Obama's science adviser confirmed
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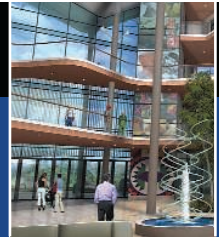

A new HIV/TB research center
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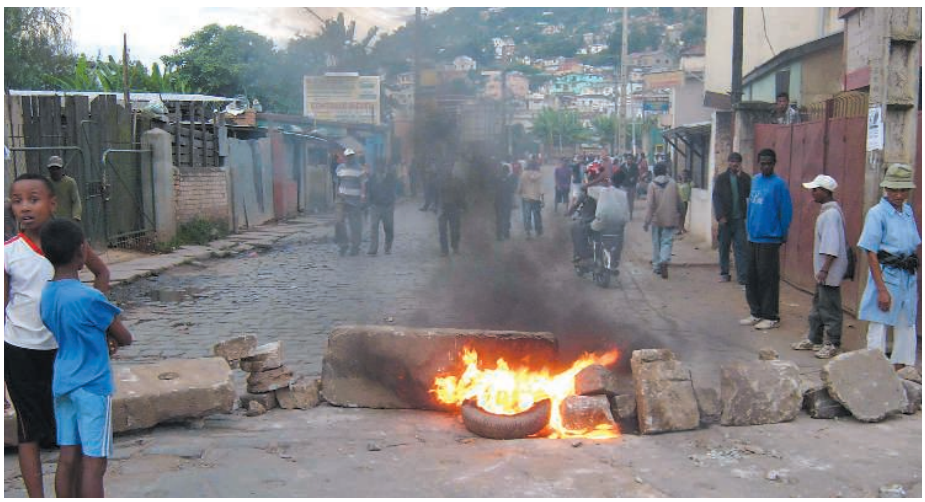

**Blocked.** Scientists returning from the field faced burning barricades in the capital.

AFRICA

# Madagascar's Coup Endangers Science and Scientists

The government of Madagascar was toppled last week in a bloody military coup that is playing havoc with the research efforts, and lives, of the many scientists studying the island's rich biodiversity. As the violence subsided, several researchers told *Science* about the harrowing events and their fears for the future of the African nation's unique natural resources. "I had to jump over 12 manned barricades of burning tires and then sneak through the public zoo to get to my house to pack," says Brian Fisher, an entomologist at the California Academy of Sciences and director of the Madagascar Biodiversity Center in Antananarivo, the nation's capital.

Until this year, Madagascar had been enjoying an unusual period of peace and stability. After being democratically elected in 2001, now-ousted president Marc Ravalomanana had championed science and conservation. During its 160 million years of isolation in the Indian Ocean, a strange menagerie of life evolved on the California-sized landmass, from unique noncactus prickly plants to the only populations of our primate relatives, the lemurs. But since arriving 2000 years ago, human colonizers have cut down more than 90% of the island's forests, threatening the flora and fauna with extinction.

The Ravalomanana government was credited with opening the doors wide to ecotourism. The lure of lemurs brought in hundreds of millions of dollars annually to one of the world's poorest nations. Madagascar's system of protected areas and national parks was expanded with the help of international support. In parallel, education and research have flourished, says Steven Goodman, a biologist at The Field Museum in Chicago, Illinois, who has lived and worked in Madagascar for more than 3 decades (*Science*, 26 September 2003, p. 1835). Goodman and his Malagasy collaborators have identified a string of vertebrate species new to science, including, just 2 years ago, "one of the most marvelous bats in the world" that climbs surfaces with suction-cup elbows.

The trouble started in January as the global economic downturn hit Madagascar, says Goodman. "There were a lot of people with little to no means to feed their families, tourism was close to zero, and organized crime had notably grown," he says. Some of Ravalomanana's decisions came under harsh criticism, such as his leasing of half of Madagascar's arable land to a Korean company for corn and palm oil production. Ravalomanana tried to quell criticism by partially shutting down television and radio stations, but protesters took to the streets of Antananarivo, and dozens were killed in clashes with the police. After the city's mayor, Andry Rajoelina, called on the president to resign, Ravalomanana sacked him. Madagascar quickly descended into chaos.

"The situation has gone from bad to worse," wrote Goodman in an e-mail to *Science* on 17 March, the day the president resigned. "Gun fire around the house, raging fires in the neighborhood, and wide-scale looting and pillaging. … Several students have been killed." Fisher and other scientists were stranded in the turmoil after returning from fieldwork. On the way to the airport to flee the country, Fisher had "a close call" with a rock-throwing mob but escaped on a motorcycle. Nearly 200 deaths have been confirmed, but the true number is "far more than reported in the local and Western press," says Goodman, who remains in the capital.

When the country's military leaders declared support for the opposition last week, Ravalomanana resigned. Rajoelina, who had become the public face of the opposition, was installed as president and then dissolved Parliament. Supporters of Ravalomanana have held protest rallies, but little violence has been reported. On 21 March, Madagascar's highest court declared Rajoelina's leadership legal, although the 34-year-old former disc jockey is too young to hold office according to Madagascar's constitution. As *Science* went to press, the former president remained in hiding.

**Biological riches.** Steven Goodman holds newly discovered bat species of Madagascar.

Fisher says the coup derailed plans for donors to visit the island, placing his center in financial risk. "The big fear now is that this year's tourism revenue for Madagascar will be completely wiped out," adds Christopher Raxworthy of the American Museum of Natural History in New York City, who studies the island's unique reptiles and amphibians. "Sadly, any decrease in income from tourism may increase human

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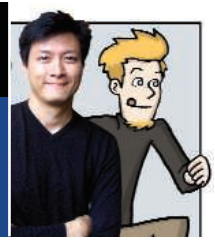
Seeing the humor in grad school
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pressures on the local natural resources."

A more immediate threat to the environment comes from "people taking advantage of a power vacuum," says An Bollen, a biologist who coordinates an international conservation organization based in Toamasina in eastern Madagascar called the Madagascar Fauna Group. Marojejy National Park has been shut down due to "looting and destruction," according to its Web site. It reports that "gangs of armed men (led primarily by foreign profiteers in conjunction with the rich local mafia) are plundering the rainforests. … Most worrisome is the well-being of the highly endangered Silky Sifaka," a lemur that exists only in the park's forests and the surrounding area.

Madagascar's new government is being greeted with international condemnation, and most nonhumanitarian aid to the nation has been frozen. In terms of conservation, "it is unclear what the new government will bring," says Bollen, noting that the new environment minister is a former employee of a major nickel-cobalt mining company. **–JOHN BOHANNON**

GLOBAL WARMING

# Arctic Summer Sea Ice Could Vanish Soon But Not Suddenly

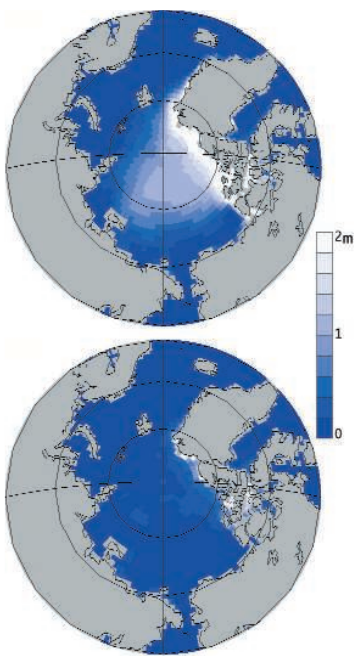
Global warming is causing trouble for polar bears, no doubt about that, but how long the bears will have floating ice for summer seal hunting has remained unclear. Just a few years ago, it looked as if summer ice would still be around at the end of the century, but when ice melting took a sharp turn for the worse in 2007, some scientists started talking about catastrophic "tipping points" and a possible imminent demise of summertime ice.

After paring their suite of 23 climate models down to the best half-dozen, two researchers now say with new confidence that summer ice will most likely disappear around 2037. But none of the select models predicts a tipping point—a sudden jump to an ice-free summer Arctic. "They've identified the most credible models," says polar researcher John Walsh of the University of Alaska, Fairbanks, and "the most realistic models are the most sensitive to future [greenhouse] changes." All in all, it's bad news for the bears.

The new model study recognizes that not all climate models are created equal. For the 2007 Intergovernmental Panel on Climate Change (IPCC) assessment, modelers around the world ran 23 different climate models with and without rising greenhouse gases. The fate they predicted for arctic ice ranged from complete loss in the summer by 2020 to only slight losses by 2100, and almost everywhere in between. Modeler Julienne Stroeve of the National Snow and Ice Data Center (NSIDC) at the University of Colorado, Boulder, and her colleagues shrank the IPCC list to the 13 models that did a reasonable job of reproducing the observed slow decline of the extent of summer sea ice, but that still left them with a considerable range of losses by 2100.

To further narrow the possible outcomes, arctic researchers Muyin Wang of the University of Washington, Seattle, and James Overland of the Pacific Marine Environmental Laboratory in Seattle added another constraint: Usable models must reasonably reproduce the ups and downs of sea ice area from summer to winter and back. As they report in a paper in press at *Geophysical Research Letters*, that shortened the list to six models. "That's a very important improvement," says Wang, because those models should have the most realistic response to the rising heating by the strengthening greenhouse.

Wang and Overland then examined each simulation to see how many years it took summer sea ice to dwindle from its current 4.6 million square kilometers to an essentially ice-free summer Arctic Ocean. The "expected time frame" for ice-free summers is about 30 years. Ice-free conditions aren't likely before the late 2020s, according to these models. And none of them go ice-free in a single, abrupt jump; there are no tipping points.




**Won't be long.** The six best climate models available show global warming clearing the Arctic Ocean of summer ice (*top*) within about 30 years (*bottom*).

Researchers have long worried that the models don't have ice tipping points because they simulate some key physical process poorly. In the real ocean, for example, a decline in ice coverage decreases the amount of solar energy that ice reflects back to space while increasing the amount of heat absorbed by the darker open water. This ice-albedo feedback, if unopposed, could drive the system past a tipping point, but ice physicists Ian Eisenman of the California Institute of Technology in Pasadena and John Wettlaufer of Yale University believe they have discovered what tends to counteract it.

In the 6 January issue of the *Proceedings of the National Academy of Sciences*, Eisenman and Wettlaufer report an underappreciated ice-thickness feedback that strongly opposes the ice-albedo feedback. When added summer heat thins the ice, the ice can grow back in winter all the faster because the ocean can lose heat faster through thinned ice. "The harder you kick the ice, the harder it tries to get back to where it was," says Eisenman. "The models do agree with our claim" that the competition between the two feedbacks that will hold off a tipping point, he says.

The loss of summer sea ice in 25 or 30 years "is probably the best estimate that models can come up with at the moment," says sea ice specialist Josefino Comiso of NASA's Goddard Space Flight Center in Greenbelt, Maryland. It coincides with the central tendency of expert opinion, adds Walsh. "We're resigned to losing the ice," says sea ice specialist Mark Serreze of NSIDC. And it looks as if that will happen sooner rather than later.

**–RICHARD A. KERR**

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