

CONSERVATION BIOLOGY

Debate Continues Over Rainforest Fate—With a Climate Twist

WASHINGTON, D.C.—Depending on whom you talk to, the future of tropical rainforest biodiversity is either “truly catastrophic” or not as bad as feared.

The common wisdom tends toward the catastrophic, says tropical ecologist William Laurance of the Smithsonian Tropical Research Institute (STRI), who is based in Brazil. According to some estimates, he notes, tropical forests are vanishing at a rate of 13 million hectares per year. Two prominent conservation biologists have predicted that only 5% to 10% of tropical old-growth forests would survive in 2050, and they gloomily forecast extinctions of up to 75% of the species.

But that view was challenged by two papers published in 2006, both by Joseph Wright of STRI and Helene Muller-Landau of the University of Minnesota, Twin Cities. They argued that a trend toward urbanism would mean fewer people living in forests and thus a slowing rate of deforestation. They predicted that more than a third of tropical forests overall would remain in 2030. Moreover, the regrowth of forests on abandoned farms would provide a refuge for tropical species. So in the end, 16% to 35% of species would be threatened with extinction, they estimated.

The reaction was fierce. Many biologists felt Wright and Muller-Landau’s conclusions would undermine attempts to preserve more rainforest. Laurance, who wrote a high-profile rebuttal in *Trends in Ecology and Evolution*, says one scientist commented: “Their argument is just plain dangerous. We should hit them hard—and with one voice.”

As the public faces of the debate, Wright and Laurance decided to host two symposia, one at STRI in Panama last August and another here at the Smithsonian’s National Museum of Natural History last week, to evaluate recent evidence on the threat to tropical biodiversity. Their talks, before an audience of 400 at the natural history museum, were illustrated with

good-natured caricatures of each other as pro wrestlers, devils, and angels. The bout isn’t over: Still unsettled are key points such as the amount of tropical forest that will remain in 2030, the biodiversity contained in degraded and recovering forests, and the effectiveness of nature reserves. But the speakers were united in their concerns that climate change may pose even greater risks of unprecedented disturbance to biodiversity than they realized 3 years ago.

Speakers presented evidence that gave cause for both hope and concern. On the negative side, Gregory Asner of the Carnegie Institution of Washington’s Department of Global Ecology in Stanford, California, noted that small-scale selective logging affects 28%



Patchwork. Tropical forests continue to be cut down and converted to agriculture, such as these soybean fields in Mato Grosso state in western Brazil.

of tropical forest worldwide. “The take-home message is that selective logging, compared to other forms, is massive globally,” Asner said. The figures will be reported in a special issue of *Conservation Biology* devoted to the symposium. Although selective logging itself is less destructive than clear-cutting, new roads lead to increased hunting, fires, and other disturbances, Asner noted. On the plus side, however, he reported that 1.7% of forests worldwide have been regrowing since the 1990s, and up to 2.4% in Central America.

These regrowing forests can house a substantial amount of biodiversity (*Science*, 13 June 2008, p. 1436). Robin Chazdon of the University of Connecticut, Storrs, described

her research on regrowing Central American forests, which are often planted with coffee under the canopy. In an unpublished study of northeast Costa Rica, her team found that 90% of old-growth tree species were present in secondary forests. “That’s a pretty promising picture,” she said. Secondary forests can’t substitute for old-growth reserves (the source of seeds, for example), she conceded, but a network of secondary forests could eventually reconstruct a landscape that would work for many species.

That will be important, because the existing reserves are in trouble, said Laurance, who presented preliminary results of a survey of 60 tropical reserves worldwide. After interviewing several experts at each, he found that biodiversity appears to be declining while threats are on the rise. “Far more reserves are getting worse than [are] getting better,” he told the audience. “The overall trend is one of worsening conditions.” Wright says the parks aren’t as remote as they used to be, but many

tropical reserves are generally successful.

Wright firmly agrees that the situation for tropical species could deteriorate as the region warms. That’s already clear for highland species—some 165 frog species have gone extinct as warmer climates enable a deadly fungus to thrive. Wright noted that a temperature increase will likely be harmful to lowland tropical species as well. He showed a new analysis suggesting that species living near the equator will have to disperse much farther, up to 2000 kilometers or more, to find climates that match

what they’re used to. Some researchers have noted that species may be able to adapt (*Science*, 10 October 2008, p. 206). But not Nigel Stork of the University of Melbourne in Australia, who said that climate change “will tip the scales toward massive extinctions.”

Whatever the extent of the threat, everyone agreed with Thomas Lovejoy of the Heinz Center here that preserving tropical forest would yield multiple benefits: storing more carbon, rather than releasing it from burning, and maintaining habitat. For that to happen, the wealthy countries will have to pitch in more than they are now, added Wright: “We’re asking the poorest countries in the world to solve this biodiversity threat by themselves.”

—ERIK STOKSTAD