



Fitzroy River, photo Michael Douglas.



**Northern Australia
Environmental
Resources
Hub**

National Environmental Science Programme

Research overview

West Kimberley

May 2017

Our regional focus

The West Kimberley's mighty Fitzroy River is of high environmental, economic and cultural significance. Areas within the catchment have been listed as National Heritage for a mix of biodiversity, Indigenous, historic, geological heritage and aesthetic values. There is increasing interest in the Fitzroy's significant land and water resources for development, and the need for environmental research to inform land use and water allocation decisions is critical. Planning to maintain these multiple values is a focus of our research in this catchment. Identifying environmental and Indigenous water needs for the Fitzroy River and supporting Traditional Owners in decision making through research are also key research priorities. We also need to better manage weeds on the riverbanks and get a better understanding of the distribution and health of bilby populations in the catchment.

Other Hub research across northern Australia is also generating information to support development decisions in the West Kimberley.



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.

Projects in the West Kimberley



Current project
(due 2019/20)



Complete project

Multi-objective planning in northern Australia

This research will create a toolkit to assist planning and management decisions in northern Australia. The toolkit will allow users to assess the potential impacts of current and future development and management regimes on terrestrial, freshwater, and coastal and marine species and communities. It will also facilitate an assessment of the benefits and costs of implementing different management interventions to mitigate biodiversity threats associated with different land and water uses. The toolkit will be designed using the Fitzroy River catchment, but can also be used in other areas in northern Australia.

Indigenous water needs in the Fitzroy catchment

This research aims to improve knowledge of Indigenous water requirements within the Fitzroy River catchment and to inform plans for future water use. It will identify customary uses of water and waterways, reveal links between Indigenous values, practices and water regimes, and elicit knowledge and objectives for the future management of land and water resources. Emphasis will also be placed on advancing Indigenous water planning by trialling social assessment methods and showing the value of community participation in environmental flow assessments. The information generated from this project will contribute to water planning and allocation, and

enhance Indigenous capacity to influence regional water policy decisions and development solutions.

Environmental water needs for the Fitzroy River

As the largest catchment in the Kimberley, there is increasing interest in the Fitzroy River's significant water resources for development. Working in collaboration with the Western Australian and Australian Governments and CSIRO, the project team will improve the available information on the water requirements of key natural assets in the Fitzroy River. This knowledge will underpin water allocation and planning decisions to help protect environmental values.

Knowledge brokering for Indigenous land management

In this project, researchers will support Indigenous land managers across the north to develop their use of scientific and traditional knowledge for improved environmental conditions and land-use decision making. Collaborative case studies in the Fitzroy catchment (WA) and Gulf of Carpentaria (NT), and pan-northern Indigenous knowledge workshops, will design and test culturally tailored knowledge-exchange and participatory modelling tools. The project will produce "Our Knowledge Our Way" (Guidelines for Knowledge Brokering with Indigenous Land Managers) together with diagnoses of the conditions



River barrage, photo Michael Douglas.



Irrigated agriculture in the West Kimberley, photo Michael Douglas.

under which knowledge brokering can improve Indigenous adaptive management of environmental assets.

Managing savanna riparian zones

Riverbank (or riparian) zones are critical to the health of surrounding savanna landscapes and support significant economic and cultural values. However, savanna riparian zones are highly vulnerable to a number of pressures such as invasive plants, feral animals and fire, which in places are being compounded by new development pressures. The project involves three complementary case studies in Kakadu National Park and Geikie Gorge National Park. It will deliver improved knowledge on the health of riparian zones in these key areas, and recommend where management and resources should be directed to protect them. Research findings will be applicable to many savanna riparian zones across northern Australia.

Multiple benefits & knowledge systems of Indigenous land management programs

The importance of Indigenous ecological knowledge is globally recognised and supported by investments in a variety of Indigenous land management programs (ILMPs). Aside from generating ecological benefits, these programs generate many social, cultural and economic co-benefits. While we have some understanding of the monetary value of some of these co-benefits, we lack information about other less tangible co-benefits or those relating to culture. Funding agencies such as governments, businesses and

NGOs would like to know if their investments represent ‘value for money’. This project will provide quantified, comparable data about the co-benefits of different types of ILMPs, with case studies in the upper Gilbert/Mitchell and the Kimberley.

Monitoring, mapping and safeguarding West Kimberley bilbies

This project will provide an accurate understanding of where bilbies occur and how they use their habitat in the Fitzroy River catchment. This information will be used to identify and implement on-ground actions that will help safeguard this threatened species. It will also contribute to recovery planning and threat abatement programs, and support evidence-based environmental impact assessment and conservation planning.



Cattle, photo Michael Douglas.

Other projects relevant to the West Kimberley



Savanna carbon sequestration method

This project aims to improve our ability to calculate the carbon benefit in dead organic matter from changed fire regimes in lower rainfall savannas across northern Australia. 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 to greenhouse gas abatement of improved fire management. This has the potential to increase the incentive for land managers to adopt improved fire practices, by allowing them to earn additional carbon credits.



Prioritising threatened species in northern Australia

This research will guide improved management and investment to reduce the impact of threats on threatened species and to bolster their recovery in high-priority areas of northern Australia. The team will model and map the distribution of threatened species, and the pressures on these species, across the north. This can be used to help prioritise investment and to inform assessments for future development. The project team will provide guidelines and training so models and maps can be updated and applied in everyday management activities.

More Hub projects, or extensions of existing projects may occur in the West Kimberley depending on northern Australian priorities. For updates, visit nespnorthern.edu.au or email nesp.northern@cdu.edu.au



Developing eDNA methods for tropical waters

Analysing environmental DNA (eDNA) is a relatively new technique for detecting the presence of aquatic species from DNA in small water samples. The technique has a number of advantages over traditional monitoring, including increased efficiency, better accuracy, ability to detect many species, detection of targeted species and greater safety when sampling in the field. This project will develop eDNA technology and trial field methods for several northern Australian aquatic species of conservation and management significance. 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.



Methods to measure temporal change in soil carbon

This research project reviewed the current state of knowledge on measurement and modelling methods for estimating soil carbon and change in soil carbon stock in northern Australia. It assessed the applicability and cost of current and proposed methods in the context of soil carbon levels





Controlled burn, photo Glenn Campbell.

and the response of soil carbon to changes in management practices, as they occur across northern Australia. The research findings will be released later this year.

Supporting development decision making in northern Australia

This research identified nine categories of models and tools and assessed the suitability of each one for supporting different types of development decisions in northern Australia. Real-world case studies, many from northern Australia, show how these models have been used in the region. A decision tree was also developed to help practitioners in choosing the most appropriate model for their needs. This and other resources will be made into an online tool.

Lessons and protocols for Indigenous fire management partnerships

Fire has played a key role in the land management practices of Aboriginal Australians for millennia. Today, Indigenous communities are applying, adapting and rejuvenating this knowledge through a range of land management and enterprise activities. This project worked with fire program practitioners, partners, stakeholders and resource providers to review how Indigenous knowledge is being used in northern Australian fire projects. It identified lessons and developed protocols for effectively and appropriately incorporating Indigenous knowledge into fire

management goals and practices. The six protocols aim to ensure Indigenous fire management partnerships are based on culturally and scientifically sound decisions.

Research priorities for the north's Indigenous Protected Areas (IPAs)

In collaboration with IPA managers and research stakeholders across northern Australia, the project team undertook literature reviews, interviews and workshops to identify research priorities for IPAs. The priorities were found to be context-dependent, integral to priorities for Indigenous land management (ILM) broadly, and focused on multiple values of and benefits from country. These priorities are for research that: 1. Uses models that enable Indigenous people to be centrally involved and gain greater benefit from research; 2. Better values the economic contributions of ILM; 3. Enables both Indigenous knowledge and science to be more accessible and useful to Indigenous decision makers; 4. Supports ILM to be more financially sustainable; and 5. Develops participatory methods that enable protection of country in response to new impacts such as development proposals. A complementary sub-project examined how the benefits of IPAs have been valued. It found that some IPA benefits are much more easily, and therefore frequently, quantified in monetary terms than other benefits that may be just as important. Unquantified benefits are often overlooked by decision makers, and to address this gap researchers need to work with local people to determine the valuation method best suited to their needs.

✓ Remote environmental monitoring techniques

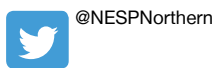
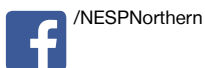
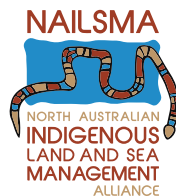
This project identified emerging environmental monitoring technologies and techniques best suited to northern Australia. It summarises what we know about them, how they're currently used, their potential future use, their pros and cons, and the research needed to more fully utilise each technique. Project participants identified technologies such as fine-scale aerial photos, drones, satellite imagery and genetic techniques as most likely to be useful in the future, as well as camera trapping, tracking telemetry and remote listening stations. See also the follow-up project '[Developing eDNA methods for tropical waters](#)'.

✓ Waste and marine debris in remote northern Australian communities

This project investigated waste management issues in the Lockhart River, Mapoon and Pormpuraaw communities on Cape York Peninsula. Each community faces unique local challenges to progressing waste management, but all are growing in size, receiving increasing numbers of visitors and tourists, and dealing with increasing marine debris washing up on their beaches. The research highlights current best management practices and found that opportunities exist for a networked regional recycling effort which could reduce local waste, generate new or repurposed resources and create new jobs and enterprises.



Fitzroy River, photo Michael Douglas.



This project is supported through funding from the Australian Government's National Environmental Science Programme.

For further information, including our North Queensland and Top End factsheets, visit nespnorthern.edu.au or contact Karen Dayman (karen.dayman@klc.org.au, 0429 502 564) or Clare Taylor (clare.taylor@cdu.edu.au, 0405 730 999).



National Environmental Science Programme