

## Deforestation emissions on the rise

Amazon study suggests denser forest yields will mean more carbon release.

Jeff Tollefson



Future deforestation could have a greater impact on emissions per area cleared. Future deforestation could have a greater impact on emissions per area cleared. NASA LBA-ECO Project

Carbon dioxide emissions from deforestation in the Amazon are increasing as loggers and land developers move deeper into dense regions of the forest, a new study suggests.

Researchers have analyzed Brazilian deforestation data from 2001–2007 in an effort to quantify emissions as deforestation moves from the forest outskirts to the interior, where more carbon is bound up in plants and soil. Areas that are not formally protected, and thus are most likely to be cleared in the future, contain roughly 25 percent more carbon than areas cleared in 2001, according to the study.<sup>1</sup>

"The arch of deforestation started out in the southeast, where forests contain less biomass," says co-author Greg Asner, a scientist with the Carnegie Institution of Science in Stanford, California. "Now people are moving north and west into the higher biomass forests."

The results underscore the danger posed by deforestation, which is responsible for upward of 20 percent of global carbon emissions. Asner says the study serves as a reminder that monitoring forest cover will not be enough in the future. "We have to monitor biomass," he says.

Slash and burn

Driven in large part by agriculture, deforestation in the Amazon averaged about 1.6 million hectares annually from 2001 to 2007, compared to nearly 1.9 million hectares in the 1990s, according to Brazilian government data cited in the paper.

The analysis suggests that emissions would rise in the future even if forest clearing were to continue at current rates.

The new study, Asner says, is an extension of work done by Sassan Saatchi at NASA's Jet Propulsion Laboratory in Pasadena and colleagues, who in 2007 produced the most comprehensive biomass maps of the Amazon. "We were surprised that nobody had done this before, to be honest," says Asner.

Ruth DeFries, a deforestation expert at Columbia University in New York, says the results are solid but hardly surprising, given what scientists know about both forest carbon and the drivers of deforestation. "It makes perfect sense," she says. "It's a combination of different data sets that became available."

Saatchi says that earlier biomass maps had only coarse resolution and were often based on models. His team combed through available field data at various plots distributed throughout the Amazon and overlaid radar and spectral data from US and Japanese satellites. They then extrapolated to build a biomass map of the Amazon basin circa 2000; the results were published in *Global Change Biology*.<sup>2</sup>

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"It basically provided a benchmark map of the biomass carbon in the Amazon," Saatchi says. He calls the Carnegie analysis "very simple and neat" and says his team is conducting a similar analysis on the impacts of fire.

Bill Laurance, an Amazon expert with the Smithsonian Tropical Research Institute in Panama City, notes that denser rainforests in the heart of the Amazon are also more biologically diverse. "The perils to biodiversity are increasing too," he says.

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#### References

1. Loarie, S.R. et al. *Geophys. Res. Lett.* 36, L14810 (2009). | Article |
2. Saatchi, S.S. et al. *Global Change Biol.* 13, 816-837 (2007).