CONTINUED FROM PAGE 280 of a *farinhada*—converting the cassava they have grown into *farinha*. In a palm-thatched pole house, two women with knives are peeling the brown skin of the starchy white roots, which others are grating into nuggets. The nuggets are pressed to remove their deadly prussic acid, then roasted over a log fire in a huge metal pan and put in sacks, which sell for $20 or so. In four days they will fill four sacks. The village has about 30 *farinhadas* a year. They are its main source of income. These Mura don't have their language or traditional crafts anymore, but they still have the *farinhada*. They are a beautiful people living honest lives. What will become of them, of this whole river culture, when the tipping point is reached and the waters dry up?

At his cluttered office back in Manaus, Phil Fearnside, an ecologist at inpa, who is the world's second-most-cited scientist on global warming (behind John Mitchell, whose office runs the Hadley Centre), tells me, "With every tree that falls, we increase the probability that the tipping point will arrive."

The deforestation crisis has its origins in the 1970s, when an average of 8,000 square miles were cleared each year, mostly by cattle ranchers, says Fearnside, who is tall and lanky, with a big brush mustache. The peak year was 1995, when more than 11,000 square miles were cleared. Now the number is fluctuating between 7,000 and 10,000. But deforestation was not the cause of last year's drought, Fearnside reminds me. It was the warming event in the tropical North Atlantic, bloated with human-generated gas.

Brazil's response to global warming has been mixed, Fearnside says. It has been good about pressing other countries to reduce emissions, but remains in denial about its own, dual role in cranking up the earth's temperature: as deforestation deprives the world of carbon-storing trees, tropical fires are belching new greenhouse gases into the atmosphere. Today, 27 percent of the world's emissions come from deforestation—7 percent from Brazil alone. That makes Brazil the fourth- or fifth-biggest greenhouse-gas producer in the world.

According to the climate model at England's Hadley Centre, Fearnside continues, the tropical Pacific and Atlantic are moving toward a permanent El Niño–like state that will in just three decades dehydrate the Amazon rain forest. While it's true that no model is 100 percent reliable, it would be crazy to sit back and hope that the earth will surprise us. Like Al Gore and many other environmentalists, Fearnside draws an analogy to the link between smoking and lung cancer. "You can't wait for years for tests to confirm that smoking is to blame," he says. "You can't keep calling for more studies, as the tobacco industry did for decades." You have to kick the addiction—be it to smoking or carbon consumption—now.

"Eating Up the Amazon"

Moving east from Amazonas into the state of Pará, I arrive in Santarém, a sleepy city of 270,000 at the mouth of the Tapajós River, 400 miles from the Amazon's mouth. Here the fight to save the rain forest is raging. Historically, most clearing and burning has been done to create pasture for cattle, but in the past decade a new player has entered the picture: multi-national agribusinesses, planting soy on a monumental scale. The largest and most written about of these are Cargill, a U.S.-based outfit that is one of the world's largest privately owned companies, and the Maggi Group, whose C.E.O., Blairo Maggi, is the governor of Mato Grosso. Nearly three million acres—mostly in Maggi's state, which is directly south of Pará—have been converted into vast mechanized soy-growing operations. Soy, to borrow the title of a Greenpeace pamphlet, is "eating up the Amazon." According to Marco J. Lima, an Amazon River ecologist who had just come from Mato Grosso, the sources of the Tapajós, the Tocantins, and some tributaries of the Madeira are desertifying as a result.

Now the soy growers, or *sorjeiros,* are moving into the forest around Santarém, where they are meeting with stiff resistance from Greenpeace and the rural caboclos. Paulo Adario, the head of Greenpeace's office in Manaus, explains what he sees as the crooked way in which these plantations are often put together. Caboclos who have been on the land for generations are approached by "land grifters," who offer them $5,000 for their 750-acre spreads—more money than they have ever seen. They think they have made the best deal in their lives and move into the growing slums of Santarém, where gangs and prostitution are proliferating. Too late, he says, they realize they have lost everything.

Some of those who resist are expelled or killed by hired guns. After the land grifters have put together 2,000 acres or so, Adario says, they sell the land to soy farmers who are often fronted money by one of the multinationals. The farmers hire middlemen known as *gatos* to bring in laborers to clear the forest. The *gato* arrives with a truck in the main square of some little village in the torrid, dirt-poor northeastern province of Maranhão and says, according to Adario, "'I have jobs for 50 of you.' He chooses the strongest-looking men from the 200 that apply, advances them some money, and delivers them to the *sorjeiro,* and they work in the forest from sunup to sundown, sleeping under plastic sheets. They are already in debt for the trip and their clothes and the money they left with their family, and the *sorjeiro* sells them food and medicine at exorbitant

prices, so their debt increases. We call this modern slavery." (Cargill and Maggi Group both deny being involved with any soy suppliers engaged in slave labor. Cargill also denies growing any significant amount of soy in the rain forest.

Most of the soy from Mato Grosso comes down the Madeira River on barges and then down the Amazon to Santarém, where it is off-loaded at a port Cargill has built right in the city. (Federal prosecutors have sued Cargill for building the port without first conducting an adequate environmental review. In February, the port was ordered shut, pending the outcome of an environmental review.) In Santarém, the soy is put on freighters that take it to Europe. One of the big consumers there is Kentucky Fried Chicken, which feeds the soy to its chickens.

A charismatic native of Rio de Janeiro who has received numerous death threats, Adario has a white bulletproof vest in his backpack and drives a bulletproof car. This is dangerous work. Dorothy Stang, a 73-year-old American nun who was trying to keep caboclo homesteaders in Pará from being run out by cattle ranchers, was gunned down in 2005. According to Greenpeace, at least 18 caboclo community leaders have been murdered since then. All together nearly 800 people have been killed in land conflicts in rural Brazil in the last 35 years, and only eight suspects have been brought to trial. Impunity is a big problem in this country.

Adario takes me for a ride in Greenpeace's plane. Most of the deforestation has taken place within the municipal boundaries of Santarém, but he shows me what he says is an illegal clearing of 1,000 acres or so farther out in the jungle. The Brazil-nut trees have been left standing, as required by law, but soy is sprouting on the rest of the land. The government owns 70 percent of the Amazon rain forest, 30 percent of which is supposed to be protected, but someone is turning a blind eye. Adario tells me the plantation belongs to one of Santarém's wealthiest businessmen. Adario says that in March 2006, after the businessman was fined and refused to pay, Adario and 56 Greenpeace warriors unfurled a huge banner in the middle of the plantation that said 100% CRIME! The businessman was arrested, but he spent just a few days in jail, and now, Adario says, he is continuing his operation. Adario even spots a new clearing in the sea of trees.

Last May, Adario used the Greenpeace ship to block soy from being off-loaded at Cargill's port. Three boats full of locals in the pro-soy faction rammed it. "The town is divided," Adario says. "We are either angels or devils. But we only have two years to stop this. After that, the moratorium we forced the *sorjeiros* to agree to on new deforestation ends."

"The Iraq of Biodiesel"

The history of the Amazon is a series of boom-and-bust cycles. Hot commodities have come and gone, but nothing has lasted. First there was the native cacao tree, from whose fruit chocolate is made. By 1755, Jesuit missionaries were cultivating 4.5 million cacao trees around Santarém, even though they regarded it as an aphrodisiac and forbade their priests and all sexually active Catholics to eat it. (This is according to the city's historian Helcio Amaral.)

But in 1839, Charles Goodyear invented vulcanization, the process that gives rubber its elasticity and bounce, and the Amazon rubber boom was on. Chocolate was out and latex was in—until 1910, when huge plantations of rubber trees in Malaysia and Indonesia, grown from seeds smuggled out of the Amazon, started producing it more cheaply and in greater volume. In the late 1920s, Henry Ford had a big rubber plantation called Fordlandia in a community on the outskirts of Santarém, but the trees were wiped out by insects and disease. Chocolate made a brief comeback, too, Amaral says, but those trees were killed by a blight known as "witches'-broom" and a big flood in 1948.

Then came jute, the textile fiber, which attracted a wave of farmers from Japan. That craze lasted until gold was discovered up the Tapajós, in the 1970s. The gold cycle was the most destructive of all, Amaral tells me. The Tapajós, once so clean you could drink from it, was poisoned by mercury. Families disintegrated as caboclos sold their homesteads, moved their families to the periphery of the city, and became prospectors. Many never came back from the jungle. Thousands died along the Tapajós from disease or violence. The gold cycle collapsed in the early 1990s, when gold plunged below $350 an ounce partly in response to the collapse of the Soviet Union.

Amaral doesn't have much confidence that soy is going to last, either. It's already starting to falter. The international market is flooded, soy prices are up and down, and lots of *sorjeiros* are planting rice or nothing at all. Many are heavily in debt for the big, expensive combines and other machinery they laid out for.

"What is our future?" asks a liberation-theology priest named Edilberto Sena, who is working with Greenpeace and the rural communities to stop the *sorjeiros*. "Either soy will collapse, and our ecosystem is being destroyed for nothing, or it could become the big new monoculture in the region—the monoculture of biodiesel. The Brazilian government is hoping that in 25 years Brazil will become the Iraq of biodiesel. The three main ingredients of biodiesel are *dendê*-palm

oil, castor beans, and soy. And what will that mean for us? *Saque.* Rape."

Britaldo Soares-Filho is one Brazilian scientist who believes soy will continue to play a dominant, destructive role in the Amazon. "By 2050, current trends in agricultural expansion will eliminate a total of 40% of Amazon forests," he predicts in a recent issue of *Nature,* "including at least two-thirds of the forest cover of six major watersheds and 12 ecoregions, releasing . . . carbon to the atmosphere . . . equivalent to four years of current annual emissions worldwide."

On Tuesday, September 26, I get a last disturbing glimpse of the Amazon during a brief stopover in Altamira, a rowdy river port in central Pará. Altamira is situated at the intersection of the Xingu River and the Trans-Amazon Highway. This is the heart of cattle country, and there is no rain forest whatsoever in sight. It's all been cleared. It looks like a hilly range in West Texas—a vision of the future, of Amazonia savannified. Pará had more fires during last year's drought than any other state. Rabid vampire bats displaced by deforestation killed 23 people.

From there, I fly south, out of the gasping forest.

Glimmers of Hope

In São Paulo, I pay a visit to José Marengo, who analyzes rainfall records and works on computer models for the Center for Weather and Climate Prediction, in Brazil. His prognosis is dire. "The Hadley model says that, if we increase greenhouse-gas concentrations, possibly by 2059 the forest will collapse and the Amazon will become savanna. I think this could be the future. But it is difficult to say if the savannification will be completed by the end of the century, or how much of the rain forest will disappear."

Carlos Nobre, chairman of the International Geosphere-Biosphere Programme, points out that the Hadley model "only takes into account continuing global warming and has the rain forest beginning to die back by midcentury. If you factor in deforestation and the increased frequency of forest fires, it should happen even sooner." Nevertheless, he's holding out hope for a "second equilibrium," with the eastern Amazon transformed into a "stable" savanna that at least doesn't devour all the rain forest that's left.

One good piece of news Nobre has is that the deforestation rate has decreased sharply in the last two years, mostly because the Brazilian government has finally begun cracking down on illegal selective logging. In 2005, according to *The Economist*, 148 people, including close to 50 officials of the Brazilian Institute of Environment and Renewable Natural Resources, were arrested. The murder of Dorothy Stang, Nobre explains, "helped create a climate that was favorable to law enforcement." It's too soon to say whether the rate of deforestation will continue to drop, but, he says, "even if we can get it down to 15,000 square kilometers per year [5,800 square miles], this is still absurdly high."

Others in the scientific community expressed cautious optimism that the rain forest might not be irrevocably lost. Professor Jeffrey Richey of the University of Washington's school of oceanography, who studies water flows in the Amazon system, believes the savannification scenario is only one of a number of possible outcomes. "It's a very complicated equation," he says. "There's a ways to go in all of this." And Antônio Manzi, a climate modeler at INPA, is confident that "the Amazon is always going to be a humid region."

And that's how I feel, in the end, or want to feel: the Amazon forest is just too big and too diverse simply to disappear in its entirety. But that doesn't mean it isn't going to shrink cataclysmically, with untold repercussions for the continent, the hemisphere, and Earth itself. The only way this can be averted is through a dramatic reduction of greenhouse emissions and deforestation, and it's hard to see either happening anytime soon. Despite heavy opposition from conservationists, the Transoceanic Highway, in Peru, is just a few years from completion. Linking with Brazil's TransAmazon Highway, the artery will connect the Atlantic and Pacific coasts and open a huge new Asian market for the forest's hardwoods, which today go mainly to the U.S.

There's always the chance that there will be some completely unanticipated development—one the Hadley model didn't take into account. But it would have to be something pretty dramatic, such as a virus that wipes out huge numbers of people, and what consolation is that? "The world has a strange way of re-inventing itself," the friend I am staying with in São Paulo reflects. "And you and I will have tipped before the Amazon's tipping point is reached, before any of this happens. So can I fix you a drink?"

But that only makes me think of my three boys, of what the world will be like when they are grown up. I remember the Native American proverb: "We did not inherit the land from our fathers. We are borrowing it from our children." It's a sentiment that applies not only to this embattled glory of the biosphere but to everywhere. □