An Australian agency plans to pull the plug on a long-term ecological monitoring program in the stunning Simpson Desert.

Aaron Greenville

Australia to ax support for long-term ecology sites

By John PickrellAug. 11, 2017 , 5:10 PM

SYDNEY, AUSTRALIA—The Simpson Desert of central Australia is as starkly beautiful as it is ecologically entrancing. Ranks of rusty red sand dunes run unbroken for hundreds of kilometers. During rare years with sustained downpours, moist swales are carpeted with spiky spinifex grasses that take on the appearance of fields of golden wheat. Desert ecosystems dominated by spinifex or *Triodia* grasses cover about 70% of Australia, but the only long-term experiment for studying them is set in a section of the desert in western Queensland—and that research site is now in jeopardy.

Launched in 1990, the study has shown that heavy rains cause flushes of vegetation and seeds that lead to booms of insects, small marsupials, and rodents. Outback pools draw immense swarms of parakeets called budgerigars. That explosion of life attracts feral foxes and cats, which have had a role in the extinction of 27 species and subspecies of mammals in Australia since European colonization in 1788. The invasive species ravage the native ones, which may spend many years hunkered down in scrubby woodland refugia until fresh downpours start the cycle again.

If you monitored the desert's fauna for just a few years at a time you'd miss that dynamic, says Glenda Wardle, an ecologist at the University of Sydney here. "Long-term research in the Simpson Desert has provided fundamental insights into the ecology of outback Australia" and crucial information for protecting endangered species and other natural resources, says Wardle, co-leader of the Simpson Desert Mammal Monitoring project.

But such studies are now slated for the chopping block. A body funded by Australia's federal government plans to stop funding all 12 sites in Australia's Long Term Ecological Research Network (LTERN), including the 8000-square-kilometer Simpson Desert site, at the end of this year. In a letter in today's issue of *Science*, Wardle and 68 co-authors decry the decision as "totally out of step with international trends and national imperatives." She and leaders of the other projects are now scrambling to find other sources of funding before their coffers run dry.

LTERN's demise could have major consequences, supporters say. "In a country like Australia, which is facing huge challenges with climate change, with expanding populations, with major pressures on its water supplies and land area—we're not going to be able to predict anything about the status of our environmental assets," says David Lindenmayer, LTERN's science director, lead signatory of the letter, and an ecologist at the Australian National University in Canberra. Barring an 11th hour reprieve, some sites will surely have to shut down, he predicts. "That's a catastrophic loss because it means we have no real ability to take a health reading on the country."

LTERN covers more than 1100 long-term field plots in ecosystems including alpine grasslands, tall wet forests, temperate woodlands, heathlands, tropical savannas, rainforests, and deserts. Some sites are globally unique, including Victoria state's forests of mountain ash trees (*Eucalyptus regnans*), the world's tallest flowering plants. Each of the 12 networks of plots started as discrete university-run projects that in 2012 were gathered under the government's Terrestrial Ecosystem Research Network (TERN) in Brisbane. But budget cuts and new government guidelines on funding priorities have forced TERN to terminate the AUS$900,000 program, says TERN Director Beryl Morris. TERN will continue to fund a handful of long-term sites that are not part of LTERN, including the Warra tall gum forests of Tasmania.

To illustrate LTERN's value, scientists rattle off a number of major findings. In 2010, for example, studies centered on Kakadu National Park south of Darwin, Australia, revealed a population collapse of small marsupials and mammals. The cause, says network co-leader Jeremy Russell-Smith of Charles Darwin University in Casuarina, Australia, appears to have been more frequent fires, which created more open ground and allowed feral cats to decimate native species. "People assumed [that ecosystem] was pretty intact," he says. "That view is totally incorrect, but you need long-term monitoring to show that."

LTERN's closure would have international implications, says David Keith, an ecologist at the University of New South Wales here who manages studies at three sites. Of 80 ecological communities listed as threatened by the Australian government, only

24 are monitored, and LTERN studies account for the longest and most reliable data sets. “Their discontinuation will substantially weaken Australia’s … ability to report on progress to meet international targets agreed to under the Convention on Biological Diversity,” he says.

Lindenmayer and others are making a last-ditch bid to find new pots of money to stabilize LTERN—and, if they’re lucky, expand the network to major ecosystem types currently lacking long-term monitoring. “I am hopeful,” says Keith, “that a phoenix will rise from the ashes.”

Ecologists protest Australia’s plans to cut funding for environment-monitoring network

Scientists say the move will reduce the country’s capacity to predict future ecosystem changes.

Nicky Phillips
14 August 2017

Theo Allofs/Getty Images

Field sites in the Simpson Desert are part of Australia's Long Term Ecological Research Network.

Every year since 1990, ecologist Glenda Wardle of the University of Sydney has ventured to the same expanse of desert in central Australia to take stock of its flora and fauna. But this year may be the last time Wardle can collect data from the 8,000-square-kilometre site in the Simpson Desert. The consortium that operates her research area and 11 other long-term sites, comprising more than 1,100 individual field plots, will stop funding this network by the end of the year because of budget cuts and shifting priorities, say its leaders.

Without this money, which covers a large portion of the operating costs at these sites, 6 of the 12 will probably close, says ecologist David Lindenmayer, who is the science director of the network and is based at the Australian National University in Canberra. This would break time-series data that scientists have collected over decades, he says.

“It’s a foolish decision given the environmental effects that are occurring throughout the world, and especially in Australia,” says Gene Likens, an ecologist at the Cary Institute of Ecosystem Studies in Millbrook, New York. Without the information collected at these long-term sites, he says, it will be impossible to know how to manage these landscapes effectively under climate change.

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Other researchers, however, concede that tight budgets mean that not all facilities can be funded.

As Australia plans to cut its ecosystem-surveillance network, other countries are expanding theirs. The US National Science Foundation, for example, announced in March that it would expand its own network of 25 long-term ecological research (LTER) sites by adding 3 new ones. “Terminating Australia’s LTER network is totally out of step with international trends and national imperatives,” wrote Lindenmayer and 68 authors in a letter published in *Science*[1] on 11 August. They say urgent and direct investment by the Australian government is crucial.

Budget cuts

The cuts in Australia follow years of piecemeal support for ecological research infrastructure. Only five years ago, the government tasked a consortium known as the Terrestrial Ecosystem Research Network (TERN) with bringing together the country’s existing LTER sites. The dozen sites in the resulting Long Term Ecological Research Network (LTERN) cover deserts, rainforest, savannahs and alpine regions and collect data to answer questions specific to each ecosystem. The oldest field locations have been running continuously for 73 years.

In June, TERN director Beryl Morris and chair of the advisory board Lyn Beazley sent a letter to LTERN’s executive director, Emma Burns, stating that the network would not be funded beyond 2017. “I was completely blindsided,” says Burns, an ecologist at the Australian National University.

Burns says the reason given for cutting LTERN's funding, along with support for a complementary ecosystem-modelling facility known as eMAST, was so that TERN could meet the needs of the government's planned environmental prediction system while staying within its budget, which is Aus$6 million (US$4.7 million) for 2016–17, a decrease of more than 50% since 2010–11. The government did not respond to questions from Nature about the future of LTERN.

Morris, who is based at the University of Queensland in Brisbane, where TERN is administered, says that TERN is funded as research infrastructure and must now develop an environmental prediction system open to all researchers. To do that, she says, it must collect data on a "continental scale that is generalized, not bespoke, so you can predict from it".

But Burns says the local and international scientific communities do not agree that TERN can deliver an environmental prediction system without LTERN. Time-series data and modelling are essential to a prediction system, says Wardle.

Michael Mirtl, who chairs the International LTER Network and is based at the Helmholtz Centre for Environmental Research in Leipzig, Germany, says the network's closure will be a loss for groups in other countries that looked to Australia for guidance on how to integrate an LTER network and other surveillance systems with data processing and modelling systems. "I think many people in Australia making decisions were simply not aware of how excellent the Australian achievement was in the field," says Mirtl.

Experimental design

Plans to withdraw funding from LTERN resurrect an ongoing debate in ecology about whether it is better to invest limited resources for environmental forecasting in broad-scale surveillance — generating lots of data by taking the same measurements in the same way at sites across the landscape — or in targeted ecological monitoring, which looks for drivers of change in specific ecosystems.

Likens says that standardized surveillance and "instruments are useful", but he and others, such as Lindenmayer, believe that monitoring should be driven by researchers asking questions that answer problems. In the tropics of northern Queensland, for example, cyclones are the main driver of environmental change, whereas in parts of inland Australia, cattle grazing is the biggest factor. "That means you can't just measure the same things in different environments," says Lindenmayer.

Ecologist Ben Sparrow of the University of Adelaide and environmental chemist Mike Liddell of James Cook University in Cairns, both of whom direct other TERN facilities, say TERN doesn't have the money to keep all its facilities running. Sparrow says that arguing over the merits of broad-scale surveillance and targeted monitoring is not constructive: both systems are necessary for understanding the environment, as is remote sensing using satellites. "The fundamental point is the lack of resourcing from the government," says Sparrow.

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References

1. Lindenmayer, D. *et al*. *Science* **357**, 557 (2017).