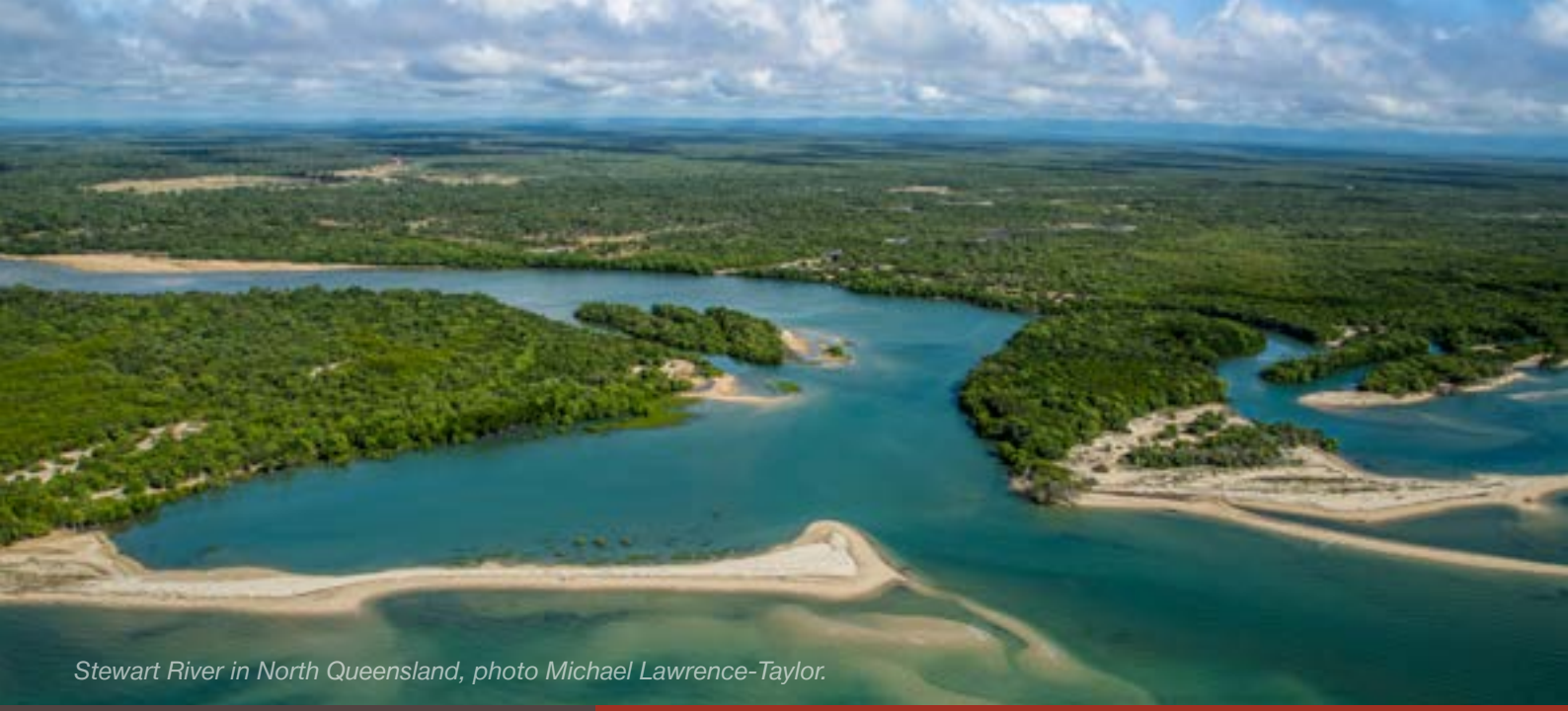


Stewart River in North Queensland, photo Michael Lawrence-Taylor.

Northern Australia Environmental Resources Hub

National Environmental Science Programme

Research overview

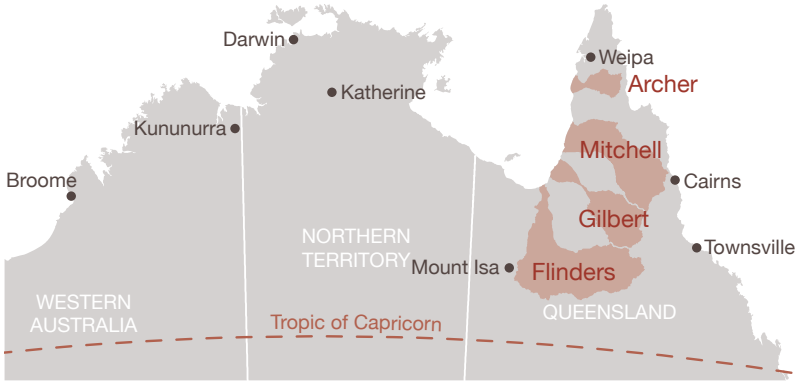
North Queensland

May 2017

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 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 assessing the benefits of Indigenous land management programs, mapping littoral rainforest and investigating waste management in remote communities.

Other Hub research across northern Australia, on topics such as environmental monitoring, Indigenous knowledge brokering, weeds, 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.

Projects in North Queensland

Current project (due 2019/20)

Complete project

Environmental water needs for the Mitchell River

This research will improve 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 protects key environmental assets.

Multiple benefits & knowledge systems of Indigenous land management programs

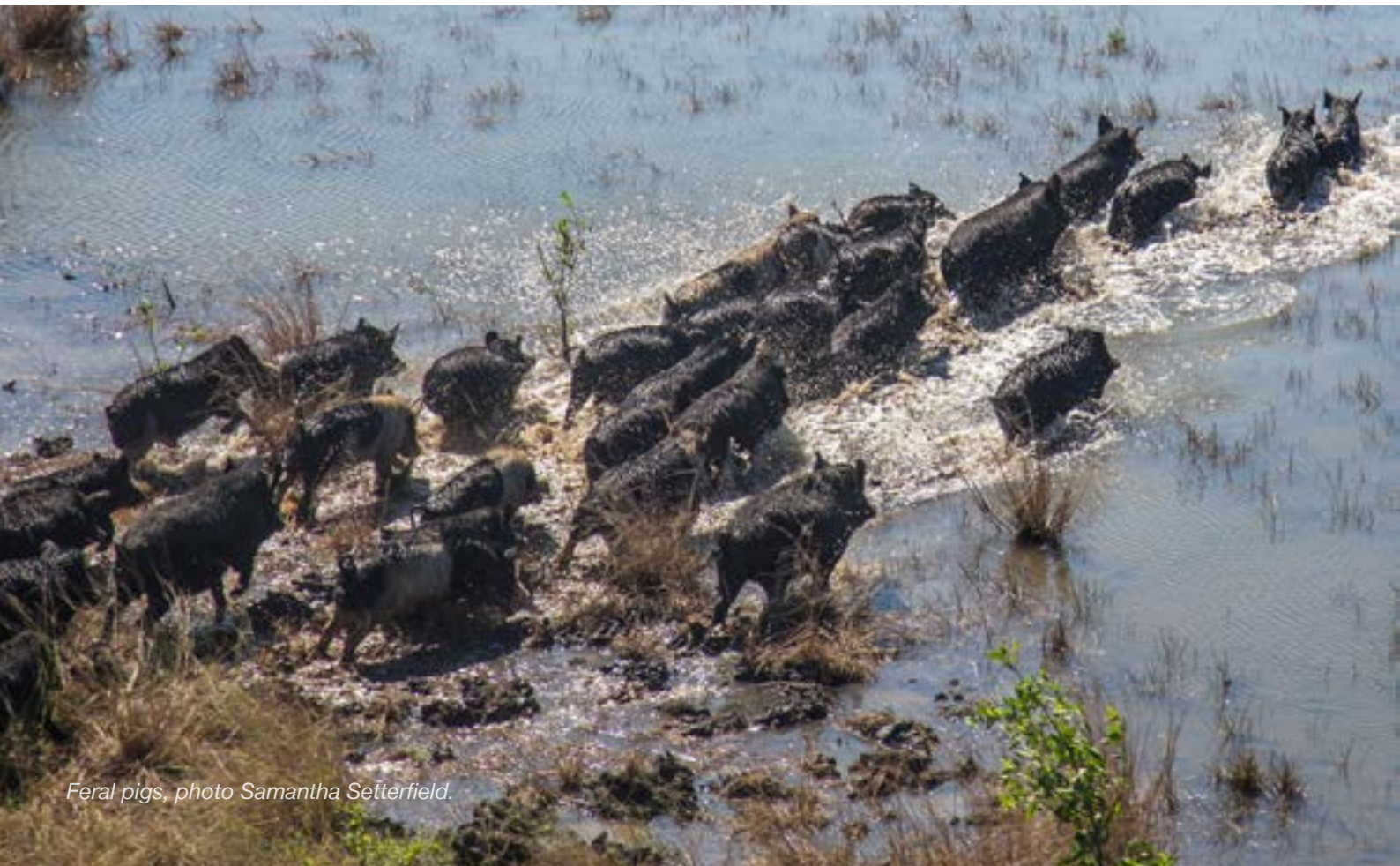
The importance of Indigenous ecological knowledge is globally recognised and supported by investments in a variety of Indigenous land management programs (ILMPs). Aside from generating ecological benefits, these programs generate many social, cultural and economic co-benefits. While we have some understanding 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.

Improved management of feral animals and indicators of success

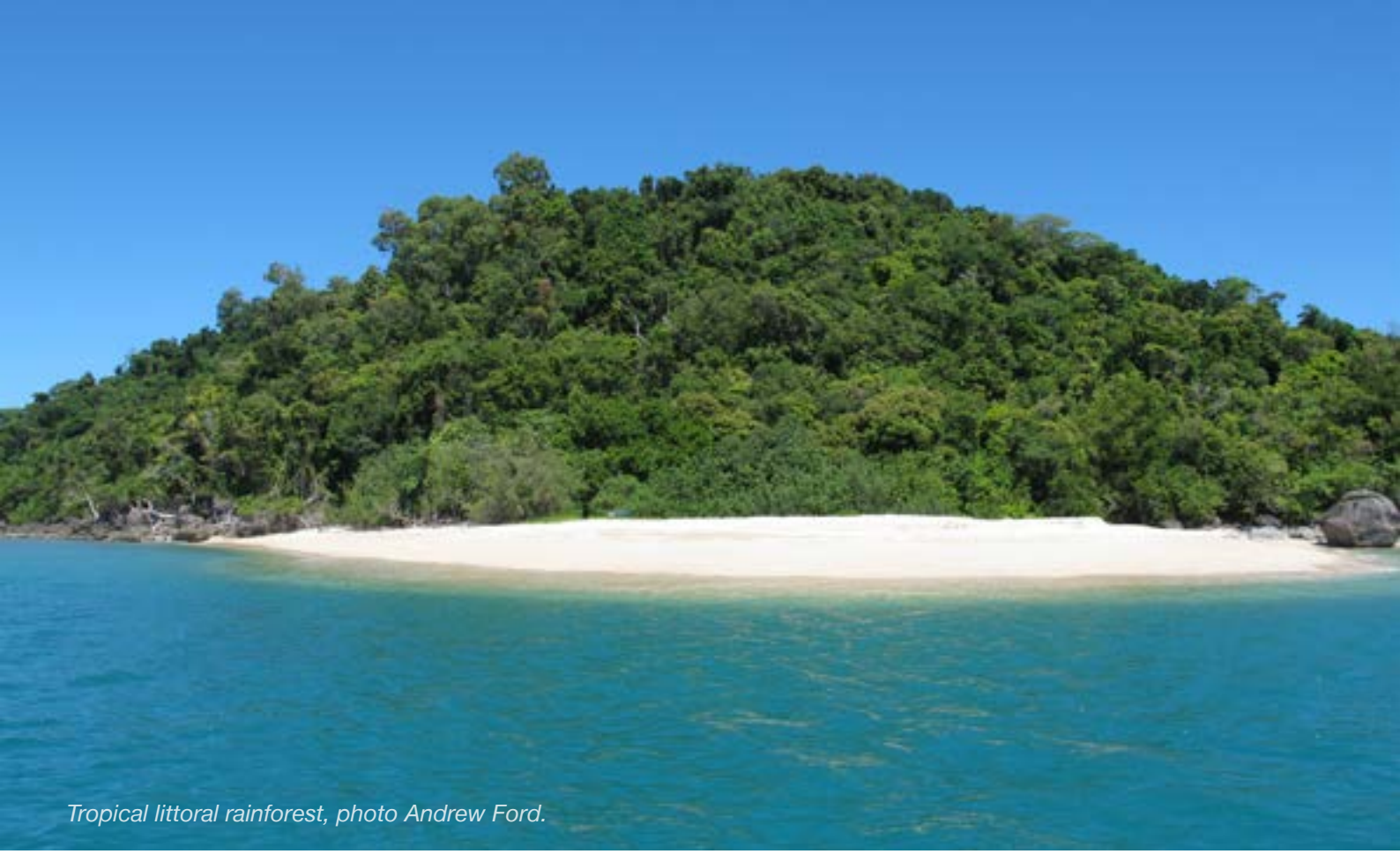
Researchers will investigate the impact of feral animals on wetlands in Cape York's Archer River catchment. The project team will work with Indigenous ranger groups, local communities and government agencies to understand the most effective ways to manage feral animals to deliver joint social, environmental and cultural benefits. They will design 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 nationally significant wetlands, 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. The results of this study will help decision makers to identify which locations make the biggest contributions to aquatic production, wetland and coastal ecosystems, and biodiversity within the Gulf of Carpentaria. It will also help them to predict



Feral pigs, photo Samantha Setterfield.



Tropical littoral rainforest, photo Andrew Ford.

the consequences of water resource development and hence inform allocation planning.

Mapping to underpin management of tropical littoral rainforest

Researchers produced cutting-edge mapping of critically endangered littoral rainforest in Queensland's Wet Tropics. The maps produced under this project identify three different types of littoral rainforest – Refugial, Leading-edge and Buffer – by their frequency of inundation. They also show inundation associated with sea level rise and a range of storm-surge scenarios. These mapping resources are already being used by local government to better manage this threatened ecosystem.

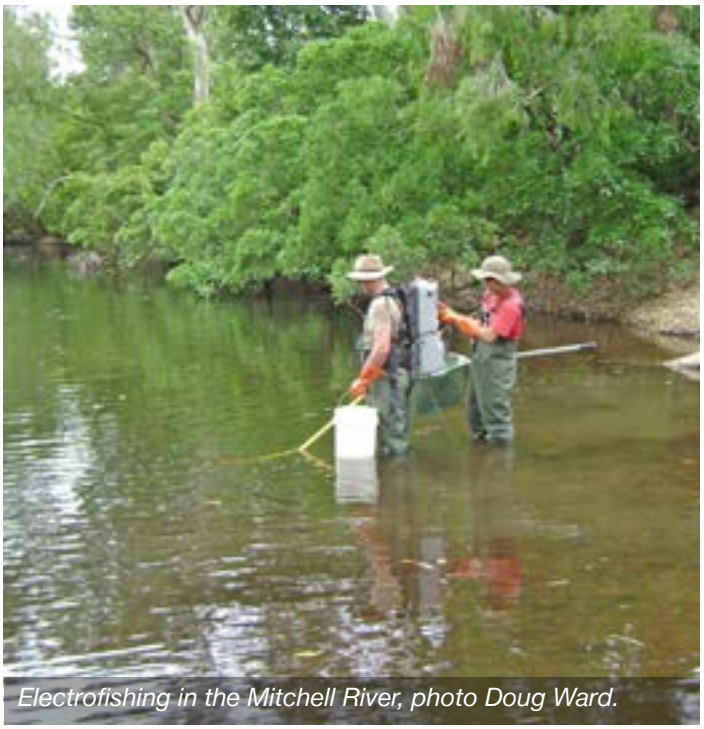
Waste and marine debris in remote northern Australian communities

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. Such opportunities would require complementary commitment from governments to achieve.

Other projects relevant to North Queensland

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



Electrofishing in the Mitchell River, photo Doug Ward.

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

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.

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 in WA, but can also be used in other areas in northern Australia.

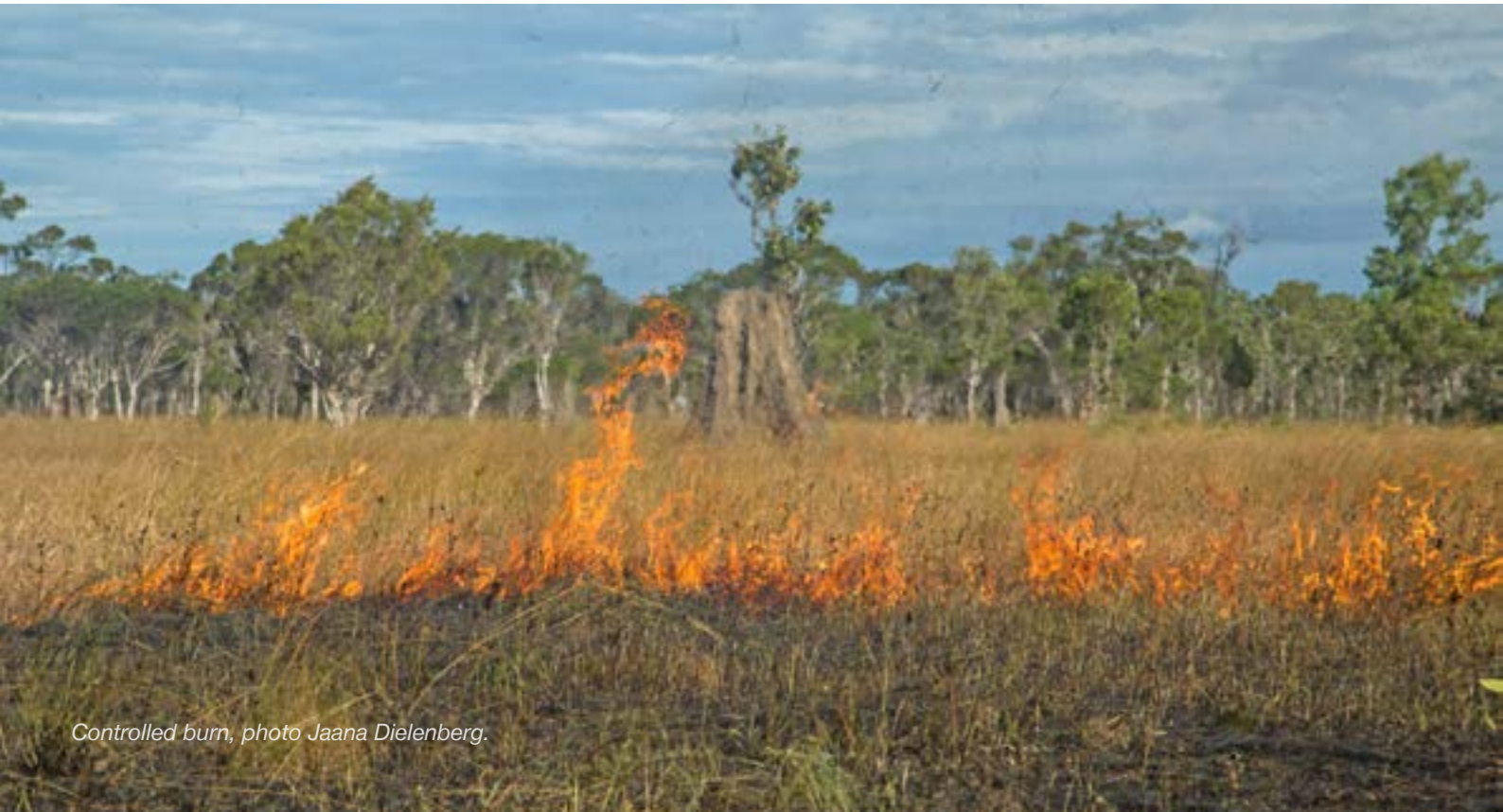
More Hub projects, or extensions of existing projects may occur in North Queensland depending on northern Australian priorities. For updates, visit nespnorthern.edu.au or email nesp.northern@cdu.edu.au

Savanna carbon sequestration method

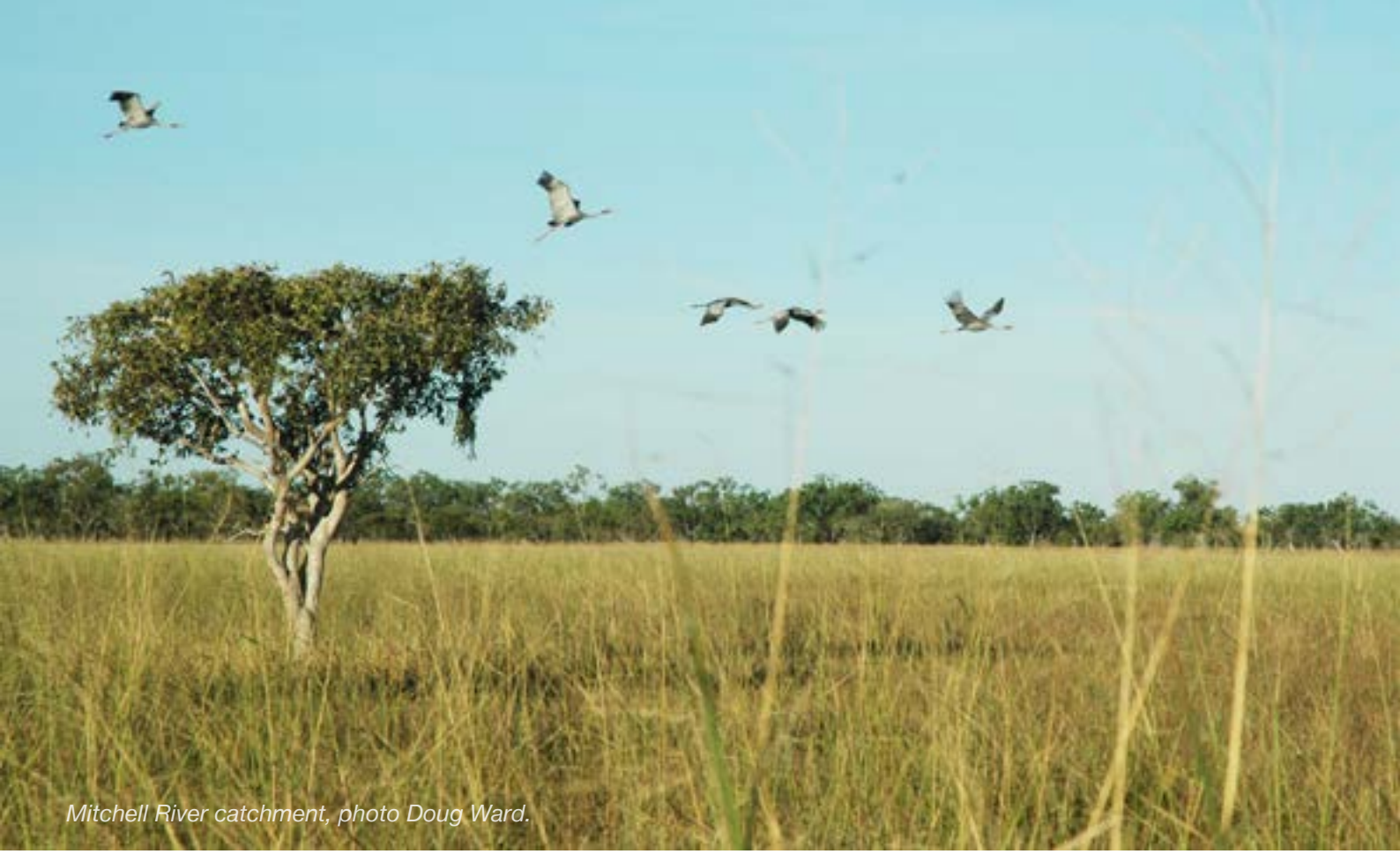
This project aims to improve our ability to calculate the carbon benefit in dead organic matter from changed fire regimes in lower rainfall savannas across northern Australia. By accounting for carbon stored in dead grass, leaves, twigs and coarser woody debris, as well as the non-CO_2 greenhouse gases, 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



Controlled burn, photo Jaana Dielenberg.



Mitchell River catchment, photo Doug Ward.

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.

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.

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.

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'.

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 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.

Mitchell River, photo Michael Douglas.

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

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 7619).

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