

Tropical Rivers and Coastal Knowledge (TRaCK) Research Hub

6-Monthly Progress Report

May – June 2010



Australian Government

**Department of the Environment,
Water, Heritage and the Arts**

Land & Water Australia

National Water Commission

TRaCK brings together leading tropical river researchers and managers from Charles Darwin University, Griffith University, the University of Western Australia, CSIRO, James Cook University, the Australian National University, Geoscience Australia, the Environmental Research Institute of the Supervising Scientist, the Australian Institute of Marine Science, the North Australia Indigenous Land and Sea Management Alliance, and the Governments of Queensland, the Northern Territory and Western Australia.

TRaCK receives major funding for its research through the Australian Government's Commonwealth Environment Research Facilities initiative; the Australian Government's Raising National Water Standards Program; Land and Water Australia; the Fisheries Research and Development Corporation and the Queensland Government's Smart State Innovation Fund.

For further information about this publication:
Kate Golson, TRaCK
Email: kate.golson@westnet.com.au

Or to find out more about TRaCK
Visit: <http://www.track.gov.au>
Email: track@cdu.edu.au
Phone: 08 8946 7444

Summary of Progress and Changes to Research Program

A total of eight TRaCK projects have undertaken fieldwork in the Kimberley since 2008 (Projects 1.2, 2.1, 2.2, 4.1, 4.6, 5.1, 5.2, and 5.8). All have had a high level of community engagement and all have progressed well.

Project 2.1 (The economic value of rivers) has completed its final written report and is now reporting on its findings. Six projects have completed their fieldwork and are now in a phase of sample processing and analysis (P4.1, P4.6, P5.1, P5.2, P5.3 and P5.8). Project 2.2 (Indigenous values) is two-thirds of the way through its field program and now has preliminary results from two rounds of field surveys. Project 1.2 (River change stories) is in the final stages of its work with the Fitzroy Crossing-based Yiriman Project. Project 1.2 is also intending to assist members of the Fitzroy Catchment Management Group's Aboriginal Reference Group with capacity-building in water planning and management later in the year. Project 6 (Sustainable livelihoods) has begun work with Nyikina Mangala people.

Another project (P5.7) is a desk-top project that seeks to integrate work from the TRaCK projects related to environmental flows and does not require any fieldwork or the collection of new information. The project has developed an organising framework (ELOHA) Ecological Limits of Hydrological Alteration and will 'harvest' flow-related material from other projects when completed. This is expected by September 2010. None of the projects contributing this information have completed results yet, so no progress update is included for Project 5.7 in this report.

Following are updates on progress for the projects currently being undertaken in the Kimberley.

Project 1.2

1. A. Name of research project

Capacity building tools for effective planning and decision-making in Indigenous contexts: Power tools project

2. Why are we doing this research?

The purpose of the project is to provide an opportunity for Indigenous people to share information about Indigenous participation in water plans and policy making processes. In particular, it is concerned with what is working and what is not working so well with past and current processes. The information assembled will help governments to more clearly hear and understand Indigenous aspirations in water planning processes, leading to more inclusive policy making and better decisions.

3. What are the aims?

- To provide targeted training, involving learning-by-doing, for local Indigenous communities so that they can develop and/or strengthen some of the skills that are required to participate in cross-sectoral water planning. This is done through a visioning and planning exercise.
- To develop guidelines for approaches and tools to improve the capacity of Indigenous communities to engage in the water management planning processes.

4. Where are we doing it and who is involved?

We plan to work with Aboriginal people in the Fitzroy catchment who have an interest in water planning and management. The first step will be to hold a visioning and planning workshop with members of the FitzCAM Aboriginal reference group and possibly other Aboriginal people who are interested, in the Fitzroy River area this year.

The results obtained will be used to produce a co-prepared report on the views of local Aboriginal people about what is working in the Fitzroy catchment regarding their participation in planning and decision making processes, and what is not. It will also include local people's thoughts on the ideas and activities that could be used to strengthen Indigenous participation. The report would focus on the Kimberley though it is expected to contribute to the strengthening of Indigenous participation nationally.

5. What have we found so far?

Since fieldwork has not yet started we have no findings to share.

6. How will we communicate these interim results to people in the region?

We will communicate interim results in a number of ways: through formal and informal discussions and presentations with participants and communities in the Fitzroy River catchment; by using the local media such as radio; by the production and distribution of a workshop report written by TRaCK staff and the participants, which will be distributed to participants and interested people; and by providing summaries of activities on message boards, and notices in local papers.

For further information contact Owen Stanley: 08 8946 6049 or owen.stanley@cdu.edu.au

1. B. Name of research project

River Change Stories Project

2. Why are we doing this research?

This oral history project is recording Indigenous knowledge about changes to rivers and wetlands in the catchment to inform TRaCK research through establishing a more complete picture of the ways that rivers and wetlands work, and the relationships people have with these systems. The community-driven research is harnessing the energy of young local people to record the stories of their senior people.

3. What are the aims?

- Record stories of senior Aboriginal people about changes to the rivers and wetlands in the Fitzroy catchment over their lifetimes and the lives of their forebears
- Provide a group of local young people with the opportunity to gain and strengthen their skills and experience in video-making and oral history recording
- Produce a DVD on the river system for the community
- Integrate the oral history information with the scientific knowledge that TRaCK is collecting to establish a more complete picture of the ways that rivers and wetlands work, and the relationships people have with these systems.

4. Where are we doing it and who is involved?

The Yiriman Project is managing the project on behalf of TRaCK and is working with community members, local organisations and other projects, such as FitzCAM and the Indigenous Community Water facilitators Network. Community fieldtrips have been undertaken at various locations along rivers and wetlands systems in the Fitzroy catchment. Interviews have been recorded with 12 senior people from 6 language groups.

5. What have we found so far?

No results are available yet.

6. How will we communicate the results to people in the region?

A DVD will be produced on the basis of the recordings, which is expected to be completed by the end of June. During its production, Yiriman will consult closely with the interviewees and with cultural advisors. On its completion, the DVD will be distributed to local communities and organisations.

For further information contact: Kate Golson on 0409088512 or kate.golson@westnet.com.au

Project 2.1

1. Name of research project

The value of Australia's tropical river ecosystem services

2. Why are we doing this research?

The ecosystem services of Australia's tropical rivers are the goods and services provided by tropical rivers that benefit, sustain and support the well-being of people. Some examples include providing water for people, wildlife and industry; providing fish and wildlife for food; and providing good places for culture and family gatherings. However, most ecosystem services are difficult to see and measure, so their contribution to human well-being is rarely considered in decision-making. We can start to correct this by documenting the existence and role of ecosystem services, and assessing the value of their contribution to human well-being and how communities are affected by changes in ecosystem services. This is especially important in the current climate of growing interest in developing the water resources of northern Australia.

3. What are the aims?

The aims of this project are to assess the value of tropical river ecosystem services in consultation with community, Indigenous, industry and government groups. We assess value in two ways. The first is by estimating the dollar value of ecosystem services that don't usually have a price. This helps to provide information on the dollar benefit to communities of maintaining or improving the quality of the river system. The second way is by learning about the history of the river system to see how changes in the past have impacted on ecosystem services. This gives us insight into the potential impacts of future developments.

4. Where are we doing it and who is involved?

We have undertaken this research in the Fitzroy (WA), Daly (NT) and Mitchell (Qld) catchments. The researchers involved in this project are Anna Straton, Sue Jackson and Nick Abel from CSIRO; Kerstin Zander, Stephen Garnett and Adam Drucker from Charles Darwin University; and Mark Kennard from Griffith University.

The economic valuation exercise involved a questionnaire that was mailed out to people around Australia and delivered face-to-face with Indigenous people in each catchment. In the Fitzroy catchment, we were advised by local organisations, particularly FitzCAM, and contracted local Aboriginal co-researchers to visit communities and people in and around Fitzroy Crossing and Derby. We first approached people to explain the project and ask if they wanted to be involved. If they did, we either had a meeting then, or set up a time to return.

The questionnaire was also sent to people in cities around Australia including Sydney, Perth and Darwin.

5. What have we found so far?

We asked people about the importance they place on improving or increasing (1) the area of floodplain in good environmental condition a little bit or a lot; (2) the condition of rivers for recreational fishing a little bit or a lot; (3) the condition of waterholes that are important to Aboriginal people a little bit or a lot; and (4) income from irrigated agriculture a little bit or a lot.

The key findings so far are:

- People around Australia have a value for improvements in the ecosystem services of Australia's tropical rivers whether they live in or have visited the tropical rivers region or not.
- People generally value large improvements in the area of floodplain in good environmental condition, the condition of rivers for recreational fishing, and the condition of waterholes that are important to Aboriginal people more than they value smaller improvements.
- In contrast, people generally value a smaller increase in income from irrigated agriculture more than they value a large increase.
- People from several different places in Australia – the Fitzroy Catchment, Perth and Melbourne – value large improvements in the condition of waterholes important to Aboriginal people the most out of all improvements.

The range of values that different groups of people have for medium and large improvements in the ecosystem services of the Fitzroy River are as follows (these are once-off payments per household):

| | Residents of the Fitzroy River catchment | Indigenous residents of the Fitzroy River catchment | Residents of Perth and Melbourne |
|--|---|--|---|
| Medium level area of floodplain in good environmental condition | \$117.59 - \$121.03 | \$110.79 - \$122.11 | \$30.16 - \$47.43 |
| Highest level area of floodplain in good environmental condition | \$139.50 - \$146.08 | \$96.24 - \$118.97 | \$132.74 - \$151.70 |
| Medium level quality of the river for recreational fishing | \$223.09 - \$252.84 | \$185.79 - \$200.50 | \$70.62 - \$78.14 |
| Highest level quality of the river for recreational fishing | \$222.95 - \$243.85 | \$223.65 - \$260.60 | \$143.33 - \$150.27 |
| Medium level condition of waterholes important to Aboriginal people | \$228.36 - \$250.59 | \$264.36 - \$290.55 | \$141.77 - \$151.68 |
| Highest level condition of waterholes important to Aboriginal people | \$314.58 - \$363.08 | \$347.51 - \$426.38 | \$281.32 - \$282.64 |
| Medium level income from irrigated agriculture | | | \$110.09 - \$122.04 |
| Highest level income from irrigated agriculture | | | \$82.10 - \$87.60 |

(The reason why there are no estimates for the two levels of income from irrigated agriculture is because the relevant coefficients were statistically insignificant. This means that they did not influence people when they were making their choices and we cannot calculate willingness to pay or any other

estimates of value for these levels of the ecosystem service.)

The key finding from looking at the history of the Fitzroy River is that the ability of the river system to provide the ecosystem services that people value is influenced by many interconnecting factors. Some of the really important factors that seem able to make a big difference are: changes in values and attitudes (including the increasing influence of Indigenous people in the debate), changes in policies and other institutions, dominant grazing practices, and how different stream flows are from the natural flow regime.

6. How will we communicate the final results to people in the region?

The results outlined above are the project's final ones. They will be communicated to Kimberley people in a range of ways, including by phone to key community members, through face-to-face meetings in the region and in the form of suitable written materials. Copies of the full technical report and a report summary, as well as the other materials, have been or are to be sent to local organisations and agencies as well as interested people in the region. The researchers are available to answer any questions and to provide further information if requested.

The full report is available for download from the TRaCK website (<http://www.track.gov.au/publications/registry/774>), as is the accompanying summary fact sheet (<http://www.track.gov.au/publications/registry/778>).

For further information contact Anna Straton: 03 9662 7325 or anna.straton@csiro.au

Project 2.2

1. Name of research project

Indigenous socio-economic values and river flows

2. Why are we doing this research?

Indigenous values relating to water are currently poorly understood by decision-makers, and are not well incorporated into water resource planning. Northern Australian rivers such as the Fitzroy River are experiencing increasing demands for their water resources, and water allocation planning processes are being undertaken in many regions. This research will increase the level of understanding of the importance of healthy rivers and flow regimes to Indigenous people.

3. What are the aims?

- To record Indigenous socio-cultural knowledge relating to water;
- To quantify the economic benefit Indigenous people derive from water dependant resource use (i.e. harvest of river/wetland plants and animals for bush tucker, bush medicine etc.); and
- To trial a participatory monitoring program using Indigenous indicators of healthy river country.

4. Where are we doing it and who is involved?

The CSIRO project team is made up of Sue Jackson, Marcus Finn, Emma Woodward, Pippa Featherston and Jon Edgar (in the Daly only). The research is currently being conducted in the Daly River NT, and Fitzroy River WA catchments. In the Fitzroy, Indigenous people from Fitzroy Crossing (Junjuwa, Kurnangki, DarlNgunaya and Bungardi), Muludja, Bayulu, Ngurtuwarda and Yungngora are involved in the household surveys (quantifying resource use). Participatory monitoring programs have also been established with a group comprising residents from Parkul/Bidijul and a Bayulu CDEP group.

5. What have we found so far?

So far in the Fitzroy we have completed a full year of household surveys (four rounds totalling eight surveys per household). Preliminary results suggest that the river made a larger contribution to Indigenous people's household incomes late in the wet season (Feb/Mar 2009) than it did in the middle of the dry season (June 2009). This is largely due to the decreased frequency of harvest of water-dependant species in the middle of the dry season. The most common reason cited for this was the drop in temperature (incl. water temperature) in the mid-dry season reducing fishing returns. This suggests there may be a return on effort below which people stop targeting some species and increase their focus on others (such as Goanna or Bush Turkey).

We have found that in the Fitzroy River Bony Bream (*Nematalosa erebi*), Spangled Perch (*Leiopotherapon unicolor*), Catfish (*Arius* spp.), Black Bream and Freshwater Crabs (*Holthusiana transversa*) are the species harvested in the greatest numbers. Household consumption of these species follows a similar pattern but is substantially lower than the number of individuals being harvested (production). Consumption of plants and animals by survey households is lower than production because a number of families often participate in harvesting trips and share the catch amongst themselves and other families.

6. How will we communicate these results to people in the region?

The project team has return visits to the communities scheduled at least 4 times a year. After each visit we send out an electronic newsletter to those with email, send copies to key community contacts, and on our return distribute newsletters to each of our research participants. A project newsletter was last compiled and distributed at the end of March 2010. The 12-page comprehensive overview of the project included 'results to date' and was targeted at a general and management audience. Interim results are also communicated to each of the people and communities involved during these trips in verbal form, using project newsletters and plain English documents where appropriate.

In April 2010, we participated in the Kimberley ranger forum and in May 2010 we reported to the FitzCAM reference group at its meeting in Fitzroy Crossing.

For further information contact: Sue Jackson CSIRO, 08 89448415 or sue.jackson@csiro.au

Project 4.1

1. Name of research project

Surface water – groundwater interactions in the Fitzroy River, WA

2. Why are we doing this research?

Groundwater and surface water have traditionally been managed as separate resources, however we now know that they are not separate entities. In the top end of Australia, groundwater discharge to streams sustains surface flow during dry seasons. Also, during the wet season, rising river levels can lead to groundwater recharge of the aquifers, through lateral flow into the bank and/or vertical infiltration beneath the floodplain during periods of inundation. We want to understand where groundwater is naturally discharging into the Fitzroy River, as well as the origin and evolution of this groundwater. This information will assist groundwater management in the region, and allow us to better protect the Fitzroy River from impacts of groundwater pumping.

3. What are the aims?

The aim is to identify locations and elucidate sources of groundwater

4. Where are we doing it and who is involved?

Peter Cook, Rebecca Doble and Glenn Harrington (CSIRO, Adelaide) are involved in this project, together with Louise Stelfox and Duncan Palmer (DoW, Kununurra). The Noonkanbah community allowed drilling on their land in October 2009. Kulkarriya School and Fitzroy Crossing District School are collecting water samples, which are sent to CSIRO for analysis.

5. What have we found so far?

Groundwater inflow to the Fitzroy River was assessed by measuring surface water chemistry between Fitzroy Crossing and Willare in May 2008. A helicopter was used for river sampling, as this allowed more than 300 km of the river to be sampled in one day. Changes in river chemistry around the Cunningham Anabranche confluence with the Fitzroy River indicate that groundwater flows into the river in this area, which may be due to alluvial and Permian bedrock aquifers being in contact with aquitards. The salinity of the river decreases downstream of the confluence and is lower than the regional groundwater salinity. This suggests that water stored in river banks from the wet season may be flowing back into the river throughout these lower reaches.

Drilling on Noonkanbah station during October 2009 resulted in the completion of 9 new groundwater monitoring wells located at different distances from the Fitzroy River and at different depths into the aquifers. Subsequent sampling of these wells in November 2009 for groundwater chemistry analysis has started to provide more detailed models of how

groundwater from each of the different aquifer systems flows towards (and ultimately discharges into) the Fitzroy River. Groundwater dating with chlorofluorocarbons has indicated that most of the shallow groundwater beneath the floodplain is less than 40 years old, although there is some evidence of deep, regional groundwater flowing into the river. Follow-up sampling of these shallow wells, and sampling of some deeper existing groundwater wells throughout the region, was undertaken during May 2010. Analysis of these samples is currently underway, and it is envisaged that the data will provide useful clues into the primary source(s) of groundwater discharging into the river.

6. How will we communicate these final results to people in the region?

Complete results of the October 2009 and May 2010 groundwater sampling programs will be available by late June 2010. We will then interpret the data and produce a written report of the findings by late August 2010. Information from this will be presented by TRaCK staff at face- to-face reporting meetings in the catchment.

For further information contact: Glenn Harrington on Glenn.Harrington@csiro.au

Projects 5.1 and 5.2

1. Name of research project

Two projects relating to food webs in river-floodplain systems:

5.1 Bottom-up and top-down control of riverine food webs

5.2 Refugial waterholes

2. Why are we doing this research?

Food webs describe who eats who and so provide a way of describing links between plants and animals. External influences like feral animals, changes to the flow regime or some land-use activities might change the abundance of a particular species which will have knock-on effects to other species linked via the food web. So, the structure of food webs in rivers and floodplains can influence how these systems respond to river management and land-use activities. Of equal significance is the position in the river landscape where these food webs exist. Waterholes in intermittent rivers and on the floodplain become an important refuge for plants and animals during the dry season, and a source of colonists once the rivers start flowing again. Understanding the important food sources (plants) supporting these food webs, the key animals responsible for transferring energy within these food webs, and links between different parts of the river landscape is critical to the sustainable management of these ecosystems.

3. What are the aims?

- To identify the food sources and key consumers in freshwater food webs.
- To understand spatial variation in food web structure.

- To identify differences in food web structure between the dry and the wet seasons.
- To develop indicators to compare river health across systems

4. Where are we doing it and who is involved?

In mid-2008, we conducted sampling of plants and animals comprising freshwater food webs at 19 sites across the Fitzroy River Catchment, from upland and floodplain tributaries to the main channel and floodplain waterholes. We also sampled at 27 sites in the Daly River Catchment (NT) and at 23 sites in the Mitchell River Catchment (Qld). In early 2009, sampling was repeated at 6 sites in the Fitzroy Catchment (as well as in the Daly and Mitchell catchments) to provide a comparison between the wet season and the dry season.

The research team is led by Dr Neil Pettit (UWA) and Dr Danielle Warfe (CDU) with assistance from Dr Peter Kyne (CDU), Dom Loong (JCU), Ian Dixon (CDU), Xavier Pettit (UWA), Dr Paul Close (UWA), Rebecca Dobbs (UWA) and Dave Tunbridge (UWA).

In the Fitzroy Catchment, we have gained approvals and worked with traditional owners, Aboriginal ranger groups and the KLC Land and Sea Unit, with Kulkurriya community school at Noonkanbah and on Mornington Station. We were assisted and advised by the FitzCAM project.

5. What have we found so far?

By late 2009, we had completed the processing of all the food web samples - about 1500 – that had been gathered in the 2008 dry season. We are continuing with our analysis of these samples.

So far, the key findings are:

- Assemblages of fish, invertebrates and vegetation show consistent variation between tributaries, main channels and floodplain waterholes, and this variation is strongly related to flow regime (whether sites have permanent water) and width of the waterbody or channel (an indicator of ecosystem size).
- In all three catchments, the food webs are primarily supported by benthic algae.
- Invertebrates and fish are most strongly linked to local food sources in the Fitzroy catchment, i.e. benthic algae that are found at the same locations as the animals. This is not the case in the Daly River, where fish are relying on a food source from somewhere other than where they were sampled. We think that the intermittent flow regime and relatively short-term flooding of the Fitzroy River might result in less exchange of food energy across the river landscape, so fish are more dependent on their local food sources.
- Food chains, describing the number of links between plants foods and top predators, are longer in the Fitzroy than in the Daly and Mitchell Rivers. This suggests there are fewer food sources available in the Fitzroy, and stronger links between these sources and the animals that consume them.

We have nearly finished processing the samples collected in the early 2009 wet season and hope to analyse these over the next few months. These samples will allow us to see how food web structure might change between the wet and the dry seasons in the Fitzroy River.

6. How will we communicate the final results to people in the region?

We returned to the region in May 2010 to present our final results directly to local people and organisations who we worked with or who were interested in hearing about the work. We presented to a meeting of the FitzCAM reference group in Fitzroy Crossing, visited Kulkurriya school at Noonkanbah and met with KLC LSMU staff and ranger groups in Derby. We also made a presentation at Mornington Station. Written information is available on the TRaCK website and by contacting the researchers.

For further information contact Danielle Warfe on: Danielle.Warfe@cdu.edu.au

Project 5.8

1. Name of research project

Biodiversity and high conservation value aquatic ecosystems

2. Why are we doing this research?

The biodiversity values of aquatic ecosystems in northern Australia are poorly understood. North Australian rivers are experiencing increasing demands for their water resources and water allocation planning processes are being undertaken in many regions. Some water allocation actions, such as transferral of water among catchments, represent risks to aquatic biodiversity. This research will increase the level of understanding of various components of biodiversity of rivers in northern Australia. This will facilitate improved assessment of risks to biodiversity associated with water resource development proposals.

3. What are the aims?

- Identify indices and patterns of aquatic biodiversity
- Determine the relationship between riverscape setting and patterns of biodiversity
- Develop explanatory and predictive models of environmental drivers of natural patterns of biodiversity
- Produce a bioregionalisation based on aquatic vertebrate species distributions (fish and turtles) and molecular analyses of selected vertebrates and invertebrates
- Identify areas of high conservation value on the basis of biodiversity attributes
- Identify the role of contemporary versus historical factors in determining patterns of biodiversity

4. Where are we doing it and who is involved (all researchers and Indigenous collaborators)?

The TRaCK biodiversity team includes Jane Hughes, Ben Cook, Mark Kennard, Brad Pusey, Arthur Georges and Damien Burrows. In the Kimberley, we undertook field research in mid-2008 with the Uunguu rangers and KLC Land and Sea Management staff. Further fish and invertebrate samples that we have relied on were collected and processed by the WA Department of Water and the Wungurr rangers from the Barnett, Hann River and Isdell rivers.

5. What have we found so far?

Using genetic tools to assess freshwater biodiversity throughout the rivers of northern Australia, we are finding interesting patterns of genetic diversity in the Kimberley. On the basis of the Kimberley data that has been analysed to date, and in particular samples that were collected at Mool Mool Lagoon on the Carson River near Kalumburu, we have found that the lineage of the mouth almighty (*Glossamia aprion*) in Kimberley rivers is the most genetically divergent of the species within northern Australia. Moreover, within the Kimberley, the mouth almighty of the Ord and Fitzroy rivers, although different, are more similar to each other than those of the North Kimberley rivers. Indeed, the mouth almighty from the Carson river is the most distinctive population in the whole of northern Australia, and is without question a new species, restricted to that river and indicating the uniqueness of the biodiversity of the latter sub-region. Over the next three months we will be processing and analysing many more of the samples collected in the Kimberley.

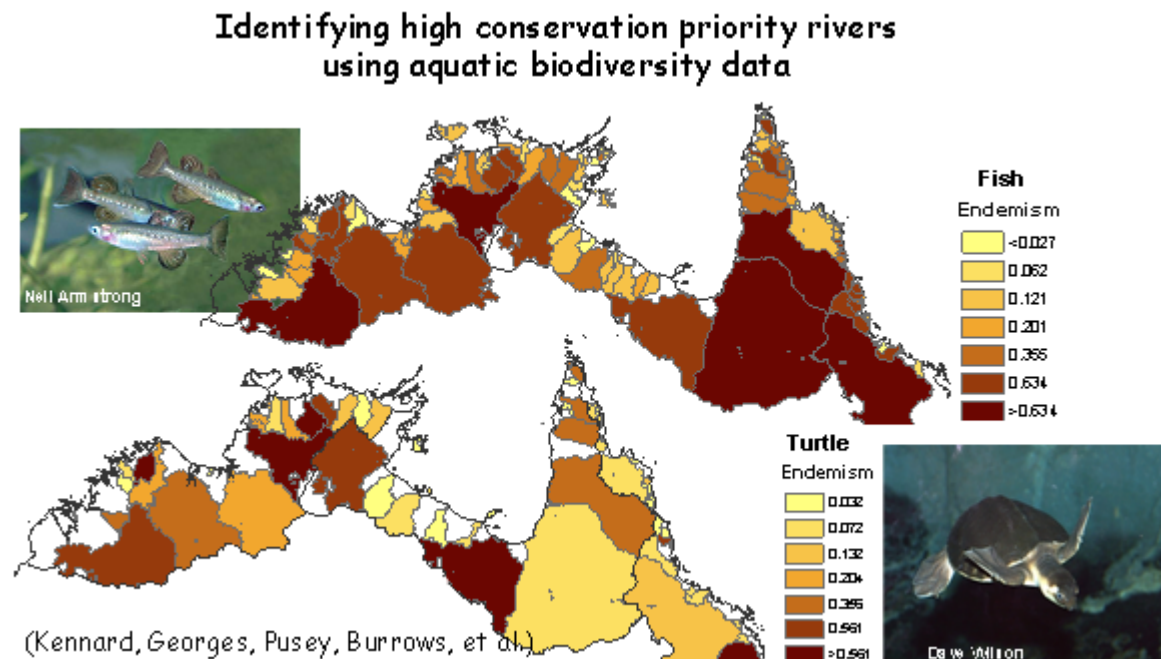


Figure 1: Freshwater biodiversity in northern Australia showing high fish and turtle endemism in the Fitzroy catchment

6. How will we communicate the final results to people in the region?

These results are final and will be communicated to people in a number of ways. We will prepare an overview of our activities and the main results which will be presented at regional meetings planned in the next few months. Written documents will be provided to stakeholder groups.

For further information contact: Ben Cook (ben.cook@griffith.edu.au) or Mark Kennard (m.kennard@griffith.edu.au)

Project 4.6

1. Name of research project

Trial of the Commonwealth Governments Initiative: Framework for Assessing River and Wetland Health (FARWH).

2. Why are we doing this research?

The Commonwealth Government intends that the “Framework for Assessment of River and Wetland Health” (FARWH) form the basis of national river and wetland health assessments in Australia. National-scale reporting of waterway condition requires consistency in the assessment techniques used among Australian States and Territories. This project will facilitate the up take and adoption of a key Australian Water Resources 2005 product, by building upon the Framework for the Assessment of River and Wetland Health (FARWH) and improve its national applicability.

The project is developing the FARWH for a range of ecological and geoclimatic environments and testing monitoring and assessment programs not tested in previous trials. The project also provides an opportunity to develop a region-wide approach to river health monitoring and reporting in northern Australia that is regionally relevant and provides the information required for national reporting of river health under the FARWH. The project will also improve the capacity of staff in each region to undertake river health assessments consistent with the FARWH.

FARWH includes six key components to assess river and wetland health. The project aims to identify appropriate indices within each of the six broad themes and establish how to combine indices so that nationally comparable assessments can be reported. The six assessment themes are:

1. *Aquatic Biota (fish and aquatic macroinvertebrates)*
2. *Water Quality (physico-chemistry and nutrients)*
3. *Riparian Vegetation (structure and composition)*
4. *Physical Form (structure of the stream channel, bed and banks)*
5. *Hydrology (streamflows)*
6. *Catchment disturbance (landuse)*

3. What are the aims?

The aim of FARWH is to provide assessments of the aggregate impacts of resource use on rivers and wetlands as the basis for reporting on waterway condition (health). The Framework has been tested successfully on Victorian and Tasmanian data, and is now being tested using data from other states and territories. Testing of the Framework in Tropical WA and Northern Territory is being undertaken as part of the Tropical Rivers and Coastal Knowledge (TRaCK) Research Program. The combined “Tropical FARWH” (WA and NT) aims to trial consistent assessment methods across tropical rivers.

The objectives of the Project are:

- a. to assess the National Framework for the Assessment of River and Wetland Health (FARWH) for its relevance and applicability in meeting State level requirements for monitoring and assessing aquatic ecosystems;
- b. to examine correlations or redundancies with the existing regional assessment frameworks and state-level monitoring programs as well as determining the overall applicability of FARWH;
- c. to assess whether one river and wetland health approach can be used to provide both State and national needs;
- d. as part of the reporting of FARWH trials comment on its relationship with water management within each trial region;
- e. to develop an implementation plan for the roll out of FARWH for the whole of the wet/dry tropics of northern Australia, including monitoring scale and frequency;
- f. to provide links to future reporting frameworks under the Australian Water Resources Information System (AWRIS)

4. Where are we doing it and who is involved (all researchers and Indigenous collaborators)?

Testing of the FARWH in WA is based on a desktop trial of the framework on the Ord River Catchment (recently completed), and field-based trials in the Fitzroy Catchment (currently underway). These field trials require collection of data from sites distributed throughout the Fitzroy Catchment.

People involved in the project include: Paul Close (UWA), Rebecca Dobbs (UWA), David Tunbridge (UWA), Claire Taylor (UWA), Simon Townsend (CDU), Ian Dixon (CDU), Ruth Duncan (CDU), Peter Davies (UWA) and Michael Douglas (CDU).

We collaborated with traditional owners in the Fitzroy catchment and North Kimberley, with the leaseholders and managers of Jubilee and Quanbun Downs, Gogo, Fossil Downs and Mornington stations and with the WA Department of Water. We relied for advice and assistance on the Fitzroy Catchment Management Reference Group, project staff from KLC LSMU and the Indigenous Community Water Facilitator Network.

5. What have we found so far?

Desktop trials (Ord Catchment)

The desktop trial of FARWH in the Ord River Catchment is complete and results have been documented in the following two reports:

- a. Dixon, I. *et al.* (2009). Desktop Trial of the Framework for the Assessment of River and Wetland Health (FARWH) in the Wet/Dry Tropics: Darwin Harbour and Ord River Catchments.
- b. Close, P.G. *et al.* (2009). Recommendations and Issues identified from Desktop trial of Tropical wet/dry FARWH in: Darwin Harbour (NT) and Ord River catchments (WA)

Field trials (Fitzroy Catchment)

Field trials of The FARWH have been completed in the Fitzroy River catchment. A summary these field tests is documented in a milestone report:

Dixon, I. *et al.* (2010). Field Trial of the Framework for the Assessment of River and Wetland Health (FARWH) in the Wet/Dry Tropics: Daly River and Fitzroy River Catchments.

Field trials in the Fitzroy River catchment focused on the sensitivity of bio-indicators to grazing and recreational/traditional land use intensity between June and September 2009. Thirty-four sites were selected to represent the variety of land use intensities, where possible, although sites sampled were largely determined by accessibility (accessibility to water and pastoral/traditional approvals). (Figure 2).

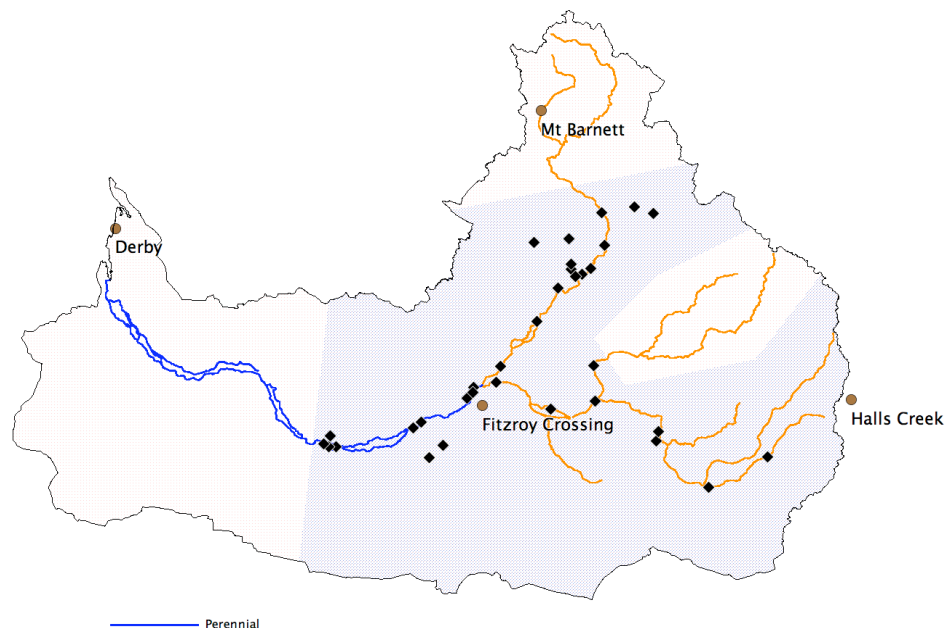


Figure 2. Distribution of 34 FARWH sites in the Fitzroy River catchment, Western Australia, 2009. Major streamlines are shown as Perennial or Seasonal (with permanent pools). Dark and light shaded areas represent access granted or declined respectively.

Data and samples from the field trials are currently being processed for final project reporting in May 2010.

6. How will we communicate the final results to people in the region?

Results will be communicated through face-to-face meetings with project collaborators, participants and other people with an interest in the work. Site specific information packages will be produced for community groups involved in the project. Briefings will be provided to staff at key organisations. Materials summarising the results will be produced and distributed broadly. A draft report on FARWH field trial for the National Water Commission will be produced in the next 2 months.

For further information contact: Paul Close (pclose@cyllene.uwa.edu.au) or Peter Davies (pdavies@cyllene.uwa.edu.au).

Project 6.5

1. Name of research project

Nyikina Mangala Mardoowarra (Fitzroy River) Sustainable Livelihoods on Country Case Study

2. Why are we doing this research?

The Board of the Nyikina Mangala Aboriginal Corporation has proposed a sustainable livelihoods project. They seek to develop a holistic sustainable livelihoods plan for Nyikina Mangala country that builds on previous planning and community development initiatives, which will support Traditional Owners to develop sustainable livelihoods.

The project is part of TRaCK Theme 6 research which is centred on sustainable enterprises. A key goal of Theme 6 is to present resource use options matched to the needs and aspirations of the resident population that also maintain ecological integrity.

3. What are the aims?

The Nyikina Mangala people have already achieved considerable momentum towards developing sustainable livelihoods on country. The project will, through a participatory, action-based research approach, both document the factors that have contributed to the Nyikina Mangala people's sustainable livelihoods agenda momentum to date and document and facilitate the continuation of this momentum through achieving the Case Study objectives.

The Case Study aims to:

- Build the leadership and governance capacity of the Nyikina Mangala Aboriginal Corporation (NMAC);
- Broker partnerships to support the implementation of the Nyikina Mangala Mardoowarra Wila Booroo Natural and Cultural Heritage Management Plan, including convening a partnership-building workshop;
- Collaborate with the NMAC Ranger Coordinator to support the Nyikina Mangala Ranger Group;
- Assist the NMAC Board to develop the NMAC Strategic Plan;
- Negotiate ongoing funding to support the implementation of the Strategic Plan and the Nyikina Mangala economy on country;
- Document barriers, strategies and actions to achieve Indigenous sustainable livelihoods on country. Mardoowarra Wila Booroo Natural and Cultural Heritage Management Plan, including Indigenous Protected Area funding;
- Collaborate with the NMAC Board to build a Culture/Conservation;
- Develop a research agreement between TRaCK and NMAC and negotiate the input of relevant TRaCK researchers that could contribute to the NMAC sustainable livelihoods agenda;
- Collaborate with other TRaCK Theme 6 Case Studies to contribute to the development of best practice planning and support for sustainable Indigenous livelihoods.

4. Where are we doing it and who is involved

The project will take place on Nyikina Mangala lands in the lower Fitzroy River in the West Kimberley region. The lead researcher is a Senior Research Fellow, Virginia Falk, who is being hosted by the Jarlmadangah Burru Aboriginal Corporation on behalf of the Nyikina Mangala Aboriginal Corporation Board. Dr Anne Poelina (PhD) will be the community mentor providing industry and community support to the incumbent.

5. What have we found so far?

There are no results at this time.

6. How will we communicate these interim results to people in the region?

The research is being conducted using a participatory action-based approach. Regular consultation meetings will be held with representatives of the Nyikina Mangala native title group during the course of the project. A presentation was provided to a gathering of the FitzCAM reference group in May 2010. Further verbal and written presentations will be made where appropriate.

For further information contact: Michael Storrs on Michael.storrs@cdu.edu.au