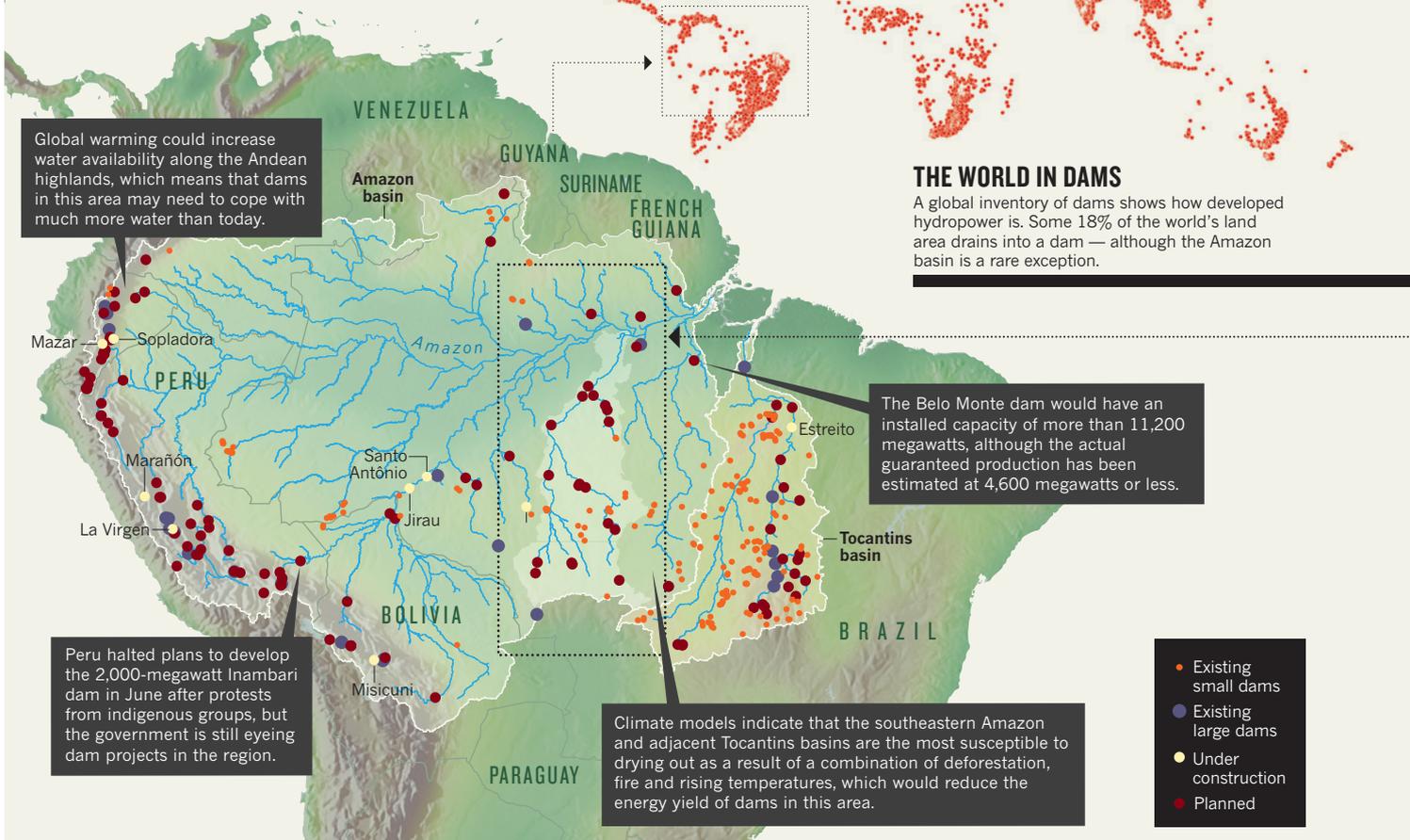


A BECKONING PRIZE

With thousands of kilometres of free-flowing waterways, the Amazon region looks increasingly attractive as an energy source for Brazil and other nations.



ENVIRONMENT

A struggle for power

Brazil is developing the last great untapped reserve of hydroelectricity, the Amazon basin.

BY JEFF TOLLEFSON

When a few hundred demonstrators, mostly from indigenous communities, temporarily occupied the construction site of the Belo Monte dam on Brazil's Xingu River early on 27 October, workers laid down their tools. But the Brazilian government did not back down from its stance that this hydroelectric project on a tributary of the Amazon — expected to be among the world's largest, with a capacity of 11,000 megawatts, when completed in 2015 — is essential to meeting the energy needs of a booming economy. Under a court order, the demonstrators vacated the site later the same day, but the dam remains the subject of fierce litigation.

The episode briefly drew the world's

attention to a controversial mega-project, but this is only part of a larger picture. Led by Brazil, governments in the region are increasingly looking to tap into the Amazon system to slake a growing thirst for energy. If current plans are realized, a wave of dam construction will bring staggering change and development to the rainforest in the coming decades.

In a global context the Amazon stands out as an area of untapped potential, with the world's greatest river system and a paucity of hydroelectric stations, says Mark Mulligan, a geographer at King's College London, who has led the development of an interactive database of more than 36,000 dams around the world. One of his former students, Leonardo Sáenz, has moved on to Conservation International in Arlington, Virginia, where he is improving the database and

incorporating dams that are planned and under construction in the Amazon (see 'A beckoning prize'). The goal is to understand how those investments affect the broader landscape, both physically and economically.

According to the conservation group WWF, less than 10% of Brazil's electrical power comes from dams in the Amazon region at present. The Belo Monte dam would boost this figure, and many more projects are on the drawing board, including 18 dams proposed for the Tapajós tributary system alone over the coming decade. Brazil has also signed an agreement to develop hydroelectric dams in the Peruvian Amazon in exchange for a share of the power.

Although the dams promise carbon-free electricity, they also lead to more road construction and deforestation as well as invasions

LITIGATION

US lawsuit extends thalidomide's reach

Drug blamed for a broader range of harmful effects.

BY MEREDITH WADMAN

In a new twist of a historic tragedy, 13 Americans who say they are survivors of thalidomide are suing four companies for producing and distributing the notorious drug. They say that the drug — used by pregnant women for morning sickness until it was discovered to cause severe birth defects — affected more people in the United States than thought, and caused a wider range of deformities. And, they say, the companies have done all they can to hide these facts.

Thalidomide's devastating effects first came to light 50 years ago this month in the German newspaper *Welt am Sonntag*. In Europe, the drug was implicated in thousands of cases of malformed newborns, but in the United States the damage was limited because the Food and Drug Administration (FDA) refused to approve it for market. Until now, most US cases were thought to originate from thalidomide obtained abroad.

The lawsuit, filed in a Philadelphia court on 25 October, asserts that before thalidomide was pulled from markets around the world, samples were doled out to more than 1,200 physicians in the United States by three companies whose legal liabilities are now the property of Sanofi-Aventis US, based in Bridgewater, New Jersey. Separately, it alleges, citing an FDA memorandum that only came to light earlier this year, the company Smith, Kline & French, now GlaxoSmithKline (GSK), ran a clinical trial of the drug in the US involving 875 people, including pregnant women, in 1956–57. The suit claims that at least one malformed baby was born to a trial participant in 1958. (The German firm Grünenthal, based in Aachen, and Avantor Performance Materials, based in Center Valley, Pennsylvania, are also named in the suit.)

Sanofi-Aventis and Grünenthal say that they cannot comment on ongoing litigation.

Mary Anne Rhyne, a spokeswoman for GSK, says that the company “intends to vigorously defend itself against this lawsuit”. She notes that Smith Kline & French never manufactured or sold thalidomide and adds: “The Plaintiffs’ complaint is replete with scientific inaccuracies and misstatements.”

The company challenges the claim that thalidomide can cause limb defects that are confined to one side of the body, as seen in

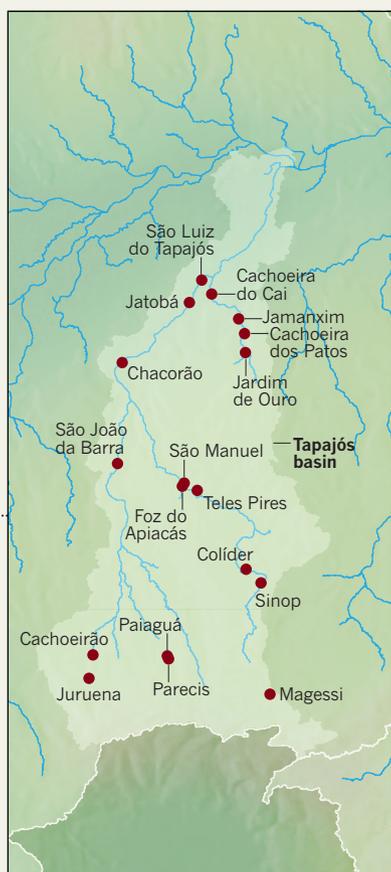
nine of the plaintiffs. Conventional wisdom has long held that thalidomide's signature defect — a shortened, seal-like ‘flapper’ arm, known as phocomelia — affects both sides of the body.

The plaintiffs’ lawyers argue that this assumption is unproven. “There are no representative, controlled studies documenting the true spectrum of thalidomide injuries,” they write in the lawsuit. “A universe of thalidomide related injuries has been thereby excluded from diagnosis.” They further suggest that “recently available studies published in medical and scientific journals reveal the flaws in the orthodox medical opinion”.

When asked by *Nature* for relevant studies, the plaintiffs’ lawyers at Hagens Berman Sobol Shapiro in Seattle, Washington, pointed to work showing one-sided limb defects in chick embryos exposed to thalidomide and thalidomide analogues (C. Therapontos *et al. Proc. Natl Acad. Sci. USA* **106**, 8573–8578; 2009). The paper’s senior author, Neil Vargesson of the School of Medical Sciences at the University of Aberdeen, UK, says that the one-sidedness was due to the physical orientation of the developing chick when the medication was injected into the egg.

Vargesson says his work does not confirm or deny that the plaintiffs’ defects are the result of thalidomide. “The biggest issue facing the lawyers is persuading authorities that thalidomide gave rise to a range of other defects, including unilateral limb defects — or that it caused other damage without apparent limb defects at all.” However, adds Vargesson, who has advised lawyers for potential plaintiffs in the United Kingdom who do not have apparent limb defects, “it’s pretty clear that this drug did an awful lot of things and they don’t always centre around limb defects”.

Lewis Holmes, an expert in birth defects at Massachusetts General Hospital in Boston, says that the plaintiffs will have an uphill struggle to support their argument from the scientific literature because of the lack of systematic studies that follow up the offspring of women who took thalidomide during pregnancy. Holmes also notes that the relative paucity of thalidomide births in the United States means that few researchers there can speak with authority on the drug’s effects. “None of us ever saw thalidomide-damaged children,” he says. ■



TAPAJÓS BASIN

Among the projects most likely to move forward are several located within the Tapajós river basin, where the Brazilian government has focused its planning efforts over the next decade.

of migrant workers and massive methane emissions when large swathes of forest are drowned. And, increasingly, experts fear that changing patterns of rainfall brought about by deforestation and climate change could reduce the energy return from dams, rendering many investments obsolete.

“It’s really easy to get your infrastructure wrong, and that poses serious investment risks in the long run,” says John Matthews, a freshwater expert at Conservation International. “From this perspective climate change presents the ultimate risk in the Amazon.” Matthews fears that Brazil could become perilously reliant on an uncertain energy source, even as the government builds more dams.

“They are opening a new hydropower frontier, the last hydropower frontier in South America,” says Pedro Bara, who works for the WWF in Brasilia. “In 30 years, if all of the plans were implemented, half of Brazil’s energy would come from the Amazon.” ■

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