### **Research consultancies**

This section contains a summary of non-uranium mining related external projects carried out by *eriss* during 2005–2006.

### The Tropical Rivers inventory and assessment project (TRIAP)

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#### Background

'Australia's tropical rivers – an integrated data assessment and analysis' is more commonly known as the 'Tropical rivers inventory and assessment project' (TRIAP). The TRIAP, funded by Land & Water Australia and the Natural Heritage Trust 2, is a collaborative effort between *eriss*, James Cook University and the University of Western Australia, with additional involvement of the University of Wageningen in the Netherlands. The project aims to provide an information base to support the management of Australia's tropical rivers and consists of three sub-projects: (i) mapping and inventory; (ii) risk assessment of key threats; and (iii) development of a framework for evaluating ecosystem services. The project focus during 2005–06 was on sub-projects 1 and 2. The summary below was drawn from the Milestone 5 Project Progress Report (NCTWR 2006), the full details of which are available from the TRIAP web site (http://www.environment.gov.au/ssd/tropical-rivers/publications-reports.html).

#### Study area

The TRIAP is operating primarily at two spatial scales: (i) the tropical rivers study area, comprising the 51 river/drainage basins for the Gulf of Carpentaria, Arafura Sea and Timor Sea; and (ii) focus catchments, namely the Fitzroy River (WA), Daly River (NT) and Flinders River (Qld) (see Figure 1).



Figure 1 Delineation of the two scales at which the Tropical Rivers Inventory and Assessment Project is focusing: (i) the tropical rivers study area (catchments shaded light and dark grey); and (ii) focus catchments (shaded dark grey)

# Sub-project 1 – Inventory of the biological, chemical and physical features of aquatic ecosystems

#### Description

The major purpose of sub-project 1 is to undertake a multiple-scale inventory of the habitats and biota of the rivers, floodplains and estuaries within Land & Water Australia's program area for the Tropical Rivers funding program. The project is integrating information from the previous Land & Water Australia (LWA) data collation project and additional published sources to make an initial assessment of the diversity, status and ecological value of aquatic ecosystems across the region. This is being undertaken using the multiple-scale model for inventory supported by the Ramsar Wetlands Convention and being applied in the Alligators Rivers Region. The core data cover information necessary for describing the biological, chemical and physical character of an aquatic ecosystem.

#### Status

A summary is provided in Table 1 of progress against the key activities that occurred, and/or were scheduled to occur, during 2005–06. The major activities during the reporting period involved (i) ongoing data gathering and analysis for the biophysical attributes, and (ii) construction of the GIS and associated standardisation of the datasets and metadata records. Two key components that were significantly progressed were the geomorphic and initial hydrological classifications of the TRIAP study area.

# Sub-project 2 – Assessment of the major pressures on aquatic ecosystems

#### Description

The objective of sub-project 2 is to develop a risk assessment framework applicable across multiple scales, which meets stakeholder needs, within the tropical rivers study area. In developing the risk assessment framework, semi-quantitative and quantitative risk analyses are being undertaken where possible, for selected threats. The scope of TRIAP has only allowed the detailed quantitative risk analysis methology to be developed and trialled in the Daly catchment, although it will have broader application to issues in other catchments. In contrast, semi-quantitative risk analyses will be applied to the tropical rivers study area as well as at least one of the focus catchments, based on data gathered during this sub-project and sub-project 1 (see below).

#### Status

A summary is provided in Table 2 of progress against the key activities that occurred, and/or were scheduled to occur, during 2005–06. Through discussions with LWA, the scope of this sub-project was formally broadened to include a northern Australian overview of threats to aquatic ecosystems. The aim of this component is to identify and describe the key threats, and their relative risks, to the aquatic ecosystems of the tropical rivers. This will be done using a comparatively coarse level, catchment scale relative risk model (RRM), the same tool being applied at the focus catchment scale, as described in more detail by van Dam et al (2006). Progress has been steady, but slower than initially anticipated, mostly due to staff resource constraints.

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Data and metadata standards	A hierarchical directory structure was applied for the storage and management of spatial datasets. All spatial datasets are maintained in a geographic projection, using the Geocentric Datum of Australia 1994.
	Following a review of procedures for the creation and management of metadata within the Department of Environment and Heritage, metadata for databases / datasets was progressively created / updated to the ISO19115 standard. Significantly, all datasets now have a metadata record attached to them. It should be noted that the level and availability of metadata varies considerably.
Compile existing GIS datasets at 2.5M, 250K and other scales	Collation and compilation of data for the inventory component of the project was completed, with data compiled at two broad scales (continental – 1:2,500,000; and catchment scale – 1:250,000). In addition, data were collated for the 'focus' catchments at the catchment scale, or better.
	Data collation continued at a reduced level to support risk assessment activities within the three focus catchment, focussing on the collation of datasets representing the distribution of feral animals, weeds, rare and threatened species, and temporal variations in land use and landcover.
	A license for cadastral /land tenure data for the Kimberley region in Western Australia was being sought, and will complete the coverage of this type of data across the project area.
	Existing collated datasets were reviewed and updated to ensure that the latest versions of key datasets (geology, topography, hydrology) are held by the project database.
ldentify, collate and analyse additional data for reach attributes	Additional national (eg. AUSRIVAS, OZCAM, BirdsAtlas) and State/Territory faunal and floral databases were accessed and data extracted to identify the distribution of specific species at catchment and focus catchment scale.
	Additionally, new spatial datasets were created for hydrological, geomorphic and water quality attributes.
	Analyses were undertaken to look for patterns/relationships of biophysical attributes across the tropical rivers.
Develop geomorphic classification/typology	Both the continental scale and focus catchment scale geomorphic classifications were completed. These classifications will be used by other Theme Leaders in the analyses of their data.
Trial and apply skeletal typology	Given the dependency of this activity on the finalisation of the data analyses for the key biophysical attributes, there was little progress. However, the project timeline was extended to reflect this delay (see <i>Variations to Milestones</i> ).
Estuary classification review	Data collection included information on tidal character and non-tidal processes, cyclone paths and land crossing, climate change and variability projections and estuarine classification systems. Classification systems were reviewed. This component was approaching completion.

Nevertheless, numerous key activities have been undertaken, including: stakeholder workshops in two of the focus catchments (Fitzroy and Flinders); the completion and distribution of a risk assessment framework and methodology paper (van Dam et al 2006); and the development of several conceptual models for the focus catchments, depicting the inter-relationships between the ecological assets and threats. In addition, a large amount of information on ecological assets and threats for the tropical rivers study area and the three focus catchments was collated.

Table 2	Summary of progres	ss to June 2006 fo	or key activities	for Sub-project 2 (	Assessment of
pressure	es)				

Activity	Progress/status
Risk assessment framework and methodology	A paper describing the risk assessment framework and methodology was completed and distributed to stakeholders.
Identify key stakeholders	Stakeholder identification has been an ongoing task. The key stakeholders for the Fitzroy and Flinders Rivers were identified.
	Stakeholder liaison/consultation was active and ongoing, and will continue. This process helped refine and improve the information on assets and threats
Liaise with stakeholders on assets and threats	A stakeholder workshop was conducted in Derby, WA for the Fitzroy catchment, and in Richmond, Qld for the Flinders catchment. The Daly River, NT stakeholders will be consulted during 2006–07.
Identify, acquire data for, and describe key assets & threats	Data acquisition was occurring during the latter half of the period, for all three focus catchments and the tropical rivers study area as a whole. Information from spatial datasets and key synthesis documents will continue to be extracted and synthesised.
Compile new GIS layers/ datasets & maintain metadata	Where possible, spatial data for key assets and threats were acquired through the relevant State, Territory or Commonwealth agencies. This activity was advanced for the Daly River and in ongoing discussions with CALM and WWF for the Fitzroy River.
Develop conceptual models	Draft conceptual models were developed for the Fitzroy catchment and a conceptual model for land clearing was drafted for the Daly River. The conceptual models will be completed in 2006-07.
Semi-quantitative risk analyses	A model for conducting semi-quantitative risk analysis at the catchment and regional scale was selected: the Relative Risk Model. Application of the model will commence upon completion of the conceptual model and effects/consequence analysis.
Quantitative risk analyses	Data are being sourced for the specific requirements of quantitative risk assessments. In addition, software (Netica) was purchased to undertake Bayesian Network development.

#### **Communications achievements**

Communication and consultation activities continued to take place during 2005–06. Two major stakeholder communication activities were the workshops held in Derby, WA, for the Fitzroy catchment, and Richmond, Qld for the Flinders catchment. These workshops were designed as a forum to elicit stakeholder views on ecological assets and threats in their focus catchment. Another important communication activity was the commencement of cross-project collaboration meetings in December 2005. Meeting participants include representatives from the TRIAP, Charles Darwin University, Northern Territory Department of Natural Resources, Environment and the Arts, and the Northern Australia Irrigation Futures Project. The regular meetings are designed to share knowledge, ensure relevant linkages between projects are built through regular communication and minimise duplication. One key aspect that the meetings address, is the coordinated approach by the various projects in engaging stakeholders.

The third and fourth editions of the TRIAP Newsletter were distributed to all stakeholders in November 2005 and April 2006, respectively. Distribution of the newsletter to stakeholders is an important tool to identify stakeholders who have not been engaged previously.

Numerous presentations on the TRIAP were given during 2005–06, including:

- Lowry J & Alewijnse M 2005. Integration of data for inventory and assessment of Australia's northern rivers, *Proceedings of the North Australian Remote Sensing and GIS Conference*, Darwin, 4–7 July, 2005.
- Moliere D, Boggs G & Lowry J 2005. Spatial analysis of stream runoff response in the Tropical Rivers Region, *Proceedings of the North Australian Remote Sensing and GIS Conference*, Darwin, 4–7 July, 2005.
- Lowry J, Bartolo R. & Alewijnse M 2005. Integration of data for inventory and assessment of Australia's northern rivers, Proceedings of SSC 2005 Spatial Intelligence Innovation and Praxis: The National Biennial Conference of the Spatial Sciences Institute, September 2005, Spatial Sciences Institute, Melbourne, 953–962.
- Finlayson M, Lukacs G, Lowry J, van Dam R, Bartolo R & De Groot R 2005. Benchmarking Northern Australia's rivers before further degradation practical approaches and constraints. *International Riversymposium*, Brisbane, 6–9 September, 2005.
- van Dam R, Finlayson M, Lowry J, Bartolo R & Lukacs G. 2005. Benchmarking the attributes of Northern Australia's tropical rivers the basis for informed management decisions, *Water in the Bush*, Australian Water Association NT Branch Annual Conference, Darwin, 20 October.

#### References

- NCTWR (National Centre for Tropical Wetland Research) 2006. Australia's tropical rivers an integrated data assessment and analysis. Milestone Report 5: Progress report for subprojects 1 (Inventory & mapping) and 2 (Assessment of the major pressures on aquatic ecosystems). LWA/NHT Project DET18, June 2006.
- van Dam R, Bartolo R & Bayliss P 2006. Ecological risk assessments of key threats to Australia's tropical rivers: Overview, proposed framework and methodologies for the Tropical Rivers Inventory and Assessment Project. Internal Report 517, June, Supervising Scientist, Darwin. Unpublished paper.