

CHILE'S SCIENCE TRANSFORMATION GAINS STEAM

New president Gabriel Boric promises to invest in research and fight climate change.

By Emiliano Rodríguez Mega

On 11 March, Chile's new president – its youngest ever, and its most liberal in decades – took office, ushering in what many scientists see as a new era for the country.

Gabriel Boric, 36, enlisted scientists in his election campaign and has given some of them top jobs in his administration. He plans to take a stronger stance on fighting the climate crisis, and has promised to boost public and private investment in science from 0.36% of the country's gross domestic product – where it has stalled for years – to 1%. One of the linchpins of his campaign, an effort to fight inequality, could also help a scientific system plagued by disparities, researchers say.

“Hope is the word” to describe how researchers are feeling, says Jacqueline Sepúlveda, a neuroscientist and addiction researcher at the University of Concepción.

After nationwide protests over inequality in 2019, many Chilean scientists took an active interest in reshaping the country by participating in policy efforts, such as rewriting the nation's constitution and participating in public debates. They did so again last year, when Boric's presidential-campaign team launched a public call for citizens to help draft and review his proposals for the government – in total, around 33,700 people participated, including researchers. “We have not just remained as spectators,” says Cristina Dorador, a microbiologist at the University of Antofagasta and a member of the constitutional convention.

The wheels of progress had already started turning for Chilean science before Boric's presidency. In 2018, the country got its first science ministry, which manages research funds and promotes science-based policies and programmes. And in 2021, a committee of researchers was charged with creating a national strategy for how science will address the country's challenges; it is set to deliver this year. Researchers say that Boric's administration arrives in time to help cement this revolution in science and environmental policy, and promises to build on its success.

For scientists who lived through the 17-year dictatorship that followed a coup in Chile in 1973, the promise of this new era is exciting

– and long overdue. “We [always] wanted the country to use science for its own development,” says Gonzalo Gutiérrez, a physicist at the University of Chile in Santiago and one of the nearly 80 researchers who volunteered to help write the science proposals for Boric's campaign. “We just didn't think it was going to take this long.”

A ministry for the people

In 2011, Boric made his mark politically by organizing student-led protests across Chile to demand more equitable access to universities by calling for a high-quality education free from tuition fees. A United Nations report in 2017 found that the richest 1% of Chile's citizens earned 33% of its wealth – a sustained trend that today places it among the countries with the highest income inequality, according to the Organisation for Economic Co-operation and Development in Paris.

Boric's principles have resonated with the scientific community. For years, researchers have lamented a lack of funding for science. And many who spoke to *Nature* pointed out that grant money has mostly gone to the same elite institutions or scientists. The academic research system replicates society's



Gabriel Boric's pledges to reduce inequality in Chile have excited researchers.

inequalities, Sepúlveda says.

During Boric's bid for presidency, dozens of researchers stepped out of the laboratory, the office or the field to campaign for him, says Cristian Undurraga, a developmental biologist at the Centre for Genome Regulation in Santiago who helped to coordinate the group that crafted Boric's science proposals. “We got them out of their comfort zone and onto the streets.”

Since then, the president-elect has named prominent scientists to help execute his vision. Two of them, immunologist and cancer researcher Flavio Salazar and climatologist Maisa Rojas, are his science and environment ministers, respectively.

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Salazar has his work cut out. The creation of the science ministry was a boon, researchers say, but research and innovation have yet to be fully harnessed to benefit the country. “Science is still a foreign body to Chilean society,” Gutiérrez says. “There's been progress, but not as much as you might have expected.”

The science minister is also up against a time crunch. Boric and his team have only a short period – a four-year presidential term, with consecutive re-elections banned – in which to steer the country in a new direction, and the federal budget for the fiscal year 2022 has already been approved. So the administration won't be able to increase science investment until 2023.

Still, Salazar says, “I feel extremely excited.” One of his big goals is to ensure that the ministry of science “is a ministry for the country and for the people”, rather than a “ministry of scientists for scientists”.

This means executing the new government's ambitious science proposals. These include creating 15 regional research centres to establish knowledge hubs outside the capital; improving working conditions for students and technicians, many of whom lack social security and formal contracts; and boosting gender equity in science.

Salazar has yet to announce specific plans for how he will achieve these goals, but he has met with various organizations to listen to their concerns. Adriana Bastías, president of the Chilean Network of Women Researchers, says Salazar approached the association to discuss possible actions, such as restricting access to funding for scientists sanctioned for sexual harassment.

“What I feel is hope – hope that we can work together” and that these meetings move beyond good intentions, Bastías says.

Another area for hope among scientists is that Boric plans to address global warming by declaring a climate emergency in Chile. Each year for more than a decade, rainfall has been below average in the centre of the country. Combined with record high temperatures, the trend has led to a series of dry years that researchers have called a mega-drought.

Rojas says that Chile is “highly vulnerable” to further climate extremes. A 2011 government report found that the country, with its shrinking glaciers and water scarcity, met seven of the nine vulnerability criteria set by the United Nations Framework Convention on Climate Change.

For most of her career, Rojas has gathered data on the consequences of climate change in the region and analysed models of ancient climate shifts in the Southern Hemisphere. She was also one of the authors of a landmark report last year from the Intergovernmental Panel on Climate Change. With this new government, she says, “evidence is now reaching decision-making”.

Rojas plans to prioritize climate action as head of Chile’s environment ministry. One of her goals is for the country to enact its first framework law to achieve carbon neutrality by 2050. The legislation, approved on 9 March by Chile’s Congress and awaiting Boric’s signature, would regulate greenhouse-gas emissions, formulate adaptation plans and assign specific climate responsibilities to various sectors.

National programme

Another goal is to create a national programme, the Biodiversity and Protected Areas Service, which could also help to fight climate change by preserving “genes, species and ecosystems” in Chile (ecosystems such as forests absorb carbon emissions). A 2019 report from the UN-backed Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services estimated that, globally, conservation efforts such as these could provide 37% of the climate-change mitigation needed until 2030 to limit global temperature rise. Gathering conservation efforts under one national umbrella was the “missing piece” in Chile’s environmental programmes, Rojas says.

“There is a very high level of expectation with this government,” she adds. “I feel strongly committed not to disappoint – and to deliver a country that is on the path to greater well-being for Chileans.”

Whether Boric and his administration will deliver on their proposals is yet to be seen. In the coming months and years, Sepúlveda says, scientists will be watching to see whether they keep their promises: “I hope, for the good of all Chileans, that this government does well.”



Scientists in China have had a chance to analyse Moon rocks for the first time.

CHINA'S FIRST MOON ROCKS IGNITE RESEARCH BONANZA

Samples collected by Chang'e-5 are providing exciting insights into the Moon's evolution.

By Smriti Mallapaty

Until recently, geochronologist Li Xian-Hua's research focused on molten rocks on Earth. But when a Chinese spacecraft delivered the country's first rocks from the Moon in December 2020, Li pivoted to study them. “I'm a new person working on extraterrestrial rocks,” says Li, who is based at the Institute of Geology and Geophysics (IGG) at the Chinese Academy of Sciences in Beijing.

Li is one of many planetary scientists in China who have had the chance to study lunar rocks for the first time. The samples, collected by the Chang'e-5 spacecraft, are the first to be brought back to Earth since NASA's Apollo missions and the Soviet Union's Luna missions more than 40 years ago. They are being examined for clues to the Moon's evolution.

Those studies are starting to yield intriguing results. Some half a dozen papers have been published on the Chang'e-5 samples in the past six months. And earlier this month, at the Lunar and Planetary Science Conference in Houston, Texas, a session on China's lunar missions saw roughly a dozen studies presented.

“There are a lot of young Chinese researchers getting involved,” says Clive Neal, a

geoscientist at the University of Notre Dame in Indiana, who has worked on Chang'e-5 samples with collaborators in China. Several post-graduate researchers and students presented work on the lunar samples at the conference in Houston, he says. The rocks are exciting because they “represent a window into a very different era of lunar magmatism” compared with those gathered previously.

Youngest rocks

The Chang'e-5 mission recovered 1.7 kilograms of loose volcanic material called basalt from a vast lava plain, known as Oceanus Procellarum, in the Moon's northern region. The location was selected partly because it might contain younger volcanic material than the regions visited by the Luna and Apollo missions. The hope was that a younger site would give insight into a time when the Moon had started to cool but was still volcanically active.

Last July, the China National Space Administration released the first specimens to scientists across China. Some 17.5 grams of fine-grained powder and solid rock were distributed for 31 scientific projects selected from 85 applications. Several further rounds of applications to work with lunar samples have followed.