

STOCK MANAGEMENT

in riparian zones of the Murray-Darling Basin

by Amy Jansen and
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In this three-year project sponsored by Land & Water Australia, we are investigating management of domestic livestock in riparian zones. This is a collaborative project between Charles Sturt University in Wagga Wagga, and James Cook University in Townsville, a research partnership that will enable us to draw conclusions across very different systems. The previous article is about the north Queensland project, here we will discuss the work in south-eastern Australia.

Why manage livestock grazing in riparian zones?

Reviews of the literature generally conclude that grazing of domestic livestock in riparian zones is detrimental to the structure and functioning of both waterways and their associated riparian zones. This means that the best recommendation for grazing in riparian zones is exclusion, however, there are many reasons why grazing cannot or will not be excluded from riparian zones. These include:

- ~ fencing is too expensive;
- ~ small property sizes make it unviable to lock up portions of land to prevent stock accessing the riparian zone;
- ~ frequent and/or severe flooding destroys fencing, which represents a significant cost for the landholder; and,
- ~ weeds may infest areas excluded from grazing.

In these cases it is necessary to determine the best strategy for grazing in riparian zones.

Best management of grazing in riparian zones?

Very little work has been done comparing the effects of different grazing management practices in riparian zones, and nearly all of that work has been done in the western United States. In reviewing these studies, the main conclusions we could draw were that:



Photo 1: Cattle in the riparian zone of the Murrumbidgee River.
Photo Amy Jansen.

- ~ rotational grazing *can* have lesser impacts than continuous grazing;
- ~ the *timing* of grazing in a rotational system can be important;
- ~ grazing affects some aspects of riparian and aquatic ecosystems more than others; and
- ~ some level of grazing *may* have more positive outcomes than exclusion of grazing, under some circumstances.

With these studies as background, we have surveyed riparian zones in the Murray-Darling Basin (see Photo 1) and found that the following plant and animal communities all vary with different grazing regimes:

- ~ understorey plants;
- ~ wetland frogs;
- ~ terrestrial invertebrates; and
- ~ birds.

For example, Figure 1 shows how bird communities vary according to grazing intensity on the Murrumbidgee and Murray Rivers. Sites with similar bird communities are close together, while those with dissimilar bird communities are far apart. It is clear that ungrazed sites tend to have similar bird communities, as shown towards the left of the figure, while heavily grazed sites tend to be towards the right of the figure. These sites have many common farmland birds, such as magpies, willie wagtails and cockatoos, while the

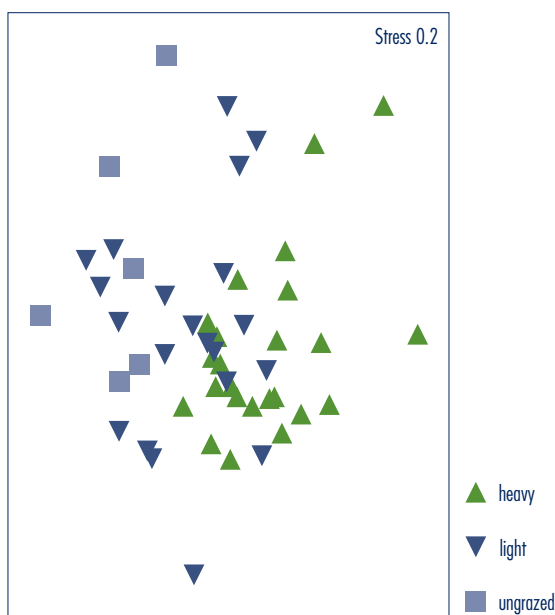


Figure 1: Non-metric multi-dimensional scaling plot of sites on the Murrumbidgee and Murray Rivers according to their bird communities. The key indicates levels of grazing intensity.

ungrazed sites tend to have more small, specialist birds such as honeyeaters, treecreepers, wrens and robins.

The results of the survey work suggests that the impacts of grazing in riparian zones might be reduced by using a rotational grazing regime, where grazing occurs for only part of the year, with the remainder of the year having no grazing. Our collaborators, State Forests of New South Wales, have adopted rotational grazing in most of their floodplain forests to improve biodiversity values. In areas dominated by exotic annual plants, they have imposed winter grazing to control weed species and facilitate the recovery of native species, while in areas dominated by native perennials, they have imposed summer grazing to provide spaces for native herbs to grow between the dominant perennial grasses and sedges.

Given the different grazing regimes available on State Forest lands on the Murrumbidgee and Murray Rivers, we have designed an experiment to compare the effects of these different regimes on the structure and functioning of the riparian zone. State Forests is also contributing fencing costs to the project so that we can compare the different grazing regimes with exclusion plots where recovery from grazing will be occurring over the next three years.

We are in the process of establishing sites in four different areas, with different grazing regimes and histories of flooding. In each area we have a number of fenced and unfenced plots. Monitoring of the experiment is focusing on understorey plant communities and terrestrial invertebrate communities, since these are likely to show the most rapid responses. We will also be looking at recruitment of native trees and shrubs.

Development of indicators

In addition to documenting the changes that occur in the plant and invertebrate communities, this experiment will enable us to determine what are the best *indicators* of changes in grazing management practices. We will then be able to develop a set of indicators that can be used by land managers to determine the status of riparian zones in terms of level of degradation and potential for recovery with changed management practices.

To expand the conclusions of the survey work completed earlier on the Murrumbidgee River, we are also conducting two other projects in south-eastern Australia to look at relationships between grazing management practices and condition of the riparian zone. In Gippsland, we have a project examining relationships between riparian condition and management practices in the dairy industry (see page 34). In the Goulburn Broken catchment in northern Victoria, we will be examining landholder knowledge of riparian issues and assessments of riparian health in relation to our condition assessments, as well as relationships with grazing management practices. This project is receiving additional funding from the Goulburn Broken Catchment Management Authority.

Further reading

- Belsky, A.J., Matzke, A. and Uselman, S. 1999, 'Survey of livestock influences on stream and riparian ecosystems in the western United States', *Journal of Soil and Water Conservation*, vol. 54, pp. 419–431.
- Jansen, A. and Robertson, A.I. 2001, 'Relationships between livestock management and the ecological condition of riparian habitats along an Australian floodplain river', *Journal of Applied Ecology*, vol. 38, pp. 63–75.
- Trimble, S.W. and Mendel, A.C. 1995, 'The cow as a geomorphic agent — A critical review', *Geomorphology*, vol. 13, pp. 233–253.

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