



2018 Annual Report



Australian Government



National
Environmental
Science
Programme

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Cover photographs

Front cover: Top End wet season storm (photo Patch Clapp).

Back cover: Kakadu National Park (photo Patch Clapp).

This report is available for download from the NESP Northern Australia Environmental Resources Hub website: www.nespnorthern.edu.au

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Annual Progress Report 4

Northern Australia Environmental Resources Hub

National Environmental Science Program

Annual Progress Report 4

1 January 2018 – 31 December 2018

Hub name: Northern Australia Environmental Resources

Host organisation: Charles Darwin University

Key contact: Professor Michael Douglas (UWA)


Contact email address: michael.douglas@uwa.edu.au

Other consortium partners/subcontractors/research organisations:

- University of Western Australia
- James Cook University
- Griffith University
- CSIRO
- NAILSMA
- NT DENR
- Qld DES
- Qld DAF
- WA DBCA

Hub Leader certification

- As hub leader, I certify that I have taken adequate steps to reasonably assure myself that:
-
- each required report component is attached;
- the contents of each component of the report is complete and accurate in all material respects;
- funds have been used for the purpose for which they were provided and all funding conditions have been met, Recipient and Other Contributions have been received, and appropriate oversight has been maintained of hub projects, their progress, performance and budgets during the reporting period;
- all relevant risks to project delivery have been notified to the Department in this and previous reports and that appropriate steps are being taken to manage those risks;
- the Hub and its sub-contractors have current workers compensation and public liability insurances, as required under the Funding Agreement; and
- any carryover of project funds have been allocated to projects in the next reporting period or financial year in accordance with the approved Research Plan or funds identified for refund to the Department.

Signed: 

Hub Leader Name: Professor Michael Douglas

Date: 1 April 2019

Hub Steering Committee Chair Certification

As steering committee chair, I certify that any issues of concern or matters raised during steering committee meetings where the draft progress report was discussed have been adequately resolved, amended or incorporated into the final report submitted to the department.

Signed: 

Hub Steering Committee Chair Name: John Childs

Date: 1 April 2019

Letter from the Hub Leader

It is with much pleasure that I submit this Annual report for the NESP Northern Australia Environmental Resources Hub for 2018. The Hub is now entering into the fifth year of a six and a half year program and we are rapidly transitioning into a period where field work is starting to wrap up, and there is a greater focus on delivering outputs for our policy and management partners.

Engagement with Commonwealth Government Departments is impressive across a large proportion of projects, including with the Departments' of Environment and Energy, Prime Minister and Cabinet, and Agriculture and Water. We have scoped the majority of our projects with a direct line of communication to relevant policy areas of Commonwealth, State and Territory Governments, and this is starting to have significant benefits for the uptake of research outputs.

In 2018, and heading into 2019, the Hub has 28 active projects underway across northern Australia, in the Kimberley, Top End, Gulf of Carpentaria and Cape York Peninsula. This is the largest year of active projects that we have had to date in the Program. A number of projects will start to wrap up in 2019 and all projects are scheduled to be completed by December 2020. We have instigated new procedures for milestone reporting to ensure that progress is being more closely monitored, because clearly there is now very limited scope for projects to have further time extensions. More information is available on the project pages on [our website](#).

In WA's Kimberley Fitzroy River catchment, six teams worked to finalise research agreements with native title holders and complete fieldwork and workshops for social and ecological research projects. We now have five signed agreements with Indigenous Prescribed Bodies Corporate in the Kimberley. A large 3D map of the Fitzroy River has facilitated knowledge sharing and local decision-making, by showing places of importance, and helping to explain concepts such as water flow, water rights, flooding and fire. The map has been transported to numerous meetings and has been a valuable project tool that we now have plans to extend to communicate the findings from other NESP projects.

In the NT teams also ran field activities, one supporting water planning in the Daly River and another investigating savanna invaded by gamba grass in the Darwin and Daly regions. We are currently working with Traditional Owners in the Daly Region to establish a new Research Agreement that provides for the orderly completion of fieldwork and establishes clear guidance around publication of results.

In Queensland, teams undertook fieldwork and data analysis to support water allocation planning in the Mitchell, Flinders and Gilbert Rivers. Cyclonic activity in the Gulf region in late 2018 caused the cancellation of field trips; these have been re-scheduled for Mar-Apr 2019 and is not anticipated to impact on final project delivery.

A number of projects are collaborating with Indigenous people and assisting with Traditional Owners reconnecting with and spending time on country. For example Justin Perry and Pethie Lyons visited difficult to access southern portions of the Wik native title area south of the Archer River on Cape York with traditional owners. The researchers also promoted on-country connections through sessions conducted at a returning generations camp for school students run by Traditional Owners. This has benefited the project and ongoing planning and land management by Traditional Owners.

We are finalising a project that is supporting methods for calculating carbon credits for savannah burning projects, leading to reduced emissions and increased carbon storage. Our

research has found that each year more than 2% of the 3.6 billion tonnes of trees across northern Australia die, creating large stores of carbon in dead standing trees.

Our project on prioritising threatened species has produced distribution maps for more than 1500 species across northern Australia. This information has been used by the Qld Government for identifying additional areas for protected area status, and the Environmental Resources Information Network (ERIN) at DoEE, who have been engaged with the project since the beginning, are reviewing outputs from the project with a view to incorporating the data into their national species distribution maps.

Our Knowledge and Adoption (K&A) team is delivering an impressive array of communication materials, supporting events and developing an impressive web site that combines outputs from the previous NESP and TRaCK programs. In 2018 Patch Clapp joined our Darwin based team as communications officer, supporting Clare Taylor and Jane Thomas. We also now have regional research coordinators working in the Kimberly (Karen Dayman), far north Queensland (Lyndal Scobell) and Kakadu National Park (Dennis Cooper).

In 2018 the K&A team produced a wide range of products, and we will be increasing our focus on communicating project outputs, and increasing our media presence:

- 35 Project factsheets (start-up, wrap-up and project updates)
- 2 project reports
- 1 project research essay
- 1 science partnerships brochure
- 7 case studies on research impact
- 1 Annual Report
- 2 Hub newsletters
- 11 North Australia News Round-ups
- 11 videos produced (including an impact story featuring Gooniyandi Traditional Owner and artist Mervyn Street on the values of the Fitzroy Rover in the Kimberley.) and assistance given to production of 5 project videos
- 56 Hub news articles
- 63 NESP Northern Hub Research/People profiles created
- 10 project web-pages created
- 91 Facebook posts
- 102 Tweets

Our Hub Steering Committee (HSC) continues to provide strong support and guidance to the Program. In 2018 the HSC met on three occasions, including twice in person, and once by teleconference to discuss projects proposed under Research Plan Version 5. I would particularly like to welcome Cissy Gore-Birch from Bush Heritage Australia to the Hub Steering Committee and would like to thank Matthew Whitfort from DoEE for his support to the Hub, as he is moving to a new position within the Commonwealth.

In May 2017 the Commonwealth revised our research priorities, which resulted in minor amendments to the text, but with some significant changes to the relative priorities that we were able to address in Research Plan Versions 4 and 5. Research Plan Version 5 was a significant effort in research planning and project consolidation; it included one new project and six extensions to existing projects. This followed on from RPV4 that saw 12 new projects get underway in 2018 covering a range of topics addressing the revised research priorities delivered in partnership with governments and other stakeholders. RPV4 was the largest Research Plan to date with respect to funds committed and RPV5 was the last research plan that was able to include new 3-year projects.

The program has now allocated research funds of \$19.0 million with just over \$200,000 (less than 1% of total program funds) remaining to be allocated to synthesis activities and emerging priorities over the final two years of the program. Commissioning of new research projects is unlikely unless we receive specific Departmental or Ministerial requests. I believe that we are in a very sound budgetary and financial management position at this latter stage of the Program's lifecycle.

In mid 2018, CSIRO reported on the Northern Australia Water Resources Assessment (NAWRA). The project aimed to identify the potential to increase water-related development opportunities in northern Australia. The studies included:

- evaluating soil and water resources
- identifying and evaluating water capture and storage options
- identifying and testing the commercial viability of irrigated agriculture opportunities
- assessing potential environmental, social and economic impacts and risks of water resource and irrigation development.

This work was part the delivery of the Australian Government's *White Paper on Developing Northern Australia*, for which one of the key initiatives is the development of northern Australia's water resources. It built on previous success in delivering the Flinders and Gilbert Agricultural Resource Assessment, and a broader body of work contributing to the sustainable development of northern Australia.

NAWRA has significant implications for our catchment based projects in the Fitzroy and Mitchell Rivers. NAWRA has provided a major boost in water resource assessment knowledge for three priority regions in northern Australia in which it has been working, including the Fitzroy catchment, Western Australia; Darwin catchments (Finniss, Adelaide, Mary, Wildman), Northern Territory; and Mitchell catchment, Queensland.

Other opportunities and highlights over the next twelve months include conducting a series of Regional workshops with government research users, Commonwealth workshops and policy briefings, the implementation of Research Plan Version 5 projects, a third year of our program of field research, new projects underway in Kakadu National Park developed in partnership with Traditional Owners; and presenting our project outcomes at national conferences.

I am pleased to submit to you the 2018 Annual Report for the Northern Australia Environmental Resources Hub.



Michael Douglas
Hub Leader

Research

Progress towards outcomes

From the Kimberley to Kakadu and across to Cape York, the Hub is undertaking research to support the sustainable development of Australia's unique northern environments. The Hub's research is delivering new knowledge, tools and partnerships to inform practical solutions as the region responds to the northern Australia development agenda.

Over 2018 the Northern Australia Environmental Resources Hub made substantial progress towards delivering its objectives and outcomes. The Hub is partnering with governments, communities and industry to improve the capacity to manage and monitor Australia's unique northern environments. The Hub's research is supporting sustainable development in northern Australia and informing practical solutions to the region's major environmental challenges. Research is focusing on:

- landscape-scale studies covering savanna, rainforest and aquatic ecosystems and biodiversity;
- new knowledge to support land and water planning for urban, agricultural, and infrastructure development, and;
- improving and supporting Indigenous land management including Indigenous Protected Areas.
- a research across a range of disciplines to underpin management effectiveness in Kakadu National Park.

Some key outcomes achieved in 2018 include:

- Research productivity has increased significantly since 2017 as evidenced through the reporting on the quantitative performance indicator measures in Table A below.
- RPV4 saw twelve new projects get underway in 2018 that covered a range of topics partnering with governments and other stakeholders. RPV4 was the largest Research Plan to date with respect to funds allocated.
- This brought a total of just over 19 million committed to research under the program to date, with 200-300 thousand of research funds remaining to be allocated in the final two years of the program.

Our research priorities are structured under six broad research themes including:

Theme 1 Ensuring that the development of northern Australia minimizes the risks to the region's environmental resources; focuses on research that will help decision makers assess and plan for development in northern Australia in ways that will ensure that development likely to occur is undertaken in a way that minimises the risks to the regions environmental resources. The overarching focus of the Hub is on research to support sustainable development. Our research is located in areas where future development is more likely to occur, including three key regions across northern Australia, the Fitzroy River in the Kimberley, Daly River in the NT, and Mitchell River in Cape York and Gulf of Carpentaria.

Projects in the Daly river region of the Northern Territory are now publishing outputs that support water resource planning, by demonstrating the flow related relationships to key species such as barramundi and pig-nosed turtle. In the Fitzroy valley in the Kimberley four inter-related projects are supporting land and water planning with the support of the WA

Government. A number of successful interactive planning meetings were held in 2018 with Government, Indigenous and pastoral stakeholders, including a mobile 3D interactive display. In north Queensland catchment fieldwork continued to better understand the relative importance of rivers flowing into the Gulf of Carpentaria, particularly for prawn and barramundi fisheries.

This research is helping to predict the likely consequences of development, and to inform planning and management practices that will minimise the risks to environmental resources.

Theme 2 Improving the management of threats to environmental resources in northern Australia; recognises that large areas of northern Australia are unlikely to be suitable for intensive development, but these areas still face major threats to environmental resources and research can help to improve how we manage and respond to those threats. In these areas, research is needed to determine the impact of natural stressors (e.g. climate) and current management regimes (e.g. fire, weed and feral animal management) to underpin improvements in on-ground management, to better understand how we can predict ecosystem failure (to help avoid it from occurring).

Targeted research has been completed on specific management issues related to waste and marine debris in remote beach locations on western Cape York, and mapping and protection of littoral rainforests in the Wet Tropics of north Queensland.

Fieldwork on control mechanisms for feral pigs on aquatic ecosystems on Cape York is well advanced and our work on managing the threat of Gamba Grass in the NT has been expended to also look at emerging issues in north Queensland. Threats to riparian zones are being examined in the Kimberly, Daly and Kakadu regions, with guidelines for management being developed that address, weeds, fire and changed land use.

Theme 3 Developing practical approaches for managing threatened species and threatening processes in northern Australia; is focussed on developing practical approaches to manage threatened species and threatening processes in northern Australia. Research is needed to help identify high-priority areas to target threat abatement and species recovery investments and to develop and trial practical methods for on-ground management for the recovery of identified threatened species.

A major project on prioritising threatened species and threatening processes across northern Australia has been producing preliminary maps and communication products that have been shared with a range of Commonwealth, State and Territory research users, with this project to be concluded in 2019. In Kakadu research on small mammal decline has moved from cat predation to look at other landscape wide factors, such as fire and vegetation management.

Theme 4 Developing approaches for monitoring environmental resources in the northern Australia; recognises that an important part of the management of environmental resources is being able to monitor changes and trends in their condition. Northern Australia presents some novel challenges for monitoring given the remoteness and limited specialist skills base within the region, a research is needed to demonstrate better ways to measure environmental drivers, pressures, stressors and responses in northern Australia, including approaches to environmental accounting and the measurement of changes in soil carbon.

After initially scoping appropriate tools for environmental monitoring in remote areas we have initiated two projects that are looking at the use of e-DNA techniques to detect significant species (i.e. Gouldian Finch) from water samples. These projects passed important proof of concept and technical hurdles in 2018 and are now expanding their fieldwork activities. Also a set of three projects commenced in 2018 that will support the rehabilitation of the Ranger uranium mine, including developing faunal colonisation criteria, riparian vegetation protection

from surface and groundwater contamination, and threats to in-stream fauna from water runoff into the Magela creek.

Theme 5 Supporting Indigenous natural resource management in northern Australia

Aboriginal people own and manage vast parts of northern Australia. Recent increases in the National Reserve System are largely due to the inclusion of new Indigenous Protected Areas and northern Australia has seen a rapid expansion of the Indigenous ranger movement. Research is needed to help support the management of IPA's and Indigenous natural resource management more broadly. Outside of IPA's there is a need to support the management of Indigenous Land Management Programs more broadly. Kakadu National Park, which operates under joint management, is another specific priority of the Commonwealth.

This theme has completed a project on the lessons learned from the incorporation of Top End Indigenous fire knowledge into fire management and on Indigenous Protected Areas. A synthesis project looking at the benefits for biodiversity from IPA's is planned to commence in 2019. A major project in the Kimberley is designing and testing culturally tailored Indigenous knowledge brokering methods and tools. Videos and communication products arising out of 'walking on country' activities have focussed on the benefits of educating students and bringing people back to their country. A large project managed by JCU that examined the social and economic benefits of Indigenous land and sea management program concluded at the end of 2018 and its findings have been communicated with DoE and PM&C, with strong support received.

Theme 6 Determining the economic values and benefits of environmental resources in northern Australia; is a cross-cutting research theme, as consideration of the economic contribution of environmental resources across northern Australia is important for supporting effective policy and planning decisions across all of the other research themes.

We were very pleased to commence a new project in 2018 on Environmental Economic Accounting that is a priority for DoEE in its efforts to implement the nationally strategy for environmental-economic accounting. The project is undertaking a case study in the Mitchell catchment of north Queensland that will synthesise existing ecological and economic research in the region, and recommend performance metrics for future investments.

Progress against research priorities

With the addition of the projects approved under Research Plan Version 5 the Hub will have either completed, or be undertaking, projects that address each of the sixteen Hub research priorities, as revised by the Commonwealth in May 2017.

Research projects

[Attachment A](#) lists the projects funded under the Northern Australia Environmental Resources Hub and provides information on the project status, information on outputs and links to products for all projects (where available). Exceptions to the NESP Data Management and Accessibility Guidelines are also noted there.

Performance against milestones

Performance against Funding Agreement milestones

All milestones for the period (and to date) have been met as per Funding Agreement Milestones 18 to 21, including the delivery and acceptance of the 2017 Annual Report and the delivery and acceptance of the final Research Plan Version 5. The most recent milestone was the acceptance by the Commonwealth of Research Plan Version 5, on the 13th December 2018.

Performance against the Research Plan milestones

Information on project progress and performance is provided in [Attachment A](#).

Measuring success

The National Environmental Science Program (NESP) is a long-term commitment to support environmental and climate research. The key objective of the NESP is to improve our understanding of Australia's environment through collaborative research that delivers accessible results and informs decision making. The focus of NESP is on practical and applied research that informs on-ground action and that will yield measurable improvements to the environment.

The Program will build on its predecessors - the National Environmental Research Program and the Australian Climate Change Science Program – in securing for decision makers the best available information to support understanding, managing and conserving Australia's environment.

The NESP is delivered through multi-disciplinary research Hubs or consortia, hosted by Australian research institutions.

The NESP seeks to achieve its objective by supporting research that:

- is practical and applied and informs on-ground action
- addresses the needs of the Australian Government and other stakeholders by supporting and informing evidence-based policy and improving management of the Australian environment
- is innovative and internationally recognised
- enhances Australia's environmental research capacity
- is collaborative and builds critical mass by drawing on multiple disciplines, research institutions and organisations to address challenging research questions
- produces meaningful results accessible to government, industry and the community
- includes synthesis and analysis of existing knowledge
- builds relationships between scientists and policy-makers to encourage collaborative problem solving on environmental issues.

NESP end-users will be a broad range of stakeholders whose decisions may impact on the environment, and include the Australian Government, state governments, industry, business, community groups and Indigenous land managers (or Indigenous Communities).

The intended outcomes of the NESP are:

- Enhanced understanding of, and capacity to manage and conserve Australia's environment.
- Improved climate and weather information for Australia through a greater understanding of the drivers of Australia's climate.
- Timely research that is used by policy and decision-makers to answer questions and provide solutions to problems.
- Research outcomes that are communicated clearly to end-users and the general public, and stored in a manner that is discoverable and accessible.

Table 1. Quantitative performance measures

Key Performance Indicator	Hub result for 12-mth period (numerical only)	Explanation (if any)
1. Percent of projects (active or completed in the reporting period) for which there is a research-user actively engaged in the project?	100%	To better ensure that project outputs meet the needs of research users, and are incorporated into policy and/ or management, each project is required to enter into a research user agreements that will be signed off by project leaders and the principal research users. The Research User Agreement specifies the outputs that will be produced by the project and the timeline and format for delivery of those outputs. The principal research user commits to making use of the outputs for specific policy and planning objectives. The Agreement also specifies the preferred method of engagement of the research users in the project.
2. Percent of projects approved under RPV5 in which research-users were actively involved in project design?	100%	In preparing Research Plan Version 5 we consulted widely with Commonwealth, State and Territory agencies relevant to the project. We ensured that in the drafting of each project plan research-users were explicitly identified and consulted.
3. Number of research outputs provided to end users on time ¹ and as identified in the Research Plan	37	This is a collation from Hub project milestone reports where they have reported research outputs completed on time.
4. Proportion of research outputs provided to end users on time and as identified in the Research Plan	100%	The projects that have been completed under the program have all completed their outputs, and these are available on our website, or through other on-line sources.
5. Number of instances of where the hub has used NESP-generated information from another NESP hub.	2	Projects 2.7 and 4.4 reported using NESP generated information from another Hub, the TSR Hub and ESCC Hub.
6. Number of peer reviewed NESP-funded publications during the reporting period	19	Includes 4 papers that are in review.
7. Number of NESP research citations in other researchers' publications during the reporting period	29	Project 5.4 reported the most with 17 citations.

¹ On time – delivered on the date the outputs were expected to be delivered

Key Performance Indicator	Hub result for 12-mth period (numerical only)	Explanation (if any)
8. Number of researchers, including PhD and Post-Doc positions engaged as a result of NESP (total, Full-time equivalent) during the reporting period	43.63 FTE	Includes at least 79 individuals.
9. Number of data sets provided to the Hub, or made publicly available, by third parties for the purposes of informing NESP research	7	Attachment A also reports on data sets that are produced as outputs to projects.
10. Percentage of data sets made publically available under open licence by the Hub	95%	Our project leaders and researchers have been advised of their obligations in relation to data management. We have prepared a Hub protocol titled <i>Ensuring Open Access</i> that has been included in orientation workshops held in Qld, WA and the NT. Some datasets are restricted because they involve social research responses from individuals, involve culturally sensitive Indigenous knowledge, or the location of threatened species.
11. Percentage of NESP research outputs (including publications, data and metadata) that are discoverable and accessible in accordance with NESP data accessibility requirements and the funding agreement.	87%	Our project leaders and researchers have been advised of their obligations in relation to data management. We have prepared a Hub protocol titled <i>Ensuring Open Access</i> that has been included in orientation workshops held in Qld, WA and the NT. 61 research outputs from projects were reported in 2018.
12. Number and FTE of Indigenous people employed in a project (separate into full and part time positions).	4.03 FTE	78 individuals including permanent, casual and one off engagements
13. Number of Indigenous researchers/graduates/post-graduate/PhD/Post Doc Positions in projects.	5	Projects 5.3 and 5.4 reported Indigenous researchers.
14. Number of Indigenous people trained in the use of environmental management tools and techniques.	289	A number of projects reported training and education targeted towards Indigenous people.
15. The number of management tools for Indigenous waters and land	10	Project 1.5, 2.5, 2.6, and 4.4 reported the provision of management tools.

Key Performance Indicator	Hub result for 12-mth period (numerical only)	Explanation (if any)
that benefitted from NESP research and outcomes (including but not limited to Plans of Management for IPAs, Co/Joint managed parks, Marine Park Plans of Management, Conservation Agreements).		
16. Number and type of communication products that have been used to communicate research with Indigenous people.	41	Ten projects reported the provision of communication products.
17. Number of research, knowledge sharing and communication events held with Indigenous communities.	58 Events	Eight projects had a significant number of communication events with Indigenous communities.
18. Number of public events, conference presentations, jointly authored/published papers with Indigenous participants/contributors.	28	Nine Projects held events with Indigenous participants/ contributors.

NESP impact stories

NESP impact stories are provided at Attachment B. These stories showcase the contribution of NESP funded research to the environment, the economy, society, culture, public policy, quality of life, beyond contributions to academia.

NESP impact stories are particularly useful to demonstrate:

- how the research conducted by the hub has been used to inform on-ground action or policy
- how the hub has collaborated with research users to better understand decision-makers needs or the key question research needs to address
- how the hub using innovative approaches to connect science with policy/decision making
- how the hub is successfully including Indigenous Australians in the work of the hub
- how the hub has improved the national environmental information base

The following impact stories are outlined in Attachment B:

1. [Communicating an Indigenous understanding of the Fitzroy River catchment through art and film](#)
2. [Supporting savanna fire management through carbon farming](#)
3. [Modelling and mapping for conservation outcomes across the north](#)
4. [Reconnecting with Country through collaborative research](#)
5. [Caring for Country and improving Indigenous lives](#)
6. [Showing and sharing knowledge with a hands-on map](#)
7. [Telling our stories face to face](#)

Hub-level risk management

All risks identified in the Hub risk management plan are being actively managed. Management processes are in place for the ongoing management of risk, through the Hub Leadership Group, Research Executive Committee, Hub Steering Committee and at the project leadership level.

Actions identified in the Risk Assessment and Treatment Plan have been implemented as appropriate. The most significant actions in 2018 have occurred around the following risks:

- Loss or change in location of key personnel (has required replacement personnel)
- Cyclones and extreme rainfall events impacting on field work

These risks have all been effectively managed and processes are in place to ensure that they are effectively managed in 2019 and beyond. There have been no new risks identified in the Hub Risk Management Plan since the approval of RPV4 in December 2017.

Financial information

Annual financial reporting

Financial information for the Northern Australia Environmental Resources Hub is provided at Attachment C and includes:

- Income and expenditure statement
- Recipient and Other contribution statement
- Asset Schedule
- Audit report



National Environmental Science Programme

www.nespnorthern.edu.au

The Hub is supported through funding from the Australian Government's National Environmental Science Program.



Australian Government

