



TROPICAL RIVERS R&D PROGRAM

Acquiring knowledge to manage our tropical resources more sustainably

There is a long history of interest in developing productive landscapes of northern Australia and with increasing demand for water, along with greater stresses on southern river systems, there is now increasing pressure to develop our tropical river systems. Land & Water Australia has identified Australia's unique tropical rivers and associated catchments and estuaries as a priority area for major investment over five years from July 2005.

Tropical rivers and groundwater systems are estimated to contain roughly 70% of Australia's fresh water resources, although there remains some uncertainty surrounding actual water availability because of limited information.

The combination of a growing interest in water at the national level, regional development aspirations in the tropics, and the relatively pristine condition of tropical rivers provides a unique opportunity for science to be proactive in providing the information needed for sound management of Australia's tropical rivers into the future.

The Tropical Rivers R&D Program is building capacity and understanding so that the best available knowledge can be used to achieve sustainable natural resource management in tropical Australia. In recognising the information gaps, the Tropical Rivers R&D Program is now working with partners and engaging with relevant states, the Northern Territory, Indigenous people and other stakeholders to guide its research along four themes.





The four Tropical Rivers R&D Program themes.

1. Assessing river assets and threats

- compiling information and undertaking assessments of rivers, groundwater, floodplains, wetlands and estuaries;
- undertaking threat and risk assessment based on future scenarios;
- supporting the classification and description of river types to enable transfer of knowledge; and
- assessing land and water resource capability.

2. Supporting regional planning frameworks

- providing targeted knowledge support for the National Water Initiative, National Action Plan for Salinity and Water Quality, and Natural Heritage Trust regional management initiatives;
- promoting scientifically based resource condition targets and indicators; and
- developing monitoring and evaluation methodologies.

3. Assessing social, cultural and economic values and opportunities

- undertaking research to determine what people value in rivers;
- valuing ecosystem services;
- understanding Indigenous cultural and economic values; and
- analysing economic and resource development, river protection and management.

4. Understanding river ecosystems

- understanding ecosystem processes and developing conceptual models of how river ecosystems function;
- understanding river and groundwater flows and hydrology; and
- understanding the fluxes and balance of nutrients and contaminants in rivers.

Final reports can be found at: www.rivers.gov.au

Completed projects

- Freshwater flow requirements of estuarine-dependent fisheries: data review and research needs (QPI 55)
- Assessing the potential for algal blooms in clear water phase tropical rivers (UAD 21)
- Ecosystem processes in tropical rivers: conceptual models and future R&D (NTU 21)
- Biodiversity and cultural significance of fishes in King Edward River (UMU 22)
- Addressing Indigenous cultural requirements in water allocation planning (CSE 26)
- Fish passage along the Fitzroy River WA (KLC 7)
- Gulf of Carpentaria field validation (GRU 34)

Projects in progress

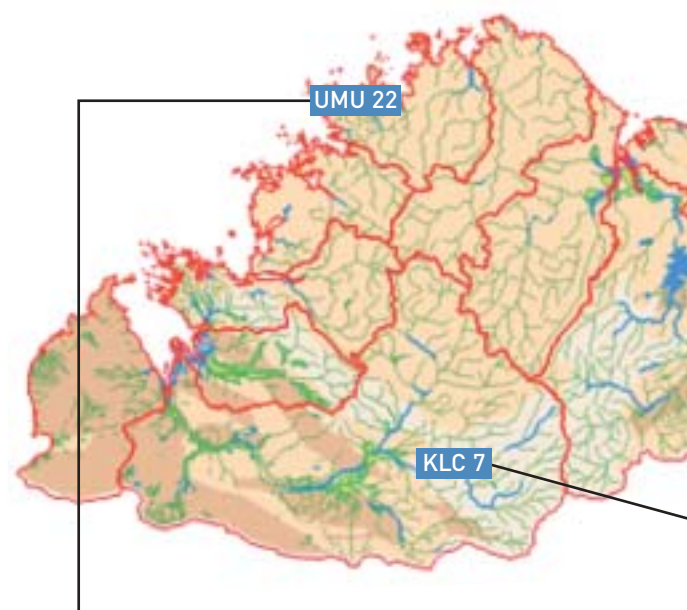
- Development of a physical framework using remote sensing and GIS to underpin ecological research in Gulf rivers and estuaries (GRU 33)
- Australia's Tropical Rivers — an integrated data assessment and analysis (DET 18)
- Developing institutional arrangements for Indigenous participation in the National Water Initiative (TRC 13)
- Valuing and managing the ecosystem services of tropical river systems (CSE 43)
- A remote sensing approach for mapping and classifying riparian gully erosion in tropical Australia (GRU 37)
- Flow impacts on estuarine finfish fisheries of the Gulf of Carpentaria (QPI 63)
- Development and trial of a methodology for total water resource assessment in tropical Australia (SKP 12)

Assessing the potential for algal blooms in clear water phase tropical rivers (UAD 21)

This project sought to develop and validate a conceptual model of wet to dry season transition in the Daly River, to determine how flow, water clarity and nutrients affect riverine biology. The project has delivered some new insights into the potential for algal blooms to affect tropical rivers. Algal groups were sampled in 13 tropical rivers, which found algal blooms are possible in tropical rivers subject to flow conditions, nutrient enrichment and whether rivers are nitrogen or phosphorus limited.

Projects

- Completed
- In progress



Biodiversity and cultural significance of fishes in King Edward River (UMU 22)

This project has undertaken a fundamental survey and taxonomic research into freshwater fish species present throughout the main channel of the King Edward River, its tributaries and estuary. The fish diversity was much higher than any previously studied Western Australian river, with 26 species recorded and their habitat requirements and Indigenous (Kwini) language names documented. The main factor thought to be limiting fish distribution in the King Edward River was the presence of barriers such as waterfalls, which do not permit upstream migration.

Fish passage along the Fitzroy River WA (KLC 7)

This project sought to understand how the Fitzroy barrage affects fish passage along the river. The Fitzroy barrage is the only major impediment to fish movement on this very large river and the report provides results that can help inform decisions about either longer term removal or establishment of a fish passage in the barrage.



- Aquifer high productivity
- Aquifer moderate productivity
- Aquifer low productivity
- Catchment boundaries
- Perennial rivers/inland water/dams
- Intermittent/fluctuating

Development and trial of a methodology for total water resource assessment in tropical Australia (SKP 12)

This project proposes to develop and trial a methodology to extrapolate streamflow data from gauged to ungauged catchments. This information would be used to determine the baseflow component and evaluate the potential for the double accounting of surface water and groundwater resources. The total available surface water and groundwater resources would be estimated with consideration of the environmental water requirements of groundwater dependent ecosystems.

Addressing Indigenous cultural requirements in water allocation planning (CSE 26)

Working with Aboriginal people in the Daly River catchment, this project aimed to understand and define Indigenous cultural values of water, investigate means to protect cultural values and develop a framework for use in other tropical catchments so that Indigenous cultural values can be incorporated in water allocation planning. The project provided funds for community engagement and products to raise awareness of hydrological science and water management institutions amongst the Aboriginal community of the Daly River.

- Gulf estuarine
- QPI 55
- GRU 34
- GRU 33
- QPI 63

Gulf of Carpentaria field validation (GRU 34)

This project has undertaken reconnaissance, site selection and ground truthing in the Gulf drainage division to assist with analysis of catchment characteristics and channel network typology, to select rivers for detailed analysis, and to develop conceptual models of river types within the Gulf.

Freshwater flow requirements of estuarine-dependent fisheries: data review and research needs (QPI 55)

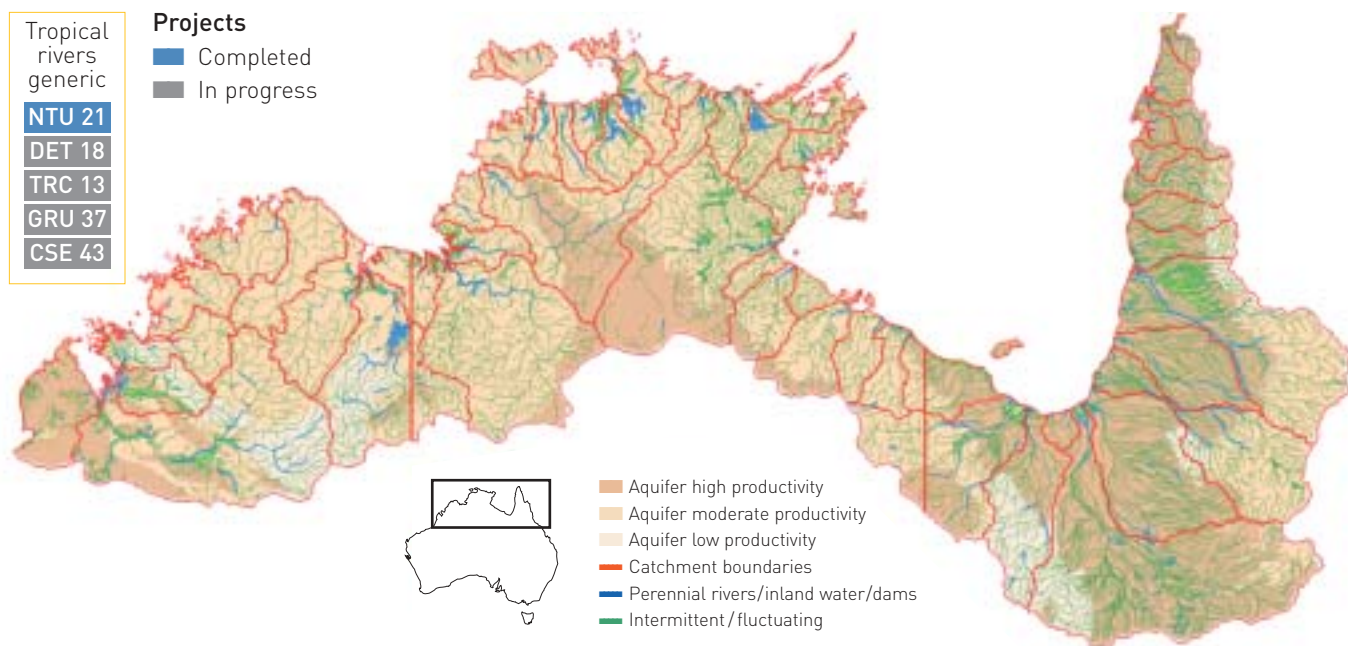
Recently completed, the project developed models of the links between water flow and estuarine dependent fisheries for catchment types in the Gulf of Carpentaria. The project has prepared an inventory of current data relevant to estuarine-dependent fisheries of the Gulf of Carpentaria and developed conceptual models of how freshwater flows affect estuarine-dependent fisheries in the Gulf of Carpentaria.

Development of a physical framework using remote sensing and GIS to underpin ecological research in Gulf rivers and estuaries (GRU 33)

The primary aim of this project is to develop a hydro-geomorphic classification for rivers draining into the Gulf of Carpentaria, for the purpose of developing an understanding of landscape diversity and ultimately its relationship to biodiversity in the freshwater systems of the Gulf. The project will help identify and prioritise natural resource management issues in this vast region.

Flow impacts on estuarine finfish fisheries of the Gulf of Carpentaria (QPI 63)

This project aims to provide greater knowledge of the freshwater requirements of tropical estuaries so that downstream effects of any future developments are considered and managed based on the best available knowledge. The project will analyse available datasets relevant to conceptual models linking freshwater flow and estuarine-dependent finfish fisheries for key catchments in the Gulf of Carpentaria; conduct targeted research that will contribute to determining the role of freshwater in supporting estuarine-dependent finfish fisheries in the Gulf of Carpentaria; and provide refined conceptual models and supporting information of the role of freshwater flows in supporting estuarine-dependent finfish fisheries.



Ecosystem processes in tropical rivers: conceptual models and future R&D (NTU 21)

This project proposed a team based workshop approach of leading scientists to develop conceptual models of tropical river ecosystems. It has identified major knowledge gaps and research needs for tropical rivers, with a focus on the relationships between river discharge and lateral and longitudinal connectivity with floodplains and coastal ecosystems.

Valuing and managing the ecosystem services of tropical river systems (CSE 43)

This project will identify the ecosystem services underpinning economic, social and cultural activities and environmental assets in three case study tropical river systems, one each in Queensland, the Northern Territory and Western Australia. Key ecosystem services will be chosen for further exploration of the relationships between land-use impacts, ecosystem processes, and economic, social, cultural and environmental values.

Australia's Tropical Rivers — an integrated data assessment and analysis (DET 18)

The project will provide an information base for determining and applying management priorities and land use practices relevant to local and Indigenous people, private sectors and governmental stakeholders. It will undertake a multiple-scale inventory of the habitats and biota of the rivers and wetlands of tropical Australia, where necessary developing and/or ensuring consistency with other suitable typology's based on hydrological and landform features, undertake risk assessments of the major pressures on the habitats and biota of the rivers and wetlands of selected focus catchments; and provide a framework for analysis of the ecosystem services (e.g. provision of water for multiple uses), provided by the habitats and biota of the rivers and wetlands of northern Australia.

A remote sensing approach for mapping and classifying riparian gully erosion in tropical Australia (GRU 37)

This project will develop a procedure for mapping riparian gully erosion within Australia's tropical rivers; it will develop a classification scheme for prioritising the threats posed by gully erosion in different parts of the landscape; it will validate the approach in five focal river systems in Queensland and the Northern Territory (the Coleman River on Cape York; the Mitchell River in the North/Eastern Gulf; the Leichhardt, Gregory and Nicholson Rivers in the Southern Gulf; and the Victoria River in the Northern Territory); and it will produce gully erosion hazard maps for these five rivers.

Developing institutional arrangements for Indigenous participation in the National Water Initiative (TRC 13)

This project aims to improve Indigenous engagement and involvement in water resource planning by convening a representative group to consider and develop Indigenous water policies, management models and economic opportunities arising from water use. The project will provide information and knowledge to Indigenous organisations and communities and improve dialogue within and between Indigenous organisations, state water resource managers, the National Water Commission and researchers. It will scope out a research program with detailed research questions, methodologies, and approved high priority case study locations.



The results of these research projects will be communicated to federal policy makers, state agency and regional natural resource managers and users through workshops, presentations, publications and the web at www.rivers.gov.au.

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