NEWS

Paying to save the rainforests

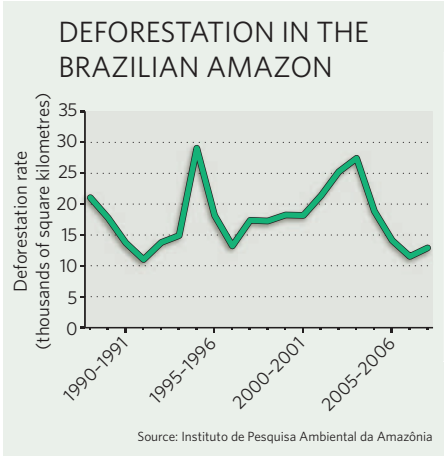
In Brazil, details are emerging for plans to stop deforestation. Can it serve as a model for other nations?

Along the Trans-Amazonian Highway in the Brazilian state of Pará, many landowners try to boost their income by clearing a hectare or two each year for farms or cattle grazing. This year, however, may be different: if all goes to plan, around 350 families will receive payments to put rainforest preservation first.

If approved by the Brazilian Development Bank within the coming weeks, the project would be one of the first to stem from the Amazon Fund, a major initiative created by Brazil last year to attract international aid. It is the largest forest-conservation initiative in the world, and the only national programme that could demonstrate how tropical-forest protection might be folded into the global-warming treaty that international leaders hope to sign in Copenhagen in December.

"The Amazon Fund could be interpreted as the fundamental test case for the rest of the world," says Paulo Moutinho, who heads research at the Amazon Institute for Environmental Research (IPAM) in Brasília. "The international community is watching Brazil and how we will deal with this experiment."

With a total price tag of about US$17 million, the Pará project is just one example of how the Amazon Fund could distribute its money. Landowners who sign up to preserve their forest would begin receiving monthly cheques, starting at around $16 and increasing to $350 in the tenth and final year. Other investments would help to modernize local agriculture in an effort to increase income from land that is already cleared, so that landowners don't need to begin cutting down trees again when the payments stop. Moutinho says the programme could be scaled up to 10,000 families in the Pará region alone.



Cash incentives could be part of a multi-pronged approach to stopping slash-and-burn deforestation.

G. GILABERT/CORBIS SABA

All told, the project would reduce the otherwise expected greenhouse-gas emissions by 3.1 million tonnes of carbon dioxide — equivalent to taking more than half a million vehicles off the road for one year — at a cost of just more than $5 per tonne. That is 75% less than the going price on the European carbon market. Backed by a satellite monitoring system and an increasingly focused enforcement programme, Brazil thus has an opportunity to show whether this way of reducing emissions from deforestation and degradation (REDD) works.

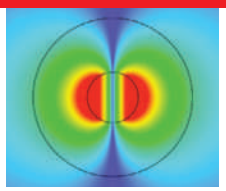
"I would call the Amazon Fund the biggest experiment in tropical conservation history," says Dan Nepstad, a researcher at the Woods Hole Research Center in Massachusetts. "If it works, REDD will survive. If it fails, there's a chance REDD will fail."

The Amazon River basin covers some 7 million square kilometres and nearly half of Brazil. By some estimates 15% of the basin has been cleared in recent decades. Worldwide, deforestation accounts for as much as 20% of greenhouse-gas emissions, and up to 70% of Brazil's emissions. Climate negotiators in the United Nations talks are looking at various ways to link international carbon markets to forest conservation, but Brazil has long opposed the idea of allowing US or European companies to offset their emissions by paying for forest conservation projects in the tropics.

"The Amazon Fund is the biggest experiment in tropical conservation history."

The Amazon Fund was designed as an alternative, allowing Brazil to deploy direct international aid as part of a comprehensive national strategy. Last year Brazil pledged to reduce deforestation by 70% by the end of 2017; the government has since extended that commitment to 80% by 2020.

Achieving those goals won't be easy, given poverty levels, enforcement difficulties and ongoing questions about who holds title to what land. Even within the federal government, policies promoting agricultural growth are often at loggerheads with those intended to protect rainforest. Deforestation rates fell for three years after peaking in 2004 (see graphic), but then increased in the 2008 season when prices spiked for commodities such as soya and beef. Deforestation rates seem to have dropped again in the most recent season; experts credit better enforcement and new policies but also the economic crisis,



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which cut demand for many commodities.

The Amazon Fund got off the ground with a pledge from Norway, which committed up to $1 billion until 2015. Brazil will receive around $114 million this year, but must continue reducing emissions in order to receive future payments. Climate negotiators are increasingly focusing on national baselines such as this, instead of on particular projects that might save one patch of forest while pushing loggers, developers and landowners down the road to another patch.

Getting REDD right in Brazil and beyond is "totally possible and essential", says Lars Løvold, director of the Rainforest Foundation Norway in Oslo, which, along with Friends of the Earth Norway, proposed to the Norwegian government that it invest in a big forest conservation initiative. "But you need some projects to show that it works."

Eyes in the sky

In the coming weeks, the Brazilian Development Bank, which manages the Amazon Fund, is expected to announce the first such project awards. Several dozen applications have been submitted, ranging from community initiatives like the project in Pará to land registry programmes and a proposal from Brazil's National Institute for Space Research for a new satellite to monitor deforestation.

Within Brazil, the money coming from abroad has whetted local appetites for more. And in June, the nine governors of the Brazilian states in the Amazon region penned a letter to Brazilian President Luiz Inácio Lula da Silva urging the country to reconsider its opposition to directly tapping carbon markets for forest conservation. The governors called the Copenhagen talks "a golden opportunity", suggesting that carbon markets could surpass $2 trillion annually by 2020 and $15 trillion in 2050.

Paulo Adario, Amazon campaign director for the Brazilian arm of environmental organization Greenpeace, is wary of governors opening their states directly to international investments; such a deal, he says, could undermine the idea of a national baseline, without which there is no way to protect the forest as a whole. "The federal government needs to have a national vision about the problems and the solutions for the country," he says, "and then performance will be evaluated against results."

The official deforestation data for the 2009 season, which ended in July, will be available in December. Preliminary results suggest that total deforestation will hit a two-decade low of less than 10,000 square kilometres — low enough to secure another payment from Norway in 2010. ■

Jeff Tollefson

Nanoparticle safety in doubt

Claims that seven Chinese factory workers developed severe lung damage from inhaling nanoparticles are stoking the debate over the environmental-health effects of nanotechnology.

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Could nanoparticles cause some lung damage?

A paper published in the *European Respiratory Journal* claims to be the first to document cases of ill health caused by nanoparticles in humans (Y. Song, X. Li and X. Du *Eur. Respir. J.* 34, 559–567; 2009). Other experts are sceptical as to whether nanoparticles are actually to blame, but the paper has triggered lively discussions.

"The study raises the bar for doing appropriate research as fast as possible to find out where the dangers might lie when working with nanomaterials," says Andrew Maynard, a nanotechnology expert at the Woodrow Wilson International Center for Scholars in Washington DC.

The study describes seven women, aged 18–47 years, who worked in an unidentified printing factory in China; two of them later died. They all had pleural granulomas — ball-like collections of immune cells in the lining of the lung that form when the immune system is unable to remove a foreign body. They also had excessive, discoloured fluid in the lung lining. Particles around 30 nanometres in diameter were found in lung fluid and tissue.

The study says that the symptoms were caused by inhaling fumes produced when the workers heated polystyrene boards to 75–100 °C. The boards had previously been sprayed with a 'paste material' made from a plastic identified as a polyacrylate ester.

> "We can't say what the link is or if there are other exacerbating circumstances."

The workroom, of around 70 square metres, had one door and no windows. The ventilation unit had broken down five months before symptoms started to manifest, and the door had been kept closed to keep the room warm. The workers wore cotton gauze masks only on an "occasional basis".

Electron microscopy found nanoparticles around 30 nanometres in diameter in the paste and in dust particles that had collected at the inlet of the broken ventilation unit. Lead author Yuguo Song, a clinical toxicologist at Beijing Chaoyang Hospital, says "it is obvious the disease is not due to microparticles or vapours, because the pulmonary epithelial cells are full of nanoparticles".

Maynard says the symptoms seen in the patients are "similar" to those seen in animals exposed to nanoparticles. He adds that damage to the areas surrounding the lungs suggests that larger particles are not to blame, as these tend to be constrained within the lungs. But because the study does not identify what nanoparticles were involved or their concentration, he says, "we can't say what the link is or if there are other exacerbating circumstances".

Ken Donaldson, a respiratory toxicologist at the University of Edinburgh, UK, doubts that nanoparticles are to blame. He says the symptoms are more typical of chemical exposure. "I don't doubt that nanoparticles were present, but that does not mean they were the main arbiters," he says.

Donaldson says that the plastic material the patients worked with is the more likely culprit — as it would have been highly toxic at the levels they were probably exposed to given the size of the room they worked in and its lack of ventilation.

Anthony Seaton, an emeritus professor in environmental and occupational medicine at the University of Aberdeen, UK, agrees that the study does not pin down nanoparticles as the cause of the ill health. Rather than an insight into the toxicology of nanoparticles, he says, the study is an example of a "total failure in health and safety procedures". ■

Natasha Gilbert