Eye in the sky manages degradation

Australian experience in tackling rangeland degradation in its semi-arid pastoral country is helping Indian land managers. **Ava Bentley** reports

Land degradation has long been an issue for land users, administrators and planners in countries with arid and semi-arid rangelands, including India and Australia. Despite that, many farmers, particularly those in developing countries, have limited awareness of when degradation is occurring, resulting in too little time to remediate lands before permanent damage occurs. Land planners too struggle to know degradation is occurring.

In many cases, the degradation of land, or damage to soil structure and vegetative cover, is caused by over-grazing and variable rainfall. Such conditions lead to low vegetative resilience – a limited ability to recover following substantial wet-season rains. The difficulty for those on the ground is that such damage is not obvious until it is very hard, or even impossible, to recover. At the same time, poor farmers are relying on this land, even as it is in decline. So where permanent, irreversible land damage occurs, poverty follows.

In the Thar Desert region of Rajasthan, in India, land degradation is occurring at an increasing rate. The region contains more than 200,000 square kilometres of arid land, has a fast growing human population (approaching 20 million) and increasing livestock numbers, all of which accelerate damage to fragile arid landscapes.

The issue in this region is an interesting example of how difficult these types of problems can be, because the damage is not obvious on the ground but clearly visible from the air. To assess the extent and causes of land degradation in Rajasthan, and provide tools with which to manage and prevent further damage, an ACIAR-supported project was undertaken in collaboration with Indian scientists from the Central Arid Zone Research Institute (CAZRI) and Australia's CSIRO Centre for Arid Zone Research.

Dr Margaret Friedel, CSIRO scientist and project manager, says the aim was to adapt Australian technology for use in the Thar Desert region: "Remote-sensing technology has been used very successfully in Australia, and our intention was to use similar technology to assess the causes and extent of land damage in Rajasthan."

It was hoped that use of the technology would provide local land management planners, policymakers and administrators with the capacity for better land management decisions, and for developing preventative land care measures.

The technology uses remote-sensing data captured by satellite (old and new) and combines this with ground-level information relating to vegetation, grazing and village communities in a Geographic Information System for a more complete assessment. By placing new satellite images over old images, researchers are able to see how a particular area of land has responded to grazing, rainfall or other agricultural factors.

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Such an assessment can pinpoint areas of poor regrowth that may indicate reduced resilience and potential degradation. It gives a bird's-eye perspective to the problems, which can make them far more visible for land planners and administrators, and trigger further investigation or action.

CSIRO scientist Gary Bastin says this type of assessment is called the Resilience Method: "The Resilience Method is one approach to determining the impacts of grazing on rangelands. It produces maps showing vegetative growth as either above or below average, and can assist with particular management practices and government inputs to areas in greatest need of attention."

Local farmers are not in a position to utilise this technology directly, and have limited capacity to understand the nature of degradation, even though they can be the best source of data.

ACIAR Research Program Manager Dr Ian Willett says that making contact with villagers is important: "The project's underlying philosophy was that if people involved in agriculture can tell if they are degrading land, and are involved in decision making, then they are more likely to take actions to reduce degradation."

As the project progressed it was apparent that local farmers were not in a position to utilise this technology directly. As a result the project's emphasis shifted to ensuring that CAZRI land managers could utilise the new technology and share this with land administrators to help villagers manage their lands and act upon signs of degradation.

In keeping with the project's philosophy, the data collected about degradation in Rajasthan has been translated into a language easily understood by local land users. Block Development Officers, who work at the local level with villagers, are a potential means for helping villagers to recognise degradation and understand what they can do to remediate this. Now that it is possible to assess degradation at an early stage, and undertake action to remediate this, land planners and administrators, together with villagers, can take action where it is needed – on the ground. ◂