

NATURAL DISASTERS

Ecologists Report Huge Storm Losses in China's Forests

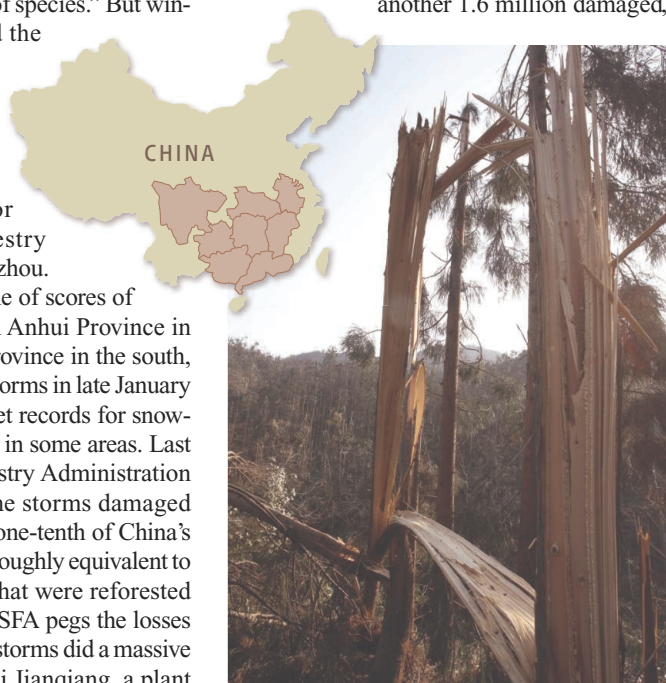
GUANGZHOU, CHINA—From delicate orchids and magnolias to rare Chinese yews and Kwangtung pines, the flora of Guangdong Nanling National Nature Reserve is considered so precious that ecologists call the reserve “a treasure trove of species.” But winter storms have reduced the biological hot spot to a splintered ruin. Snow, sleet, and ice laid waste to 90% of the 58,000-hectare reserve's forests, says He Kejun, director of the Guangdong Forestry Administration in Guangzhou.

Nanling Reserve is one of scores of fragile ecosystems, from Anhui Province in the east to Guangdong Province in the south, that took a beating from storms in late January and early February that set records for snowfall and low temperatures in some areas. Last week, China's State Forestry Administration (SFA) announced that the storms damaged 20.86 million hectares—one-tenth of China's forests and plantations—roughly equivalent to the number of hectares that were reforested between 2003 and 2006. SFA pegs the losses at \$8 billion. “The severe storms did a massive amount of harm,” says Li Jianqiang, a plant taxonomist at Wuhan Botanical Garden. “This scale of damage has never happened before.” He Kejun and others say it will take decades for the hardest-hit ecosystems to recover.

The ecological and economic toll rivals that of devastating floods along the Yangtze River in 1998 that inundated 25 million hectares of farmland. For broadleaf evergreen forests, “this is bigger than the Yangtze disaster. It's unique in the history of south China,” says Ren Hai, an ecologist with the South China Botanical Garden (SCBG) in Guangzhou. SFA and other agencies have dispatched scientists to take stock and formulate restoration plans. “The government is acting very, very fast,” says Ren.

In southeastern China's worst winter in 5 decades, snow and ice knocked out power and paralyzed roads and rail lines at the height

of the year's busiest travel season—the Spring Festival, when many Chinese return to their hometowns. The storms pummeled 21 of 33 provinces and regions, claiming 129 lives. Some 485,000 homes were destroyed and another 1.6 million damaged,



Disaster scene. Storm damage was more severe in eight provinces (red); devastation at Nanling reserve.

displacing nearly 1.7 million people, according to central government statistics. Agriculture officials estimate that 69 million live-stock—mostly chickens and ducks—froze to death. Storm-related losses exceed \$21 billion. As *Science* went to press, electricity had still not been restored to some remote areas.

Scenes of scums at train stations and vehicles adrift on highways were splashed across the news in China and abroad last month. Meanwhile, outside the spotlight, an ecological calamity was unfolding. In Jiangxi Province, for example, entire bamboo forests were reduced to matchsticks; fast-growing bamboo can regenerate in several years. In Guangdong, officials estimate that more than

700,000 hectares of forest and plantations are damaged severely, with losses approaching \$1 billion. Other provinces enduring extensive forest damage are Anhui, Guangxi, Guizhou, Hubei, Hunan, and Sichuan (see map).

The carnage was not limited to natural ecosystems. “Exotic species were harmed more than native species,” says Ren. In northern Guangdong Province, plantations of slash pine (*Pinus elliottii*), an import from the southern United States, splintered under wet snow, and extensive stands of Australian gum trees “are almost all going to die,” Ren predicts. At Wuhan Botanical Garden in Hubei Province, the roof of a greenhouse housing Asia's largest assemblage of aquatic plants caved in under heavy snow. “A unique collection has been lost,” says Wuhan botanist Li Xiaodong.

SCBG scientists maintain long-term experimental plots at Nanling that will allow them to gauge ecosystem damage and recovery. At the moment, the picture is bleak. Nanling's entire forest between 500 meters and 1300 meters in elevation was wiped out, says He. “Before the storm, we could hear birds singing in the reserve. Now it is mostly silent,” he says. Many *bai xian*, or silver pheasants—Guangdong's official bird—succumbed to the severe weather, and carcasses litter Nanling's trails, says He. One worry, he says, is that epidemics will erupt this spring in the storm-sapped animal populations and among migratory birds.

With support from Guangdong Province's government, SCBG plans to send teams of scientists to several of the most devastated forests to survey damage and to set up test plots that will track everything from species composition to the susceptibility of the degraded forests to insect pests and fires.

The storm damage lends urgency to a new national strategy for plant conservation released last week by SFA, the Chinese Academy of Sciences, and the State Environmental Protection Agency. Under the manifesto, crafted with help from Botanic Gardens Conservation International, a Richmond, U.K., nonprofit, China has pledged to launch a nationwide survey of species and habitats, construct a national herbarium, crack down on illegal logging, and establish by 2010 a system to monitor and protect China's 31,000 plant species, more than half of which are native. Some ▶



5000 plant species in China are threatened with extinction.

As damage assessments proceed, SFA has established a disaster relief technology group and will hold an emergency meeting later this month to plan for restoration. Botanical gardens are doing their part, too. “We must work hard to save vegetation and lessen the extent of damage,” says Ren. “We want to find a way to help natural ecosystems

recover with minimal human disturbance.”

That is a tricky balancing act. At Nanling, managers are barring local residents from entering to remove downed timber. Although salvage logging could reduce wildfire risk, it could exacerbate erosion, further degrading ecosystems. The bulk of the restoration work is likely to focus on economic recovery: rehabilitation of plantations. The storm’s aftermath should also

spur long-term research on plant cold tolerance, says Li Jianqiang.

The immediate task is picking up the pieces after the worst winter in recent memory. “We cherish our endangered species,” says Li. But for some of the precious plants at Wuhan Botanical Garden and in southern China’s battered reserves, he says, “there is nothing we can do to save them.”

—RICHARD STONE

With reporting by Li Jiao in Beijing.

ANIMAL RIGHTS

Brazilian Scientists Battle Animal Experimentation Bans

Brazilian scientists are fighting a series of local attempts to ban animal experimentation that they say could cripple scientific research. At the top of their list: a controversial law passed 2 months ago by the city of Rio de Janeiro that prohibits all animal experiments at private companies. Researchers are hoping that a comprehensive federal bill addressing animal experimentation, which has been lingering in the Brazilian Congress for 12 years, will put a stop to such local bans.

The battle in Rio, a major biomedical research hub, has gone on for more than 2 years. In 2006, the city council passed an animal-welfare law, introduced by actor-turned-politician Cláudio Cavalcanti, that would have banned all animal experiments in the city. Mayor César Maia vetoed the bill. A second version, passed in September 2007, made an exception for universities and public organizations such as the Instituto Oswaldo Cruz (Fiocruz), a major vaccine producer. Maia vetoed that one, too. But the council overrode his veto on 26 December.

The law has not taken effect yet, and the mayor does not appear in a hurry to enforce it, says animal physiologist Luis Eugênio Mello of the Federal University in São Paulo, president of the Federation of Brazilian Societies of Experimental Biology. But if enforced, the ban could force several Rio biotech companies out of business. “It’s a crazy law,” says Eduardo Krieger, a former president of the Brazilian Academy of Sciences.

A comparable far-reaching bill was approved in December by Florianópolis, the capital of the southern state of Santa Catarina; that law was replaced by the city’s mayor in February with much less

stringent regulations. Similar legislative plans are afoot in other cities.

Brazil’s scientists contend that regulating animal research should not be a local issue and are arguing for a federal law. Indeed, such a bill was introduced in 1995 by Chamber of Deputies member Sérgio Arouca, who was once director of Fiocruz; it would ban animal experiments if other alternatives are available, require ethics committees to approve studies, and set up a national council to issue guidelines. But the bill never came to a vote, and Arouca died in 2003.

Researchers say “Arouca’s law” would protect them from a wave of municipal or state initiatives, and they have been lobbying hard to get the bill to a vote. Animal-rights activists oppose it, however. Ethics panels, which already exist at the majority of research institutions, are dominated by scientists and rubber-stamp proposals, says George Guimarães, director of Ethical Vegetarianism, Animals Rights Defense and Society, a São Paulo-based group.

The researchers’ lobbying appears to have paid off, says Mello, with “support from left to right” in Congress. And recently, Brazil Presi-



No petty issue. Cláudio Cavalcanti is pushing for a ban on animal experiments to include the Instituto Oswaldo Cruz (top).

dent Luiz Inácio Lula da Silva, who has made advancing research a national priority, named Arouca’s law among his legislative priorities. Guimarães agrees that the federal bill is now likely to pass. But a legislative stalemate in the Congress, unrelated to the bill, could make it hard to pass any laws at all in 2008, Mello warns.

Cavalcanti says that he wants Rio’s mayor to enforce his law; he will also reintroduce the proposal for a total ban this year. Officials at Fiocruz, a big yellow fever vaccine producer, have warned that such a move could imperil routine quality testing of vaccines. But Cavalcanti says that he does not believe animal research can benefit human health. A single-issue politician, he has offered to become a guinea pig himself if it can help save animals. “This is my mission, my only reason for living,” he says.

Scientists should do more to counter the cruel image of animal studies that activists have promoted and explain why such work is necessary, says Walter Colli of the University of São Paulo. “We are guilty of not having done enough to influence public opinion,” he says. “The average citizen is confused.”

—MARTIN ENSERINK