

► them for aerial photography and package delivery. This has put the FAA under pressure to develop regulations prohibiting uses of drones that compromise safety or violate privacy. A few years ago, the US Congress ordered the FAA to develop such rules by September 2015. But in a report this July, the US Department of Transportation's inspector general expressed doubt that the FAA would make its deadline.

The administration has shut down almost all commercial drone flights until those regulations are in place — to the ire of some researchers. “The FAA's severe restrictions on research and education are out of all proportion to the actual risks posed by small-model aircraft used responsibly on private property,” says Paul Voss, an engineer who does atmospheric research at Smith College in Northampton, Massachusetts. On 25 July, Voss and 28 of his colleagues wrote to the FAA outlining their concerns. Because the agency is forbidden by law to put such severe restrictions on model aircraft flown by hobbyists, they say, it has established a bizarre double standard in which recreational users can pilot drones but trained researchers cannot.

Geographer Scott Drzyzga of Shippensburg University in Pennsylvania, for example, enjoys flying small helicopters in his free time, and had hoped to show his students how to use them to capture geographical information. “There are things I can do as a recreational user that I cannot do in front of my students,” he says. “It's frustrating.”

Alison Duquette, a spokesperson for the FAA, says that the distinction has been in place for years, and the agency has always made it clear.

Engineer Mary Cummings at Duke University in Durham, North Carolina, hopes to overcome the regulatory obstacle by teaming with colleagues at a nearby public university to test drones for wildlife tracking. But for now the FAA rules confine her to indoor testing — poor conditions for determining whether her machines can follow animals in the wild. “We are looking to go to another country to address this problem,” she says.

Even at public universities, red tape and legal fears have spooked researchers who want to use drones. Larry Purcell, a crop scientist at the University of Arkansas in Fayetteville,

has used the devices to monitor the effects of drought on soya beans. He did not know that he was required to fill out a 50-page application for each field he wanted to survey. Instead, he sought and obtained verbal permission from FAA staff at a local airport. Shortly after his university issued a press release about his work in 2011, Purcell received a cease-and-desist letter from the FAA's regional office. “It's still very confusing as to what's allowed right now and what's not,” he says. Purcell has turned to kites to carry his cameras aloft, but the compromise has its shortcomings: no wind means no data.

Others at both public and private institutions have continued their work without notifying the agency. Several scientists contacted by *Nature* declined to describe their work with drones, for fear of drawing FAA attention.

And some have gone to extremes to stay out of trouble. A few years ago, Voss designed 200-gram drones small enough to pack into a suitcase for field work in Antarctica. The craft worked well, but he has since got rid of them. “I don't even want them in the lab,” he says. “I want to be squeaky clean.” ■ [SEE EDITORIAL P.231](#)

ENVIRONMENT

Double threat for Tibet

Climate change and human development are jeopardizing the plateau's fragile environment.

BY JANE QIU IN LHASA

A comprehensive environmental assessment of the Plateau of Tibet has found that the region is getting hotter, wetter and more polluted, threatening its fragile ecosystems and those who rely on them.

The plateau and its surrounding mountains cover 5 million square kilometres and hold the largest stock of ice outside the Arctic and Antarctica; the region is thus often referred to as the Third Pole. And like the actual poles, it is increasingly feeling the effects of climate change, but rapid development is putting it doubly at risk, the report says.

Released in Lhasa on 9 August by the Chinese Academy of Sciences (CAS) and the government of Tibet, the assessment aimed to address gaps in knowledge about the extent of the problems the 4,500-metre-high plateau faces. It finds that precipitation has risen by 12% since 1960, and temperatures have soared by 0.4°C per decade — twice the global average.

In addition, glaciers are shrinking rapidly and one-tenth of the permafrost has thawed in the past decade alone. This means that the number of lakes has grown by 14% since 1970, and more than 80% of them have expanded since, devastating surrounding pastures and communities.



The plateau feeds Asia's biggest rivers (see 'Running wild'), so these problems are likely to affect billions of people, the report says. Pollution from human and industrial waste as a result of rapid development is also a serious risk.

But the assessment also suggests ways to combat the problems, calling on the Chinese and Tibetan governments to make conservation and environmental protection top priorities. It will help in the design of “policies for mitigating



Hot, dry weather and progressive urbanization are turning grasslands into sand near the headwaters of the Yellow, Yangtze and Mekong rivers.

climate change and striking a balance between development and conservation”, says Meng Deli, Tibet’s vice-chairman.

“The Tibetan plateau is getting warmer and wetter,” says Yao Tandong, director of the CAS Institute of Tibetan Plateau Research in Beijing, who led the assessment. This means that vegetation is expanding to higher elevations and farther north, and growing seasons are getting longer. But some areas, such as the headwater region of Asia’s biggest rivers, have become warmer and drier and are being severely affected by desertification and grassland and wetland degradation.

Human activity, too, is on the rise. The population of the plateau reached 8.8 million in 2012, about three times higher than in 1951. And the number of livestock has more than doubled, putting more strain on grasslands.

MULTIPLE MENACES

Growing urbanization is creating more waste than the region can handle. Tibet has the capacity to treat 256,000 tonnes of domestic solid waste a year, less than the amount generated by its two largest cities, Lhasa and Shigatse. “You see a lot of rubbish lying around the plateau, including headwater regions,” says Kang Shichang, a glaciologist at the CAS Institute of Cold and Arid Regions Environmental and

Engineering Research Institute in Lanzhou. “It’s an environmental menace.”

A bigger threat comes from mining. According to the assessment, Tibetan mines produced 100 million tonnes of wastewater in 2007 and 18.8 million tonnes of solid waste in 2009. Because most of the mines are open pits and have limited environmental oversight, “air, water and soil pollution is particularly serious”, says the report. Officials release few details about actual pollution levels.

Pollution is coming not just from local sources. Dust, black carbon, heavy metals and other toxic compounds are being blown in from Africa, Europe and southern Asia. The dust and carbon residues are darkening glaciers, making them more susceptible to melting, and the toxic chemicals are poisoning crops, livestock and wildlife.

But the threats from mining and pollution are dwarfed by the potential repercussions of changes in ice and vegetation cover, the assessment says. Different surfaces — snow, grassland, desert — reflect and absorb different amounts of solar radiation, affecting how the air above them is heated. This means that changes in coverage are likely to affect the onset and strength

of Asian monsoons. It also has important ramifications for the livelihood of downstream river communities because the glaciers, permafrost and ecosystems act as a giant sponge, helping to control the release of water and prevent floods. “The significance of the assessment goes beyond national borders,” says David Molden, head of the International Centre for Integrated Mountain Development in Kathmandu.

Temperatures in the plateau are projected to rise by between 1.7°C and 4.6°C by the end of 2100 compared with the 1996–2005 average, based on the best- and worst-case global-emissions scenarios. So as urbanization and climate change tighten their grip, researchers worry that unbridled development will devastate the plateau’s environment. To protect it, the report says, the central government must evaluate local officials on the basis of their environmental, not just economic, achievements. It must also invest more in ecological compensation, for example by paying herders more to cut their livestock numbers. Moreover, it must be much more open about pollution incidents.

“Tibet will be a test case of how seriously China takes ecological protection,” says Yao. “Safeguarding the plateau environment is crucial not only for sustainable development of the region, but also to social stability and international relations.” ■

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Q&A

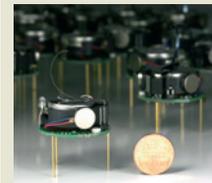


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