

► over basic research since his term began, is not seen as a champion of ESO membership.

That has essentially left Brazilian astronomers to lobby Congress on their own. And not all of them are in favour of joining ESO; some see it as an expensive step that will bankrupt more modest, home-grown efforts to nurture Brazilian astronomy.

João Steiner, an astronomer at the University of São Paulo, is the most vocal critic of ESO membership. He argues that Brazil's fees — which are based on the country's gross domestic product — are comparable to those of Italy and the United Kingdom, even though Brazil has fewer astronomers, and fewer still with research programmes mature enough to compete for observation time. "It doesn't make sense for us to subsidize European science with Brazilian taxpayers' money," says Steiner.

He would prefer Brazilian astronomers to work with more affordable telescopes. These include Gemini, two 8-metre telescopes in Chile and Hawaii, run by six countries including Brazil; the Southern Astrophysical Research Telescope (SOAR), a 4.1-metre

instrument in Chile part-owned by Brazil; and a 1.6-metre telescope at Brazil's own Pico dos Dias Observatory near Itajubá.

But Marcio Maia, an astronomer at the National Observatory in Rio de Janeiro, says that his country should be ambitious. "If Brazil wants to remain in the Stone Age of astronomy, we can do it at the city of Itajubá, where there is nothing to be seen, we can keep our meagre share at Gemini or we can use SOAR, a telescope with no good instrument," he says. "We can only learn how to do cutting-edge astronomy by entering the competition and fighting for it."

Steiner acknowledges that joining ESO would bring benefits, but says that the fees are too high at a time when Brazil is unlikely to take on expensive projects. In July, the government announced a 10-billion-real (US\$4.3-billion) cut to overall federal expenses. And the Ministry of Science, Technology and Innovation has little room in its own budget; it says that it would have to commit 12% of its general funding to honour the ESO agreement if Congress does not approve new spending for it. Such a commitment is unlikely from Raupp,

who has blamed the delay in ratification on the lack of consensus. "The strong divide in the Brazilian astronomical community is certainly an important fact that cannot be ignored," says José Roberto Ferreira, a spokesman for Raupp.

But contrarians such as Steiner seem to be in the minority, according to a 2010 poll by the Brazilian Astronomical Society. In interviews of 180 of the society's 660 astronomers, 75% supported the ESO agreement. Another 17% (mostly theoretical cosmologists) declined to vote; just 8% were against membership.

Even with strong support from astronomers, however, it will be difficult to persuade Congress to approve membership by the end of 2013.

If Brazil fails to ratify the agreement, ESO could boost its funding by adding other member states. Russia, Poland, Canada and Australia have all expressed interest. "We are being regularly approached by other countries," says de Zeeuw. But it would be years before money from any new member would arrive. If ESO wants to build the ELT, it has few choices but to wait for Brazil. ■

CLIMATE CHANGE

Floods spur mountain study

Himalayan nations take action in response to changing climate and its deadly effects.

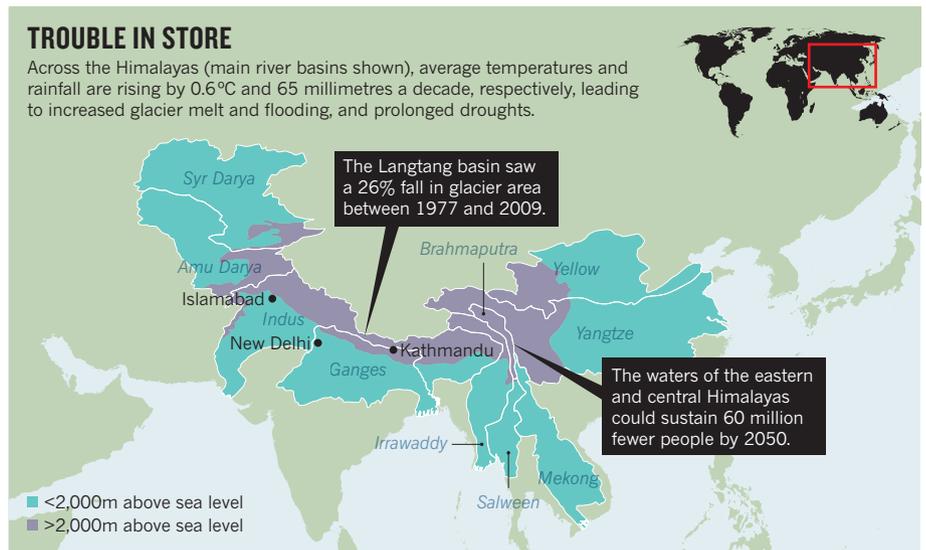
BY JANE QIU

A snapshot of weather-related disasters in the Himalayas suggests that things are amiss on the roof of the world.

This spring, for example, western Nepal was hit by a severe drought, leading to crop failures and exacerbating an already serious food crisis. In June, the same region was devastated by its worst floods in 50 years, caused by unusually intense monsoon rains. The deluge wreaked havoc in the northern Indian states of Uttarakhand and Himachal Pradesh, killing at least 5,700 people and causing an estimated loss of US\$2 billion.

After decades of such climate-related incidents, the eight member countries of the International Centre for Integrated Mountain Development (ICIMOD), a regional body, have agreed that enough is enough. On Monday, they launched a three-year study that aims to comprehensively assess the current state of the Hindu Kush Himalayas, the enormous area sustained by the world's highest mountain range, and to make recommendations on how it might be safeguarded and developed.

And none too soon, say many scientists. As climate change tightens its grip, "disasters will become increasingly frequent", says



Vinod Tewari, a geologist at the Wadia Institute of Himalayan Geology in Dehradun, India. The Himalayas are getting warmer at a rate of 0.6°C each decade, three times the global average¹. Rainfall there is increasing at a rate of 65 millimetres per decade and the monsoon season is getting wetter¹. However, winters are getting drier (see "Trouble in store").

As a result of the warming, most Himalayan

glaciers are retreating rapidly. Glacier lakes are becoming larger and more numerous, inundating pastures and threatening downstream communities. The changing climate is also "taking a toll on alpine pastures and forests", says Maharaj Pandit, an ecologist at the University of Delhi in New Delhi. Some plants are shifting to higher altitudes², others are on the verge of extinction, and the incidence of invasive

SOURCE: S. R. BAJRACHARYA ET AL. CLIMATE CHANGE (U. BLANCO ED.) (INTECH, 2011); S. DASGUPTA ET AL. J. ENVIRON. DEV. 20, 167-190 (2011)

species is rising. “If the warming trend persists, we will see drastic changes in the ecosystems, with devastating consequences on biodiversity and the livelihood of mountain communities,” he adds.

India and Nepal are not the only nations affected. Hindu Kush is a 3,500-kilometre mountain chain that spans eight countries — from Afghanistan to Myanmar. Known as Asia’s water tower, the mountains provide ecosystem services and support the livelihoods of more than one-fifth of the global population.

“The impact of climate change is compounded by many other challenges that face the Himalayas,” says David Molden, ICIMOD’s director general. In the past few decades, the region has seen increasing population growth, energy shortages, pollution, environmental degradation and disasters — all of which challenge traditional livelihoods. “Once self-sufficient people now face dire economic poverty,” he says.

To mitigate climate change, it is crucial to factor in all those challenges, says Molden. This is where ICIMOD’s assessment comes in. It will, he says, review the current state of knowledge on glaciers, biodiversity, water resources and pollution, identify trends of changes in climate, demography and land use, and address issues such as poverty, hydropower development, natural disasters and food security. The result will be a set of policy recommendations on, for example, sustainable grazing, increased collaboration between nations, deforestation and flood prevention.

The Himalayas are of global significance, says Volker Mosbrugger, director of the Senckenberg Research Institute and Natural History Museum in Frankfurt, Germany. The report will help to manage the region’s wealth of resources sustainably and empower mountain communities to tackle climate change, he says.

Pandit lauds the project as “timely and important”, but says that it is the enforcement that matters. “Whatever decisions or recommendations are given, they have to reach local authorities.” ■

1. Shrestha, U. B., Gautam, S. & Bawa, K. *PLoS ONE* **7**, e36741 (2012).
2. Telwala, Y., Brook, B. W., Manish, K. & Pandit, M. K. *PLoS ONE* **8**, e57103 (2013).



Non-native eucalyptus trees dominate the wild forest that covers San Francisco’s Mount Sutro.

ECOLOGY

Forest management plans in a tangle

Conservation fight flares over invasive California eucalyptus.

BY DANIELLE VENTON

In the middle of metropolitan San Francisco stands an army — and many Bay Area residents want it to stay garrisoned there. It is a forest of non-native, invasive blue gum eucalyptus, along with Monterey cypress and pine, that has covered the city’s Mount Sutro since the late nineteenth century.

For more than a decade, the University of California, San Francisco (UCSF), which sits at the base of the hill and owns the 25-hectare reserve, has sought to manage the forest. Its aim is to reduce fire hazards and to encourage native grasses, wild flowers and brush by selectively thinning the trees. It also wants to restore the original natural habitat — and some conservationists and locals are having none of it.

On 29 August, as San Francisco’s characteristic fog burned off, about 40 protesters stood in front of the UCSF campus while a crew with chainsaws and electric weed-cutters cleared blackberry bushes, ivy vines and small eucalyptus trees near roads and buildings in what the university is calling “urgent

fire measures” recommended by the city’s fire department. The protesters were not pleased to see the trees come down, even in the name of fire safety. “Here we have a beautiful, wild forest right in the middle of our city and the university wants to destroy it,” says Paul Rotter, a resident of the area since the 1970s who regularly walks the hill.

Selective tree-clearing on Mount Sutro would help the larger remaining trees to fight the beetle and fungal pests currently afflicting the forest, say UCSF consultants. The area’s great horned owls could also have more foraging opportunities. Reducing competition for sunlight should encourage the growth of large trees, which, say consultants, would enhance carbon storage and reduce the risk of the catastrophic fires that threaten lives and property, and pour carbon into the atmosphere.

That these reasons hold little water with the protesters highlights an emerging fissure among environmentalists and ecologists. For some, a hardline devotion to preserving native ecosystems is giving way to a more post-modern idea of what constitutes a natural ▶

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