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Special report - Biodiversity: Trees of knowledge; Brazil's conversion

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Abstract (summary) [Translate \[unavailable for this document\]](#)

Mauro Lucio is living the dream. Having started work as a cowboy at 16, he is now 48 and raises cattle on 50 square kilometres of Paragominas municipality in Para state. The animals on his ranch are healthy, the grass thick and the fences solid. The only thing that is not ideal about Mr Lucio's estate is its history. Until around ten years ago it was part of the rainforest. The biggest trees, up to 100 feet tall, were sold for timber, the rest burnt. In this way Brazil has lost around 19% of its Amazonian forest. And Brazil makes up around 63% of the Amazon region. Half of the world's plant and animal species are believed to live in rainforest, so destroying it is a sure way of wiping out large swathes of biodiversity. Until recently it would have been normal practice in the area for Mr Lucio to occupy his ranch for a few years, then, when productivity dropped--as it tends to on the rather thin rainforest soil--burn down some more and move on. But Mr Lucio has no plans to do that, nor, if they are to be believed, do any of the other ranchers in Paragominas. Burning down the rainforest, in addition to having been outlawed, has also become socially unacceptable. Mr Lucio is focusing on raising his income not by colonising more land but by increasing his farm's productivity.

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How Brazil is using education, technology and politics to save its rainforest

MAURO LUCIO IS living the dream. Having started work as a cowboy at 16, he is now 48 and raises cattle on 50 square kilometres of Paragominas municipality in Para state. The animals on his ranch are healthy, the grass thick and the fences solid. Along the avenues on his estate, wooden posts name the many different varieties of trees he has planted between the fields. His wife serves delicious food while his three daughters play happily on the verandah of the handsome wooden ranch house.

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Half of the world's plant and animal species are believed to live in rainforest, so destroying it is a sure way of wiping out large swathes of biodiversity. Species are put at risk not just when forest is burned but also when clearing cuts up the remaining forest into smaller and smaller fragments. A study conducted over three decades by Thomas Lovejoy, an American scientist, shows that creatures die when the forest becomes more and more fragmented, partly because it dries up and partly because some species are deprived of the range they need to survive.

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Space-age solution

When Luiz Inacio Lula da Silva became president in 2003, his government, under pressure from public opinion and foreigners, turned against deforestation. From 2003 his environment minister, Marina Silva, started giving greater protection to land in the Amazon and beefed up the federal environmental police, the Ibama. Centres of illegal logging, such as Paragominas, were put on a blacklist.

Ms Silva was greatly helped by a combination of remote sensing and a Brazilian NGO, Imazon. Brazil's space agency published figures on deforestation, but only on an annual basis, nearly a year in retrospect and without a map, so nobody knew exactly where the trees were coming down. Beto Verissimo, who founded Imazon to use science for the benefit of the rainforest, realised that NASA's Modis satellite collected data that could be published monthly and would also show where the damage was being done. In 2007 Imazon started processing NASA's data and publishing them within a few weeks of being collected.

Partly because of rising prosperity and partly because of international attention, Brazilians were getting more interested in the fate of the Amazon. Newspapers started putting Imazon's data on their front pages. State governors had to respond to them on national news programmes. Month after month, Mato Grosso and Para were found to have the highest rates of deforestation.

In 2008 the government ratcheted up the pressure, publishing a list of the 36 municipalities with the worst records. Seventeen, including Paragominas, were in Para state. Being blacklisted did not just bring public humiliation to the citizens of Paragominas, it also hit their wallets. Businesses in municipalities on the list were not eligible for cheap credit from state-owned banks.

Adnan Demachki, Paragominas's mayor, saw that Greenpeace's boycott of soya produced from Amazonian estates was hitting the soya farmers of Mato Grosso and realised that something similar was about to happen to the beef producers of Para. He went round making speeches to local groups to persuade them that deforestation had to stop.

The federal public prosecutor in Para, Daniel Avelino, followed the supply chain back from the supermarkets through the beef companies to the ranchers to find out which animals had been produced on illegally deforested land, and threatened the supermarkets with prosecution. "They reacted fast," says Mr Avelino. "It was about their brand, their visibility to the public." Brazil's supermarket association--which includes Walmart and Carrefour--said its members would stop buying beef from recently deforested land.

This made Mr Avelino exceedingly unpopular. He received death threats and still travels with an armed guard. But he was not alone in applying economic pressure. The International Finance Corporation, the private-finance arm of the World Bank, withdrew a loan it had promised to Bertin, a big beef producer, to expand its facilities in the Amazon.

Mr Demachki persuaded local trade associations to commit to stopping deforestation. In April 2008 he fined three farmers who were still at it. In October 2008 he was re-elected with 88% of the vote. But not everybody liked what was happening, and things came to a head that November night when the environmental-police station went up in flames.

Since then deforestation in the municipality has pretty much stopped and Paragominas has become a model town. It has a Green Lake, a Green Stadium and a Green Park in the centre of town. A museum built from illegally felled, confiscated wood shows, with admirable neutrality, how Paragominas performed its U-turn on deforestation. Since the 1960s two-fifths of the municipality has been cleared of forest. The plan is for about 15% of the cleared area to go back to forest, and half of the rest to be left to cattle-ranching and half to arable farming.

In 2011 Simao Jatene, Para's newly elected governor, decided to replicate Paragominas's achievements around the state. Central to this effort is the Cadastro Ambiental Rural (CAR), the rural environmental registry. Uncertainty about land tenure is a big administrative stumbling block in Brazil. Some farmers do not have title to the land they farm; some give money to people in whose name land is registered, known as laranjas--oranges--so that the real owners are not held to account for deforesting it. "If you have a speed trap but the cars have no numbers, that's useless," says Mr Avelino. Rather than try to delve into the history of every piece of land, the state governments in Mato Grosso and Para are trying to get farmers to apply for a CAR certificate so the government knows who is using the land and how much forest it is supposed to have. Banks now require loan applicants to produce a CAR; beef companies will buy only from farms with a CAR. In Para the number of properties with a CAR has gone up from 600 in 2009 to 80,000 now.

Deforestation in Para has more or less come to a halt. In the Brazilian Amazon as a whole, it has fallen from 28,000 sq km in 2004 to under 5,000 sq km last year (see chart 6). Although small farmers continue to clear land in areas where the authority of the state is weak, the big beef and soya companies that used to do it themselves or buy produce from those that did no longer want anything to do with it.

Brazil's success--so far--demonstrates how many elements have to come together to make such policies work. You need clear direction not just at the top but all the way through government. Ms Silva's determination was crucial, but if her views had not had the support of Mr Jatene, Mr Avelino and Mr Demachki, she would not have got far. You need administrators with enough imagination to find novel solutions: the CAR was a way around an apparently insuperable land-tenure problem. You need a functioning police force: if the Ibama had not been effective, the politicians' and prosecutor's intentions would have been impossible to implement. You need businessmen whose conscience or share price induces them to change their supply chains. You need NGOs, such as Greenpeace and Amazon, to badger business and government to do things differently. You need independent media to pick the story up and run with it. And, crucially, you need a public that cares: if voters and consumers were indifferent, none of this would happen.

Help from foreigners, especially Americans, has been important too--though, given Brazilian sensitivity to interference by gringos, some of them keep quiet about it. Amazon's Mr Verissimo was inspired by Chris Uhl, an American field ecologist working in Para in the 1980s who is now a professor at Penn State. Amazon was founded with grants from USAID and the MacArthur Foundation. The Ford Foundation funded a sustainable forestry project in Paragominas. NASA provides the satellite data that Amazon publishes. Google has built a platform to allow Amazon to process the data more quickly and cheaply, and Amazon is now training people from other rainforest countries to use it. Mr Lovejoy's forest-fragments project has been running for 30 years, bringing in a stream of foreign researchers, employing Brazilian scientists and pointing out the consequences of slicing the forest up into little bits. Greenpeace's international campaign against Brazilian soya, beef and leather put pressure on global businesses such as Walmart, Carrefour and Nike, and that put pressure on Brazilian companies. So although globalisation exacerbated deforestation by boosting demand for Brazilian produce, it is also part of the solution.

Keep at it

But the problem is still not solved once and for all. Deforestation rates may rebound. If locals can prosper without chopping trees down, there is a good chance that the rest of the forest will survive. If they can't, it won't.

Migration should help. These days it flows away from the Amazon rather than towards it. Brazil is urbanising fast, and the attractions of scrubbing a living from raising cows on deforested land are diminishing.

Still, there are plenty of people left in the countryside, and stopping deforestation means destroying jobs. In Paragominas only 14 of the city's 240 sawmills are still working, and the charcoal industry has closed down. Yet after a brief downturn, the city is doing pretty well. One reason is in evidence in the town hall, where about 50 ranch hands in cowboy hats and baseball caps listen raptly to a presentation on human-bovine interaction. "Control by understanding animal behaviour," says a slide, "not by aggression." "Suffering in the cow represents loss of quality in the meat," says another.

The course is part of a Green Ranching Project, run by Mr Lucio in his capacity as head of the local branch of the farmers' union. Better animal welfare is a by-product: the initiative's main aim is to increase output so that farmers can prosper without deforesting more land. Mr Lucio's farm shows it can be done. Average production for the region, he says, is 90kg of beef per hectare per year; his average is 500kg and his profit margin 40%. Other than happy cows, his secrets are dietary supplements in their feed, fertiliser for the grass, allowing pastures to regenerate after 48 days of grazing and planting copses in his fields to shelter his cattle from the heat.

The combination of better education and chemicals means that farmers like Mr Lucio can prosper without destroying the forest. This is progress from which all species can benefit.

Illustration

Caption: Logging off

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