Priorities for managing river biodiversity

An AEDA *Info Sheet*

Prioritising management options for river conservation

Australia's river biodiversity is internationally recognised as highly significant, but it's in trouble. Most of our river systems have been assessed as being under considerable and growing pressure. And as the situation deteriorates there's a rising chorus for targeted action and the establishment of freshwater reserves to protect our unique natural heritage.

But how do you plan such a process when the problem is so wide spread and the available resources are so limited? Which segments of the river system should be placed in a reserve? Which bits should be restored? How do you prioritise the allocation of your limited resources when conditions are always changing?

Under the umbrella of the eWater CRC, researchers from the universities of Canberra, Queensland and Western Ontario have proposed a formal framework for integrated conservation planning that focuses on three areas:

• **Irreplaceability**: What is the conservation value of the river and its catchment – and the organisms and habitats within?

• **Condition**: What is the condition of the catchment?

• **Vulnerability**: How is the condition likely to change without intervention?

While these questions are far from new, a conservation management strategy that combines all three for river systems – in a spatial framework that allows for the connected nature of rivers - is something that has never before been attempted.

To demonstrate the validity of this approach, the researchers worked out ways of measuring irreplaceability, condition and vulnerability for over 1800 subcatchments across Victoria. They then integrated the three measures into a common framework that established appropriate management responses for different combinations of these factors - conservation reserves and restoration.

Irreplaceability indicates the likelihood of any subcatchment being needed to achieve conservation targets. The researchers calculated an irreplaceability coefficient for 1854 subcatchments across Victoria using observed and modelled distributions of 367 invertebrates.

A map of Victorian subcatchments. Subcatchments with high irreplaceability, good condition, and high vulnerability (as marked) are candidate areas for river reserves.

Condition was estimated using a stressor gradient approach that incorporated data on nutrient and sediment budgets, salinisation and weed cover. It also mapped land use, such as forestry, agricultural and urban use.

Vulnerability relates to the likelihood of a catchment being exposed to a land use that degrades its condition. This was estimated by comparing land capability and current land use. If land was capable of supporting a land use that would have a more degrading effect on a river than its current tenure, it was classified as vulnerable. Two thirds of the study area was classified as vulnerable with almost four fifths of the catchments containing more than 50% vulnerable land.

By integrating the three measures, the researchers were able to identify two major groups of catchments requiring conservation management. Seven per cent of catchments were highly irreplaceable, highly vulnerable but in degraded condition. These catchments were flagged for restoration. While most highly irreplaceable catchments in good condition were already protected, 2.5% of catchments in this category are on vulnerable land. These are priority areas for assigning river reserves.

The study was undertaken to demonstrate that conservation planning for rivers can be done in a data-driven and repeatable way such that areas can be prioritised for restoration and/or reserve allocation. However, the research was undertaken as an academic exercise and only examined limited data sets in relation to irreplaceability. To properly inform conservation planning in Victoria the work would need to also examine native fish and aquatic plants.

The researchers believe that their ICV framework is a robust and transparent approach to tackling the unresolved issues of prioritising conservation and restoration efforts. They stress that while it is a framework to promote structured discussion and assist in decision making it is not a recipe for uncritical adoption. Founded in good science, they hope it should help to convey decisions about priority areas to managers and the public.

Further reading

The ideas presented in this AEDA information sheet are based on the paper:

Linke, S, Pressey, RL, Bailey, RC and Norris, RH (2007) Management options for river conservation planning: condition and conservation re-visited. *Freshwater Biology* (2007) 52, 918–938

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