

The artificial waterpoints that threaten native plants and animals in the rangelands can also be a tool for their protection. Steve Davidson reports.



Taking **water** out of range

The 'discovery' in 1878 of Australia's Great Artesian Basin was a turning point for pastoralism and conservation in the rangelands.

Today, tens of thousands of bores tap the massive, 1.7-million-square-kilometre reservoir, bringing water to vast areas of the dry interior. Little of the rangelands, apart from in the central deserts, is more than six kilometres or so from a waterpoint.

This regular supply of water is a boon for sheep, cattle and kangaroos, but what are the consequences for native plants and animals adapted to life without abundant supplies of water? Given the different water requirements of livestock and some wildlife, how can pastoralism and conservation co-exist?

A team of ecologists from CSIRO Sustainable Ecosystems, (previously Wildlife and Ecology), has been looking

into these and related issues since 1993. As reported in *Ecos* 92, they have found that some species of plants and animals – such as galahs, kangaroos and many weeds – increase in abundance with closeness to water (increasers). Others, such as the little desert daisy, saltbush, and the hooded robin, decrease in abundance (decreasers). About 10–15% of all species in rangelands fitted this category.

The researchers recognised the need for strategies to save the decreasers. One-third of the rangeland's native mammals had already vanished in the past two centuries; a delicate balance between conservation and production needed to be found.

Protective properties

In 1996, a research team led by Dr Craig James of the CSIRO Centre for Arid Zone Research at Alice Springs began a project

aimed at saving decreaser species by integrating conservation with property planning.

The project involved landholders, the Pastoral Board of South Australia, the South Australian Department for Environment and Heritage, the Northern Territory Parks and Wildlife Commission. It was funded jointly by these agencies, and Land and Water Australia. The major outcome of the project is Biograze, a set of planning principles and methods for practical wildlife conservation in the outback.

James says the central idea of Biograze is to develop regional networks of lightly grazed or ungrazed areas in which grazing sensitive plants and animals can flourish.

'The rangelands are so vast and variable that a few large national parks, alone, are not adequate for conservation of the

diversity of plants and animals that live there,' he says.

'With Biograzing planning, we believe we can achieve voluntary, regional conservation networks of up to 10% of the total land area in a region, with minimal constraints on pastoral production.

'The costs in terms of lost production are less than might be expected because it is ungrazed and lightly utilised areas that are sought for deceiver species. These areas contribute just 1–2% to the income of most properties.'

Biodiversity consists of more than just deceiver species, but no special planning is needed for plants and animals unaffected by grazing. To maintain the balance, some control measures may be necessary for species that increase because of waterpoints and grazing.

Controlling the location of artificial waterpoints is the obvious place to start. Landholders can achieve a network of lightly grazed or ungrazed areas by retaining a few corners of some paddocks, or perhaps whole paddocks, in a water-remote state. In cattle country, any areas more than 8–12 kilometres from water will already be lightly grazed. For sheep, land beyond 4–7 km from bores will benefit deceiver species. The further the area is from water, and the larger it is, the better for deceiver species.

Often the plan will simply mean not providing new waterpoints near the identified low-impact areas. In other cases, it may be prudent to remove a few waterpoints to lighten grazing pressure. In some locations, waterpoints may be added without a deleterious effect on the chosen



The hooded robin is a deceiver species.

conservation areas (see diagrams on page 14). Fencing can be used in some situations to protect sensitive species. The Biograzing planning framework supports such decisions.

Usually, many different combinations of the available lightly grazed areas in a region can be selected to achieve a network representing each type of habitat.

Landholders warm to conservation

MOST landholders in south-east Queensland appreciate the need for conservation, and many are considering environmental aspects in their property management, according to the results of a CSIRO survey.

Some 40 landholders in the region were surveyed by Neil MacLeod and Jan Green from the Sustainable Rangelands Systems group at CSIRO Sustainable Ecosystems as part of a broader project aimed at balancing profitability and conservation in the rangelands.

The group, led by Dr Andrew Ash, works with land users to develop sustainable management practices, and to raise understanding of the economic and environmental benefits.

Responses to the survey showed that many landholders had a positive view of scientifically based principles for conservation on grazed lands, and endorsed their implementation.

For example, when asked if they agreed with the theoretical rationale behind conservation principles, almost all landholders acknowledged that they were reasonable. They also highlighted practical issues that would have to be resolved before conservation principles could be incorporated in pastoral management systems.

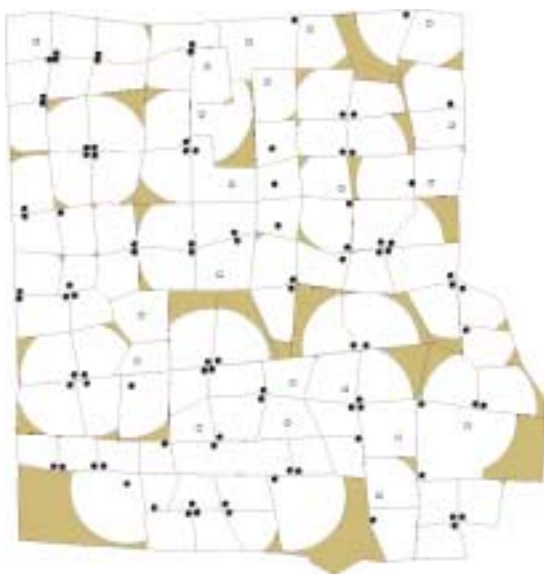
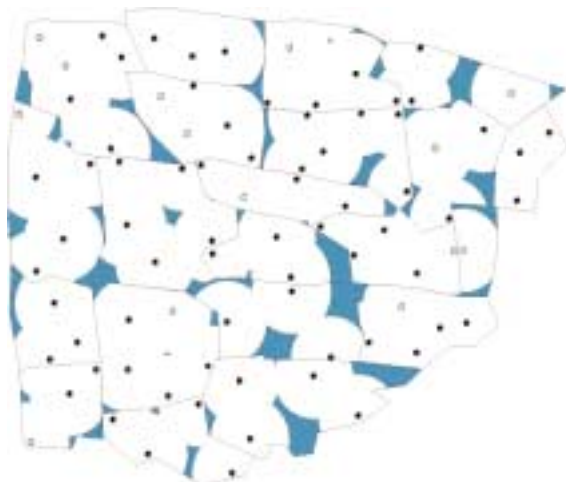


While attitudes may differ from region to region, the interviews indicated that some landholders had adopted environmentally-based management practices. For example, there has been an increased interest in retaining viable clumps of trees, and in fencing off some parts of watercourses to protect riparian vegetation and wildlife habitat.

'This gradual warming of sentiment towards the adoption of ecological management principles is the key to conservation and, in the long term, to profitable production on grazed lands,' MacLeod says. 'Landholders are rarely short-sighted and will act positively when conservation management can be shown to work for them.'

Above and below: Many landholders have a positive view of scientifically based principles for conservation on grazed lands. Some are retaining shelter and fencing off wildlife habitat.





'The most effective and least expensive design – and one that most appeals to landholders – can be sorted out only by talking to the land managers concerned,' James says.

Costs and case studies

Naturally, graziers are concerned about the costs involved in conservation projects on private and leasehold land.

In order to put Biograzing through its paces, the team applied its conservation principles to two case study regions: the Barkly Tablelands in the Northern Territory and the very different Kingoonya region of South Australia.

Left: Sheep-grazed area where 10% of the total area (shaded) is water remote and retained for deersers.

Above left: Cattle-grazed area where 5% of the total area (shaded) is water remote and retained for deersers.

Filled circles are the current waterpoints; unfilled circles are the waterpoints that could be installed after a Biograzing conservation point is developed.

They were aiming to test the planning process in realistic circumstances and to make meaningful assessments of possible costs and benefits. The plans developed for the two regions have yet to be implemented.

The researchers identified both one-off establishment costs, such as relocating waterpoints, and ongoing costs, such as the opportunity costs of not grazing (or of only lightly grazing) selected conservation paddocks in the future, or the ongoing maintenance costs of any fenced-off areas.

Their estimation of the likely costs involved in adoption of Biograzing plans for the Barkly Tableland and Kingoonya regions – each about 55 000 square kilometres in area – were \$442 000 and \$799 000 respectively (\$8900 and \$3000 per paddock).

'These six-figure overall costs are modest given the size of the areas involved, the number of properties, and the total value of pastoral production,' James says.

'We believe the costs of any conservation plan, negotiated here or elsewhere, should be shared between government and industry. Certainly, the costs of conservation through a Biograzing network are less than for an equivalent area of formal reserves.'

Satellites keep a watch on rangelands

SCIENTISTS at the Centre for Arid Zone Research are using satellite technology to assess the impact of cattle grazing on large pastoral leases in the rangelands.

The 'grazing gradient technologies' – developed by Gary Bastin and his colleagues – exploit the tendency of cattle in arid and semi-arid rangelands to graze in a radial pattern around widely-spaced watering points.

Vegetation close to water can be grazed back virtually to bare ground during dry periods, while that further away will often show lesser livestock impact, hence the term 'grazing gradient'. The gradients in plant cover can extend to several kilometres from watering points.

The CSIRO researchers employ satellite data and computer software to derive a measure, or index, of vegetation cover. The

index is then used to determine changes in cover at increasing distances from stock watering points. When graphed, the indices show to what degree grazing gradients persist after good rainfall, an indication of the extent of land degradation or desertification.

Different landscape types, such as alluvial plains and ranges, are analysed separately, as cattle graze selectively on different plants.

The pattern of recovery after rain is the key. If the computer output shows that gradients in vegetation cover persist after good rains, pastoralists and other land managers know that they have a potential desertification problem and that preventative measures are needed.

'The method is being trialled in South Australia, the Northern Territory and parts

of Africa and India,' Bastin says. 'On another tack, it could also be adapted to assess biodiversity, which we know is similarly affected by proximity to waterpoints.'

'We need a technique that is quick yet precise and cost-effective. Identification of a surrogate indicator of biodiversity that can be monitored by satellite could well be the answer.'

The work was part-funded through the National Landcare Program and the Japanese-based Global Research Network System.

More about the project

Chewings V Bastin, G Pearce G and Pickup G (1998) Remote Sensing of Central Australian Deserts. Interactive CD-ROM. CSIRO Wildlife and Ecology, Alice Springs.



Green benefits

On the other side of the ledger, the team has also identified a number of potential benefits and opportunities that pastoralists stand to gain from adopting conservation plans in the rangelands.

Australian rangeland regions are ideally placed to gain access to emerging 'green'

Abstract: The provision of water from the Great Artesian Basin to many parts Australia's rangelands has brought mixed blessings for native plants and animals. Some species increase in abundance with closeness to water. Others – some 10–15% of all species – decrease in abundance. Strategies are needed to ensure survival of the decreasees. The Biograzing project has provided a set of planning principles and methods for practical wildlife conservation. These involve controlling the location of artificial waterpoints to develop regional networks of lightly grazed or ungrazed areas in which grazing sensitive plants and animals can flourish. Research indicates this can be done without significant reductions in pastoral productivity, and could position pastoralists to access emerging 'green' markets.

Keywords: Biograzing, rangelands, grazing, land management, environmental management, wildlife conservation, Barkly Tablelands, NT, Kingoonya Region, SA.

markets. It is relatively easy for them to establish biodiversity-friendly credentials, given that rangelands pastoralism is based on ecosystems that are essentially natural and uncleared.

'If biograzing is implemented in the next few years, it will help pastoralists establish so-called best-practice, biodiversity-friendly management which will ultimately be of benefit in gaining a share of new green markets,' James says.

'If governments decide to reward private land managers for good environmental performance through "credit" systems, producers who contribute to biodiversity conservation could also reap financial benefits.'

Perhaps the most satisfying reward for practising conservation in the outback, however, is the knowledge that grazing sensitive plants and animals that could otherwise vanish from our vast and unique rangelands will survive and flourish indefinitely.

More about biograzing conservation

Biograzing: Waterpoints and Wildlife (2000)
CSIRO, Alice Springs, 13 pp.

On the web: www.cazr.csiro.au/biograzing.



Top: Researchers use a power auger to dig holes for pit traps that catch lizards and small mammals.

Above centre: Erecting drift fences with pit traps.

Above: Counting plants over a quadrat.