Peru’s floods teach tough lessons

**ECOLOGY**

Surprise El Niño causes devastation, but presents bounty for ecologists.

**BY BARBARA FRASER**

Torrential rains pummelled Peru’s northern coastal desert in February and March, triggering floods that killed at least 113 people and destroyed some 40,000 homes. As families grapple with their losses and government officials tally the cost of repair and reconstruction, scientists are gearing up for an unusual opportunity to study ecosystems that go decades without much rain.

The rains were spurred by an unusual ‘coastal’ El Niño climate pattern, in which warm water pooled off the coast of southern Ecuador and northern Peru — more so than during the much larger 1997–98 El Niño, which also soaked the region. At that time, rivers had sprouted from the Tumbes and Chira rivers overflowing and the charcoal trade. Oliver Whaley at the Royal Agrarian University in Lima, “this is a meteorologically enchanting moment.”

A Changing Climate

Climate change was high on the list of concerns among participants across the globe as they gathered on Earth Day, an annual event designed to draw attention to the environment.

The rains were spurred by an unusual ‘coastal’ El Niño climate pattern, in which warm water pooled off the coast of southern Ecuador and northern Peru — more so than during the much larger 1997–98 El Niño, which also soaked the region. At that time, rivers overflowed and the charcoal trade. Oliver Whaley at the Royal Agrarian University in Lima, “this is a meteorologically enchanting moment.”

For Adhemar Liqueutia, a graduate student in biochemistry at the National Autonomous University of Mexico in Mexico City, the fight is personal. In January 2017, the National Council of Science and Technology, the government agency in charge of implementing scientific and technological policies, reduced the amount of money offered to students like him. “If I struggled before with paying my rent and buying groceries, now I’m being forced to tighten my belt even more,” said Liqueutia.

**THE FUTURE OF FUNDING**

Many marchers railed against recent moves by governments to slash funding for science. They said that cuts threaten not only current research, but also the chances of attracting future generations to careers in science.

Curtis Moon, a graduate student studying biosystematics at London’s Natural History Museum, worries about UK science funding once the country leaves the European Union. His homemade sign read “WTF?! Where’s the funding?”

Direct political interference in US science isn’t new, said public-health researcher Simon Chapman, speaking to a crowd of about 3,000 in Sydney’s central business district. But President Trump’s plan to cut the budgets of major science programmes is unprecedented, said the retired University of Sydney professor. “Many researchers here today have colleagues living in Trump’s America who fear for their careers and their future.”

A Changing Climate

Climate change was high on the list of concerns among participants across the globe as they gathered on Earth Day, an annual event designed to draw attention to the environment.

“For the impacts on the people,” says biologist Juan Torres of La Molina National Agrarian University in Lima, “this is a meteorologically enchanting moment.”

One roads are passable, Torres will visit field sites that he studied after the powerful 1997–98 El Niño, which also soaked the region. At that time, Torres found wild relatives of domesticated crops — including tomatoes, peppers, potatoes and squash — that had sprouted from dormant seeds. This year, he will again catalogue wild plants, along with the crops that farmers choose to grow on lands made fertile by the flooding.

Part of the northern desert is irrigated farmland, but there are also patches of a dry forest that has been devastated in recent years by industrial agriculture, urban sprawl and the charcoal trade. Oliver Whaley at the Royal Botanic Gardens, Kew, in London, has studied Peru’s dry forests for 25 years, and hopes that the rain will bring respite to the ecosystem.

Peru’s forests are normally tranquil rivers. Satellite images show the Tumbes and Chira rivers overflowing and spreading nutrient-rich sediment over swathes of farmland.

That’s what the rivers are supposed to do, says Jorge Abad, a civil engineer at the University of Engineering and Technology in Lima. But these floods caused damage because the rivers have been channelled, dammed and dredged without considering sediment flow, he says, adding that better modelling would

"Except for the impacts on the people, this is a meteorologically enchanting moment."

With home-made signs and impromptu chants, people mocked those who deny evidence linking humans to rising temperatures and swelling seas.

Sticking your head in the sand is not a solution to global warming. Your ass will still get very hot,’ proclaimed the sign held aloft by Frédéric Bayer, a nutrition engineer who now works for a scientific communications agency in Paris.

Colorado governor John Hickenlooper, a former geologist, told the crowd in Denver that “climate change cannot be reversed by silencing scientists”. But his speech also highlighted that march attendees were not united on all fronts. Hickenlooper spoke over the chants of activists opposed to the drilling practice known as fracking, which he supports.

Across the globe, the gatherings tended to be upbeat, and many participants took it as their responsibility to look towards the future. “I really do believe God made all of this,” said Janine Schroeder, referring to the planet. She attended the march in Washington DC with friends from her Christian church in Arlington, Virginia.

“It’s our job to take care of this Earth. If you don’t fund these programmes to take care of it, then we’re not doing our job as stewards.”
allow engineers to improve flood control and reduce future disaster risk.

The rains have also washed rubbish, metals and chemicals from towns, mining operations and farmlands into the Pacific Ocean. That worries Carlos Zavalaga of the Scientific University of the South in Lima, who studies the seabirds that live along the Peruvian coast.

Warm coastal waters can drive out schools of Peruvian anchovies (Engraulis ringens), robbing guano-producing birds of their main food supply and leading them to hunt elsewhere. As of February, two-thirds of the Guanay cormorants (Phalacrocorax bougainvillii) at Punta San Juan, on the south-central coast, had abandoned their nests. Besides the impact on the ecosystem, losing these birds will reduce the accumulation of guano, which is still mined in the area. Zavalaga plans to survey the situation in the coming weeks and to analyse bird blood and feathers for contaminants from the washout.

No one predicted this year’s disaster until it was too late. Scientists had expected the major El Niño of 2015–16, but that system’s effects were muted in South America. And even though this year’s rainfall is comparable to that due to the large 1997–98 El Niño, the causes are different.

That raises questions for climate scientists, says Rodney Martínez, an oceanographer at the International Center for Research on the El Niño Phenomenon in Guayaquil, Ecuador. He says that scientists need a better understanding of these atypical coastal El Niños, which may also have occurred in the 1920s and 1970s, and how they relate to larger ocean cycles.

But studies could be undermined by a lack of funding. Ocean-monitoring buoys set by Peruvian and Ecuadorian scientists after the 1997–98 El Niño were vandalized and never repaired, and the Pacific-wide Tropical Atmosphere Ocean instrument array is suffering from deterioration and budget cuts.

“What we’ve seen in Ecuador and Peru is resounding evidence of the importance of managing ecosystems for the prevention of extreme events,” Martínez says. “That still is not fully included in risk management.”