



The Mitchell River in North Queensland, photo Kerry Trapnell.



**Northern Australia
Environmental
Resources
Hub**

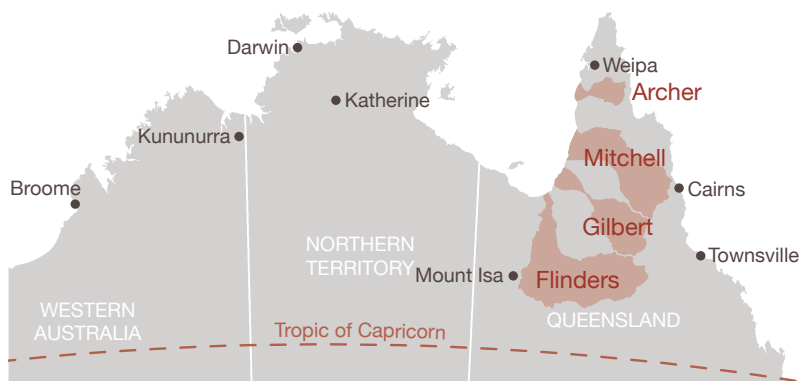
National Environmental Science Programme

Research overview North Queensland

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Our regional focus

Hub research on Cape York Peninsula and in the Gulf of Carpentaria aims to support sustainable development in the region. This includes research to inform water allocation planners and floodplain managers about the potential impacts of changes in flow on fisheries, migratory birds and biodiversity. Feral animals are another research priority and the Hub is working with Indigenous groups to determine effective management and ways of measuring this. Other research in north Queensland includes improving grassy weed management, environmental economic accounting, assessing mangrove dieback, quantifying the benefits of Indigenous land management programs, mapping littoral rainforest and managing waste in remote communities. Other Hub research across northern Australia, on topics such as environmental monitoring, Indigenous knowledge brokering, fire and carbon, is also generating information to support development decisions in north Queensland.



What is the Northern Hub?

The Northern Australia Environmental Resources Hub supports sustainable development in northern Australia and is assisting decision-makers to understand, use, manage and safeguard northern Australia's outstanding natural environment through world-class science. Current research focuses on:

- Landscape-scale studies covering savanna and freshwater ecosystems and biodiversity.
- Land and water planning for new developments, e.g. agriculture and infrastructure.
- Indigenous land management including Indigenous Protected Areas.

The \$24 million Hub collaborates with government, Indigenous, environment and industry bodies. Projects build on past work by the Tropical Rivers and Coastal Knowledge research hub and the National Environmental Research Programme, and link with other research in the region.

Environmental water needs for the Mitchell River

This research is improving our understanding of the critical flow needs to sustain freshwater ecosystems in the Mitchell River catchment. In particular, the project aims to predict the impacts of future development on important links between the river and its floodplain, and to better understand other potential risks associated with changes to river flows. This information is vital to inform decision-makers about water allocation that can sustain agricultural development and protect key environmental assets.

Improved feral animal management and indicators of success

Researchers are investigating the impact of feral animals on wetlands in Cape York's Archer River catchment. The project team is working with Indigenous ranger groups, local communities and government agencies to understand the most effective ways to manage feral animals to deliver joint social, environmental and cultural benefits. They are designing monitoring and reporting methods useful to similar projects across northern Australia.

Links between Gulf rivers and coastal productivity

The Flinders, Gilbert and Mitchell Rivers that flow into the southern Gulf of Carpentaria are home to high-value ecosystems and support important recreational and commercial fisheries. With increasing development in the region, more information is needed to understand how future water development will impact on the health and productivity of floodplains and coastal areas. This study is helping decision-makers identify which locations make the biggest contributions to aquatic production and biodiversity in the Gulf. It will also help them to predict the consequences of water resource development and hence inform allocation planning.

Links between Gulf rivers and food for migratory shorebirds

This project is investigating the importance of a range of river flows to threatened migratory shorebirds by quantifying and comparing food availability across the Flinders, Gilbert and Mitchell Rivers, and assessing how flow affects food sources. The project is also identifying areas of high ecological productivity within the river estuaries and adjacent mudflats. This will provide key information for future water planning, assessment of proposals that may lead to altered flow, as well as for shorebird habitat protection and management.

Assessing mangrove dieback in the Gulf

One of the worst mangrove dieback events ever recorded occurred along more than 1000 km of coastline from Limmen River (NT) to Karumba (Qld) during the 2015/16 wet season. This project is surveying, describing and analysing the exact extent and condition of the dieback. It is also examining the patterns, trends and likely causes of dieback, and local Indigenous rangers are being trained in quantitative mangrove assessment and monitoring methods. The project will provide recommendations for recovery, potential intervention, future monitoring and further studies.

Managing high biomass grassy weeds on the Cape

High biomass grassy weeds like gamba grass pose an increasing threat to savanna ecosystems across northern Australia through altering ecosystem processes and habitats. This project is consolidating current knowledge about management options for gamba grass and identifying knowledge gaps. These will inform on-ground management trials in north Queensland conservation areas, including testing the effectiveness of residual herbicides and biomass reduction treatments. Results will support improved management of high biomass grassy weeds across northern Australia.

Integrated environmental economic accounting in the Mitchell catchment

Using the Mitchell catchment as a case study, this research is developing an approach to environmental-economic accounting that considers the condition of interlinked ecosystem assets and the value of ecosystem services in way that reflects northern Australian ecological and socio-cultural contexts. It is also identifying how a common national approach could best represent the full suite of ecosystem-related values relevant to people in the region. The project will provide clear performance metrics to help inform development and conservation investments in the north.

Multiple benefits and knowledge systems of Indigenous land and sea management programs (ILSMPs)

As well as generating environmental benefits, ILSMPs generate many social, cultural and economic benefits. While we can clearly value some ILSMP benefits, we lack information to value many of the less tangible benefits, for example those relating to culture or to whole communities. This project is providing quantified or comparable data about these co-benefits of ILSMPs, with case studies in the Kimberley and north Queensland.

Developing eDNA methods for tropical waters

Analysing environmental DNA (eDNA) is a relatively new technique for detecting the presence of species from DNA left from hair or skin, etc, which has many advantages over traditional monitoring, such as increased efficiency and safety. This project is developing eDNA technology

for aquatic environments and trialling field methods for several species of conservation and management significance through case studies across north Australia. It aims to significantly improve the efficacy of field surveys and monitoring, hence providing a cost-effective tool to dramatically improve our knowledge and management of aquatic biodiversity in northern Australia.



Fieldwork in the Mitchell, photo Doug Ward.

Other projects relevant to North Queensland

Northern Australia environmental flow needs – synthesis project

Previous and current Hub research is quantifying the ecological responses to changes in flow regimes in rivers across northern Australia such as the Fitzroy, Daly and Mitchell. This project is evaluating how transferable these relationships are to other locations and scales, and identifying the key factors that water planners need to consider when applying this knowledge. Project outputs will be targeted to underpin sustainable water resource management in northern Australia.

Guiding non-government investment in Indigenous resource management enterprises

This research is investigating the performance motivations and the monitoring and assessment requirements of key non-government investors in Indigenous cultural and natural resource management (ICNRM) enterprises. It is identifying investor needs, and options to meet these, to help practitioners articulate ICNRM benefits in investor-friendly ways, showcase the multiple benefits, reduce monitoring loads by aligning needs, and support more non-government investment in ICNRM.

Savanna carbon sequestration method

By accounting for carbon stored in dead grass, leaves, twigs and coarser woody debris, as well as the non-CO₂ greenhouse gases, we can better quantify the value of improved fire management to greenhouse gas abatement. This has the potential to increase the incentive for land managers to adopt improved fire practices by allowing them to earn additional carbon credits. This project is improving our ability to calculate the carbon benefit in dead organic matter from changed fire regimes in lower-rainfall savannas across northern Australia.

Prioritising threatened species in northern Australia

This research is guiding improved management and investment to bolster threatened species recovery in high-priority areas of northern Australia. The team is modelling and mapping the distribution of threatened species, and the pressures on these species, across the north. It's also examining the vulnerability of species to particular threats. These maps can be used to help prioritise investment and to inform assessments for future development as well as in everyday management activities.

Multi-objective planning in northern Australia

Planning approaches that explore multiple alternative uses of land and water can help overcome tensions generated by development proposals in northern Australia. This project is using participatory scenario planning to explore different development pathways and their consequences. The project will help to build shared understandings of what is happening, understand what changes could happen and their positive and negative impacts, create an opportunity to develop connections, and facilitate group learning about strategic planning to support decisions about future land-water uses. It's being applied in WA's Fitzroy River catchment and is transferable to other areas in northern Australia and beyond.

Knowledge brokering for Indigenous land management

This project is supporting Indigenous land managers to strengthen their use of scientific and Indigenous knowledge for improved environmental and land-use decision-making. Collaborative case studies in WA's Fitzroy River Catchment and with Waanyi Garawa Traditional Owners in the NT are designing and testing Indigenous-driven knowledge-

exchange tools and approaches. These, together with input from other Indigenous knowledge case studies, are informing 'Our Knowledge Our Way' guidelines.

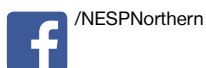
Completed projects relevant to North Queensland

Please see the project wrap-up factsheets on our website for information on

- Mapping to underpin management of tropical littoral rainforest
- Waste and marine debris in remote northern Australian communities
- Lessons and protocols for Indigenous fire management partnerships
- Research priorities for the north's Indigenous Protected Areas
- Supporting development decision-making in northern Australia
- Remote environmental monitoring techniques



Feral pigs, photo Samantha Satterfield.



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For further information, including our Top End and West Kimberley factsheets, visit nespnorthern.edu.au or contact Clare Taylor (clare.taylor@cdu.edu.au, 0405 730 999 or 08 8946 7476).



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