

Delicate Blue-eye. Photo Neil Armstrong.



A tropical protection project

MARK KENNARD AND
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THE RESULTS OF A
PROJECT AIMED
AT IDENTIFYING
FRESHWATER
PRIORITY AREAS FOR
CONSERVATION IN
NORTHERN AUSTRALIA.

Innovative research is underway in northern Australia to assess and better protect the area's unique and highly valued freshwater ecosystems. Australia's tropical rivers flow through the world's largest area of good condition savanna, with almost all of its 56 major rivers flowing freely to the sea. The region contains one of the most biologically diverse and healthy freshwater aquatic ecosystems in the world. These rivers sustain more than half of Australia's freshwater fish species, three quarters of the freshwater turtles, and they are of great importance for more than 90 species of migratory birds. They not only provide clean water, food and recreational opportunities, but have important cultural and ecological values.

The continuing discovery of new fish species suggests the real amount of unique biodiversity present in northern Australia's rivers and wetlands is significantly underestimated. The ecological health of these freshwater habitats is, however, declining due to a range of threats including feral animals, weeds, overgrazing, catchment clearing and fire. Increased development and climate change pose new challenges.

Research initiative

The Tropical Rivers and Coastal Knowledge (TRaCK) research consortium was formed in 2007 to address fundamental knowledge gaps about how tropical rivers work and their value. TRaCK has brought together more than 80 of Australia's best tropical river and coastal scientists from different disciplines and institutions. As part of this program of research, a project was recently completed to identify freshwater conservation priorities across northern Australia. This involved characterising and mapping aquatic ecosystems throughout the region, developing predictive models of biodiversity patterns (for example, fish, turtles and waterbirds species distributions), and applying several spatial prioritisation frameworks. As it is not feasible to protect all areas, the goal of this research was to identify areas which can be targeted for efficient conservation management.

Inadequate protection

The project team evaluated the extent to which freshwater biodiversity is represented in existing protected areas in northern Australia. Protected areas are defined as an area of land or sea dedicated to protecting and maintaining biodiversity and natural and cultural resources. The current reserve system includes 178 reserves in northern Australia, covering 115,963 square kilometres (about 9 per cent of the region).

The project found many elements of freshwater biodiversity and aquatic ecosystem types are poorly represented in protected areas, highlighting the potential inadequacy of existing protection measures. For example, up to 80 per cent of all fish, turtles and waterbirds have less than 5 per cent of their total distributions contained within these areas in northern Australia, and protected areas may already be at risk from current and future threats including invasive species and climate change.

Protected areas are not the only mechanism for conservation. Mixed protection and conservation management schemes, where reserves go hand in hand with community efforts, may also be needed to achieve conservation goals. The challenge is to identify how the existing reserve system could be built upon to represent a higher proportion of the region's freshwater biodiversity and provide the best value for investment.

Evaluating potential conservation areas

The TRaCK research team applied several approaches to evaluate and prioritise areas with significant freshwater biodiversity values. Highly diverse and distinctive areas were identified using simple maps of species richness and endemism. The team also applied a more systematic approach to spatial prioritisation using Marxan software, a tool widely used for conservation planning. The aim was to efficiently represent the

full range of biodiversity, within the least amount of land area, to complement areas already protected. Biodiversity distribution, longitudinal and lateral connectivity requirements, and levels of human disturbance were also considered.

This study was the first in the world to use this type of approach in freshwater ecosystems across such a broad region, and involving so many biodiversity features. The researchers identified two different types of freshwater priority areas which would complement the current reserve system and represent all the species.

The approaches applied in this study are a tool to help in the decision making process in identifying conservation priority areas. Incorporating scientific knowledge and stakeholder needs is the next step in implementing a realistic conservation plan.

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FOR FURTHER INFORMATION

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Freshwater turtle.
Photo Brad Pusey.

Floodplain wetland.
Photo Mark Kennard.

