

# NEWS IN FOCUS

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MAURO PIMENTEL/AFP/GETTY



An increase in deforestation rates in Brazil's Amazon rainforest is one of many points of contention between the country's researchers and its president.

## POLITICS

# 'Tropical Trump' sparks crisis for Brazilian science

*President Jair Bolsonaro questions government scientists and makes severe cuts to funding.*

BY JEFF TOLLEFSON

When neuroscientist Sidarta Ribeiro presented a preview of a report on the dire state of research in Brazil at a meeting of a major scientific society on 23 July, several government soldiers entered the room and began filming. Some in the audience took the soldiers' actions as a show of intimidation.

"Maybe these guys were just soldiers who

want to learn about science," says Ribeiro, a researcher at the Federal University of Rio Grande do Norte in Natal. He coordinated the analysis on behalf of the Brazilian Society for the Advancement of Science (SBPC), which hosted the meeting and commissioned the report. But it didn't look like they were there out of curiosity, Ribeiro says.

The incident is a recent example of the rising tensions between the country's scientists and President Jair Bolsonaro's administration.

Since Bolsonaro took office in January, Brazil's researchers have faced funding cuts and repeated attempts by the administration to roll back protections for the environment and Indigenous populations. Government officials blocked the release of a ministry report on drug use in Brazil. And they have questioned other work by government scientists, including most recently, deforestation reports by a national agency. The head of that agency was dismissed on 2 August. ▶

► “We are concerned about democracy itself,” says Sérgio Rezende, a physicist at the Federal University of Pernambuco in Recife, and a member of the commission that wrote the SBPC analysis.

A draft of the SBPC report details a decline in science funding that began with a major recession in 2014. It draws a direct line between the unprecedented crisis in science and the future of Brazil. Without policies that are “grounded in rationality, science and the public interest”, places such as the Amazon rainforest could soon pass the point of no return, according to the draft report.

The commission found that total spending by Brazil’s three main science-funding agencies fell by nearly 47%, to 7 billion reais (US\$1.8 billion), last year, compared with 2014. The situation has deteriorated further since Bolsonaro took office — in March, his administration announced a freeze on 42% of the budget for the ministry of science and communications, leaving it with just 2.9 billion reais for the rest of the year. The latest estimates suggest that the ministry could run out of scholarship money for undergraduate and graduate students and postdoctoral researchers by September if the government doesn’t provide more cash.

The funding crisis is just one of the sore points between researchers and Bolsonaro. Concerns over his administration’s policies regarding the environment and Indigenous tribes in the Amazon spiked last month, when Bolsonaro questioned his own government’s

data on deforestation in the rainforest.

In early July, Brazil’s National Institute for Space Research (INPE) — which uses satellite observations of the Amazon to track the destruction of the rainforest — released data showing that deforestation rates from April to June had increased by 25% compared with the same period last year.

On 19 July, Bolsonaro accused INPE of lying about the numbers, then later suggested that his administration should have the right to approve the agency’s data before they are released to the public. INPE director Ricardo Galvão accused the president of cowardice for publicly attacking his institute.

The data in question come from a monitoring system designed to provide rapid alerts to law-enforcement officers if it detects a new clearing in the Amazon as small as one hectare. The data aren’t Brazil’s official deforestation statistics — which come from a more detailed analysis of satellite observations — but often follow larger deforestation trends.

Scientists have defended INPE, saying that it has the most comprehensive deforestation monitoring system in the tropics. The agency’s estimates provide a reliable gauge of deforestation trends and are based on publicly available data, says Ane Alencar, the science director at the Amazon Environmental Research Institute, an advocacy group based in Brasilia.

**“We are concerned about democracy itself.”**

Galvão met with the minister of science, former astronaut Marcos Pontes, on 2 August to discuss the issue. But Galvão was told during the meeting that he was dismissed. He says that he had a constructive discussion with Pontes, and stressed that there was no indication that INPE’s work on deforestation would be censored moving forward. But Galvão says that it was clear that he would have to leave because of the way he challenged the president.

“I don’t have any regrets,” says Galvão, a physicist formerly at the University of São Paulo who will now return to his academic post. “That was not a proper thing for a president to say.”

The reported rise in deforestation comes as no surprise to many scientists and environmentalists. Bolsonaro’s presidential campaign relied in part on promises to open up the Amazon to agriculture and mining interests.

Since taking office, he has scaled back enforcement of environmental laws and promoted development in Indigenous reserves. Now, his administration is pushing forward with proposals to shrink the size of protected areas in regions including the Amazon.

Bolsonaro has repeatedly derided environmental laws as being a barrier to progress and has criticized enforcement officials, says Maurício Voivodic, who heads the Brazilian branch of the environmental advocacy group WWF, which is in Brasilia.

“That’s why we are seeing illegal miners invading Indigenous lands,” he says. “That’s why we are seeing more deforestation.” ■

## PHYSICS

# ‘Supergravity’ wins US\$3-million prize

*Three physicists honoured for theory that has been hugely influential — but might not be a good description of reality.*

BY ZEEYA MERALI

Whether the theory of supergravity, an attempt to unify all the forces of nature, is a true description of the world still hangs in the balance more than 40 years after it was proposed. Nonetheless, it has now nabbed its founders one of the most lucrative awards in science: a US\$3-million Special Breakthrough Prize in fundamental physics.

Supergravity was devised in 1976 by particle physicists Sergio Ferrara at CERN, Europe’s particle-physics laboratory near Geneva, Switzerland; Daniel Freedman at the Massachusetts Institute of Technology in Cambridge; and Peter van Nieuwenhuizen at Stony Brook University

in New York (D. Z. Freedman *et al.* *Phys. Rev. D* **13**, 3214–3218; 1976). The selection committee that awarded the prize did so, in part, for the theory’s impact on the understanding of ordinary gravity. Supergravity also underpins one of physicists’ favourite candidate ‘theories of everything’, string theory. This asserts that elementary particles are made of tiny threads of energy, but remains unproven.

“Supergravity has been transcendently important in the development of physics for the past 40 years and in our exploration of what might lie beyond what we know about nature,” says string theorist Andrew Strominger at Harvard University in Cambridge, Massachusetts, who sat on the prize’s selection committee.

Russian entrepreneur Yuri Milner launched the prize in 2012, and funders now include Google co-founder Sergey Brin and Facebook’s Mark Zuckerberg. Awards are given out towards the end of each year, across a range of fields in science and mathematics. But the selection committee — picked from the pool of previous prizewinners — can make special awards to recognize exceptional work.

By the early 1970s, physicists had constructed the standard model of particle physics, in which three of the four fundamental forces of nature are associated with their own particle: the electromagnetic force is carried by the particle of light, the photon; the strong force that binds atomic nuclei is mediated by the ‘gluon’; and the weak force that governs radioactive decay is associated with ‘W’ and ‘Z’ particles. All these have been observed experimentally. But the fourth fundamental force, gravity, resisted efforts to include it in the model. Supergravity was an early attempt to do so, combining particle physics with Albert Einstein’s theory of gravity, general relativity.

Ferrara, Freedman and van Nieuwenhuizen drew inspiration from supersymmetry, an extension of the standard model first proposed in 1973. It asserts that each known particle has a heavier, and as yet undiscovered, twin. Models that try to bring the final fundamental