

Satellites reveal a bleak landscape

Changes in Australia's land cover from the combined effects of clearing, grazing and feral animals have disturbing implications for the continent's biodiversity, according to a CSIRO mapping program.

Using satellite imaging, scientists from the Division of Wildlife and Ecology have established that during the past 200 years more than one million square kilometres of native forest and woodland have been cleared or thinned: an area amounting to one fifth of the entire continent.

The division's Dr Dean Graetz, Murray Wilson and Sue Campbell mapped the extent, severity and type of these land cover changes on behalf of the Federal Government's Biodiversity Unit.

The report, *Landcover Disturbance Over the Australian Continent*, reveals that a third of Australia's cover of soils and native vegetation is significantly disturbed, and existing land-use patterns are conducive to future disturbance.

According to Graetz, the extent of thinning and land clearing recorded by the study is much larger than has been generally appreciated. He says a lot of previously unrecognised clearing has occurred along the margins in pastoral areas of Queensland and northern New South Wales, where sown pastures have expanded at the expense of open eucalypt and acacia woodlands. 'Also, we suspect that there has been a loss of large remnants within the core areas of the croplands,' he says.

Graetz says the established cereal cropping areas of southern Australia 'present a particularly bleak panorama' from space. 'As habitats, they are irreversibly altered,' he says. 'The remnants are small and isolated.'

The team categorised the continent into 34 land cover types. Each type was assessed for disturbance from clearing, grazing, feral animals and fire. Land tenure was also assessed to gain an impression of the vulnerability of each land cover type to further disturbance.

The result is a 'report card' for each land cover type. Some types, such as the tall shrublands once covering the Mallee region of north-west Victoria, fare particularly badly. In fact, just 1% of Australia's tall shrubland cover remains intact.

Such changes in the nation's landscape do not bode well for Australia's wealth of flora and fauna. The report warns that clearing and grazing are significant causes of impoverished biodiversity, and their effects are exacerbated by feral animals, in particular rabbits, cats, foxes and pigs.

The researchers say Australia will be paying the environmental cost of land cover disturbance for decades to come. Graetz says land cover is the thread that links three of today's most topical environmental issues: sustainable land use, climate change and loss of biodiversity.

For example, the National Greenhouse Gas Inventory Committee estimates that the clearing of forest for agriculture

contributes more than a quarter of the total net emissions in carbon dioxide equivalent.

'But all is not lost,' Graetz says. 'While it will be difficult, the broad scale integration on conservation and land use is possible. Land use is a social activity and is therefore manageable by social means.'

'Unfortunately, the contribution from feral animals is not, or not yet, although efforts are under way to achieve this goal.'

A complementary report from the Federal Environment Department's Biodiversity Unit – released together with the findings of Graetz's team – affirms that land clearing in Australia is continuing at a rate of up to 650 000 hectares a year. This equates to about one football field every 30 seconds, or about half the rate of clearing in the Brazilian Amazon.

The report, *Native Vegetation Clearance, Habitat Loss and Biodiversity Decline*, explodes the myth that most of Australia's land clearing occurred well over a century ago. In fact, as much land has been cleared since the Second World War as was razed in the 150 years preceding it.

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John van Tiggelen

Measuring the work of nature



Dr Mick Meyer from the Division of Atmospheric Research calibrates an automated gas exchange chamber in a triticale crop during the OASIS experiment at Wagga.

David Whittas

More than 40 scientists gathered at the southern New South Wales town of Wagga Wagga in October as part of an ongoing experiment to measure greenhouse gas emissions from Australian landscapes.

The OASIS experiment is using aeroplanes, satellites, a four-kilometre-high kite and ground instruments to monitor physical and chemical processes such as gas release from farm land, and water vapour and energy exchange between land and air. The data will be used to test and improve the accuracy of computer models which predict the impacts of global warming.

OASIS involves researchers from the CSIRO Climate Change Research Program and other CSIRO divisions; Flinders University; the Australian National University; the University of Wollongong; Charles Sturt University; HortResearch and NIWA from New Zealand; and the University of Colorado, US.

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