adds Stuart: "The point of conservation is to turn that negative trend into a positive trend."

The biologists propose to do that by spending \$60 million to pull together all the known information to assess roughly 160,000 individual species from four groups: chordates (mammals and other vertebrates); invertebrates (insects and worms); [plants](#); and fungi. The species would be assessed to identify which are suffering as a result of various extinction pressures: [agricultural expansion and/or intensification](#); habitat changes; and climate change, among others. Such an assessment would give a better picture of the overall threat to biodiversity than do current efforts, according to the biologists. "There's an awful lot of information out there that we're not using because it's sitting in obscure places like museum jars," Stuart says.

Of course, 160,000 is only roughly 8 percent of known species—and the survey will not attempt to expand the rolls of living things, like the [Encyclopedia of Life](#) (an effort to catalogue all the species on the planet). "We're not going to be able to monitor the conservation status of nematodes anytime soon," Stuart admits. But "if the barometer shows a very major decline—as [the IUCN Red List of Threatened Species suggests already]—in [mammals due to overhunting](#) in Asia then that informs us what needs to be done."

As the aforementioned [Encyclopedia](#) and Red List suggest, the barometer would be only one of many such efforts, particularly given that this is the [International Year of Biodiversity](#), according to the United Nations. But many of those efforts, including the IUCN's, cover even fewer species and betray a distinct bias toward charismatic megafauna like [polar bears](#) or bald eagles.

Other conservation groups take a different approach: The Nature Conservancy will release its [Atlas of Global Conservation](#) on April 22, which attempts to capture in maps the pressures faced by global habitats as well as the relative density of various species, such as [amphibians](#). "By taking a habitat view, you're able to encompass all those species," says Conservancy senior scientist Jennifer Molnar. "It's a new view of the planet."

The new maps, which rely on collating everything from [satellite data](#) to field expeditions to fish species counts in specific locales, reveal that most areas of the world have already warmed as a result of climate change; almost [all coastal ecosystems are now impacted by excess flows of nitrogen](#) and other fertilizers, along with a decrease in sediment; and many regions of the world (if not all, because the rest lack sufficient data) now enjoy at least [five invasive mammal species](#) and three invading freshwater plants or animal species. "It's the first time to see how bad the problems are at a global scale," Molnar says. "We're not just damaging the environment, we're hurting ourselves.... The maps show that these resources are threatened beyond what we may realize."

The maps might show that current conservation efforts have failed, given that global species-saving efforts have grown as have the extent of protected habitats, although IUCN's Stuart rejects that claim. "Things would be going very much worse were it not for conservation measures," he says. "What we don't know at this stage is how much conservation has achieved." Given that Earth may be [losing as many as 140,000 species a year](#)—most of those nematodes and other uncharismatic microfauna—the question of how well conservation has worked to preserve biodiversity may soon be moot.

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'World needs a barometer of life'

By Mark Kinver

Science and environment reporter, BBC News



Knowledge about species and extinction rates is "very poor"

[Biodiversity's 'point of no return'](#)

The world needs a "barometer of life" to prevent ecosystems and species being lost forever, scientists have warned.

Existing schemes, they said, did not include enough species from groups such as fungi and invertebrates to provide a detailed picture of what is at risk.

Writing in the journal *Science*, the researchers said the barometer would increase the number of species being assessed from almost 48,000 to 160,000.

The data would help identify areas in need of urgent action, they added.

The article was penned by four leading figures in conservation, including Harvard University's Edward O Wilson and Simon Stuart, chairman of the International Union for Conservation of Nature's (IUCN) Species Survival Commission (SSC).

"Knowledge about species and extinction rates remain very poor, and species disappear before we know they existed," they wrote.

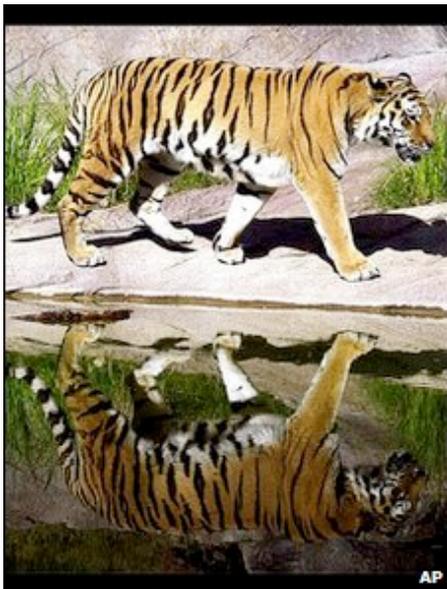
To date, about 1.9m species have been described and given scientific names, but the actual number may exceed 10m.

"As scientists are better able to assess the conservation status of the species that compose an ecosystem, the more they will understand the health of that ecosystem," they continued.

"It is time to accelerate taxonomy and scientific natural history, two of the most vital but neglected disciplines of biology."

Broader coverage

Currently, the most authoritative data on the status of at-risk species is the IUCN Red List, which has been assessing the conservation status of species around the globe for more than 40 years.



The status of animals such as tigers is well researched and documented

Dr Stuart, who oversees the compilation of the Red List, said it provided a good insight to the health of certain ecosystems, such as forests.

"But it is very weak in its coverage of freshwater, marine and arid land species," he told BBC News.

"There are a lot of additional species that we have to bring into the Red List."

At the moment, it evaluates almost 48,000 species, but it is acknowledged that there is a bias

towards higher vertebrates, which include mammals, birds and reptiles.

"The barometer would broaden the reach of the Red List to make it representative of all life, that's what it's all about," Dr Stuart explained.

The authors hope that broadening the taxonomic base of the Red List and increasing the database to 160,000 species would deliver practical benefits.

"A representative barometer would provide a solid basis for informing decisions globally," the authors suggested.

"For example, on conservation planning, resource allocation, environmental impact assessments, monitoring biodiversity trends... and enabling countries to develop national-level biodiversity indicators."

'Not acceptable'

The authors, all of whom are leading figures in their field, decided to join forces in order to voice their concerns that the rate of progress was too slow.

"The amount that we are investing at the moment in the Red List to broaden its coverage means that it would take about 20 years to get there," Dr Stuart observed.

"At a time when everything on the planet is deteriorating, having to wait 20 years before we can measure everything properly is not acceptable."

However, the scientists acknowledge that a three-fold increase in the number of species regularly monitored by a global network of biologists would come at a price - an estimated US \$60m (£39m).

But they argued: "The barometer would, from an economic perspective, be one of the best investments for the good of humanity."