Under new management

After decades of rule by first the military and then parties associated with the privileged élite, Brazil now has a left-wing president. David Adam considers the implications for the country's science.

If few Brazilian scientists were aware of Roberto Amaral when he took up office as the country's minister of science and technology on 2 January, most knew his name a week later. In his maiden media interview, Amaral seemed to suggest that Brazil was about to resurrect its nuclear-weapons programme — a gaffe that forced officials to issue a hasty statement ruling out such a volatile move.

It was an explosive start that played up to the worst fears of some researchers about the new government. Amaral, a political scientist and journalist who is vice-president of the Brazilian Socialist Party, was given control over research in the horse-trading that followed Brazil's election last year of its first left-wing government in four decades. President Luiz Inácio Lula da Silva, known popularly as Lula, was elected to bring about a social revolution, and the country's scientists were unsure about which way the coming winds of change would blow them.

Scientists weren't the only ones to express concern — economists and business leaders were also worried about what the new government had in store. But some six months after the new administration took over in January, there is a widespread mood of cautious optimism. Lula's government has won plaudits for its generally prudent management of Brazil's shaky economy. Scientists, meanwhile, have been wooed with a pledge to double federal spending on research within his four-year term, and to boost the number of young researchers being trained.

Controversially, however, Lula's government also wants to widen the geographical spread of Brazil's research base, currently dominated by the southern states of Rio de Janeiro and São Paulo — a move that is bound to create tensions between the current haves and have-nots of Brazilian science. The administration also faces a crunch over genetically modified (GM) crops: a court of appeal is expected to rule soon on whether the previous government's decision to license the commercial planting of GM soya is illegal, as consumer and green activists successfully argued in a lower court.

Brazil's scientists have learned to treat announcements about future riches with scepticism — too many government pledges have gone unfulfilled in the past. But for now at least, the signs are promising. The US$500-million annual federal research budget was largely spared from a series of stringent cuts, intended to help reduce Brazil's internal and international debts, announced shortly after Lula took office. "The new government has a very good dialogue with the scientific community," says Glaci Zancan, a biologist at the Federal University of Paraná and president of the Brazilian Society for the Advancement of Science.

E. PERES/AP; O. MAGALHAES/AE (INSET)

Men with a mission: since taking the reins as Brazil's president at the beginning of this year, Luiz Inácio Lula da Silva (left) has pledged to redistribute science funding across the country. Roberto Amaral (above) is charged with making his plan a reality.

Fruits of labour

Brazilian science has already proved that it can compete on the international stage, with the publication in 2000 of the complete genome sequence of the citrus pathogen *Xylella fastidiosa* (A. J. G. Simpson *et al. Nature* **406,** 151–157; 2000) by a consortium in the state of São Paulo. But despite such pockets of excellence, the quality of science in this enormous country remains mixed. In terms of the number of papers published in international journals, Brazil ranks 17th in the world, contributing just 1.3% of the total. "That level of performance is, quite frankly, inadequate," says Amaral. "But our position in applied science and technology is even worse." Based on patents filed, Brazil is a woeful 43rd in the world. "While South Korea registered 3,472 patents in the United States in 2002, we only managed 113," laments Amaral.

Brazil's leading researchers agree that their country's science will be most competitive if it focuses on issues that are of key domestic importance. With more than half of Brazil's territory taken up by the

rainforests of the Amazon — a critical resource for both the country and the world — it is not surprising that the remote sensing of that region is a top priority. A new project called SIVAM — System for the Vigilance of the Amazon — became operational last summer. Combining data from satellites with sensors on aircraft and the ground, the system is the most ambitious of its kind in the world, and aims to promote sustainable development by providing real-time monitoring of issues such as deforestation, pollution and the spread of disease.

The *Xylella* genome project had similar local significance — the state of São Paulo being responsible for more than a third of the world's orange crop. "Scientists in Brazil must compete in different markets," says Fernando Reinach, a researcher at the University of São Paulo's Institute of Chemistry, who helped to coordinate the *Xylella* project.

The success of Reinach and his colleagues has spawned a series of similar projects targeting the genomes of other important agricultural pests (see *Nature* **407,** 440–441; 2000), but this investment in genome sequencing has not pleased everyone. "There is a chronic shortage of funds for science in Brazil and lots of people are very dissatisfied with the amount of money invested in genome projects," says Antônio Carlos Campos de Carvalho, an immunologist at the Federal University of Rio de Janeiro, who heads a group that aims to develop therapies using adult stem cells.

Compared with his counterparts in São Paulo, Campos de Carvalho has good reason to be concerned. His state government of Rio de Janeiro is having a torrid time financially, and is barely able to pay university salaries. "It's crazy here," he says. "Sometimes there is money and sometimes there isn't."

Such problems are common because, as well as receiving money from the national government through several routes, Brazilian scientists also rely on their state governments for funding. Each state has its own funding agency, in name at least, but only the one operated by the state of São Paulo, called FAPESP, is truly effective. This is because under the state's law, 1% of all tax revenue goes to the agency. Other states have passed similar laws — Rio de Janeiro even pledged to double its local rival's contributions — but they are rarely enforced.

"The worst thing in Brazilian science is the instability of funding," Campos de Carvalho says. "Even if you get a grant approved, you have no idea if you will ever see the money." Still, compared with other regions, the states of Rio de Janeiro and São Paulo are lucky. Brazil is very much a country of rich and poor — and this is as true in science as in any other aspect of society, with spending on science being heavily concentrated in the two southern industrialized states.

Regional rewards

It's in trying to redistribute this wealth that Lula's government may evoke the wrath of Brazil's scientific élite. "We intend to promote a policy of social inclusiveness and break up the concentration of investment in science and technology," Amaral says. "We aim to create incentives to help researchers establish themselves in their own geographical regions." Portions of the federal budget may be reserved for research groups outside Rio de Janeiro and São Paulo.

The proposal has split the research community. Zancan, for one, supports it: "It is a mistake to leave emerging groups to their own resources," she says. Unsurprisingly, successful groups in São Paulo and Rio de Janeiro argue that the move will undermine Brazil's efforts to become internationally competitive in science. "Lots of money already goes to the regions and much of it is just wasted," claims Reinach. "It's a very tricky problem, but the idea goes against the culture of merit and means that good science in São Paulo will not get funded."

Another controversial issue is the stance of Lula's government on transgenic crops. In opposition, Lula was seen as an opponent of GM agriculture. But his cabinet is split on the issue, and he has now set up a commission to produce an official declaration. Last month, the government decided to allow the GM soya currently being grown in the south of country — in defiance of the court-imposed moratorium — to be sold until 31 January next year.

Despite such potential flashpoints, most scientists remain reasonably confident that Lula's government will build on its predecessor's achievements in science policy, which involved channelling more money into research. For example, an innovative new funding mechanism, under which taxes from various industries including oil and information technology are fed back into related research, currently provides about US$400 million a year, over and above the federal research budget. "One of the important things that has happened over the past few years is that Brazil has built a system," says Hernan Chaimovich, who heads the chemistry department at the University of São Paulo. "The new government will shift the emphasis, but the system is set."

A stiffer challenge will be turning investment in basic science into innovations that benefit local communities and the economy as a whole. Brazilian industry has tended to bring in expertise rather than trying to develop it locally, so the government is now considering redirecting a portion of federal funds towards research projects with commercial potential. Examples include exploiting the biodiversity of the Amazon region and developing alternative fuels — Brazil already has decades of experience in running cars on ethanol derived from sugar cane. "We want to develop the technical and scientific tools to contribute to long-term national development," says Amaral.

The ultimate test for Lula's government, however, will be whether it can improve the lot of the poor citizens whose votes propelled it into office. And when the next elections come round, some scientists fear that investment on science may lose out to shorter-term priorities. "No kids in the United Kingdom had to starve to let John Sulston sequence the human genome, but in Brazil we still have to worry about feeding people," says Reinach. "Science here always runs the risk of appearing to be a luxury." ■

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L. E. PEREZ/CCSIVAM

Brazil's SIVAM project to monitor the Amazon forest combines data from ground, airborne and satellite sensors.