

National Rivers Consortium (Tropical Rivers)

Australia's tropical rivers – an integrated data assessment and analysis

Detailed Work Plan for Sub-Project 2

Assessment of the major pressures on aquatic ecosystems

Duration

2 person equivalents at each of ERISS and ACTFR for 16.5 months each (Years 1 and 2)

Description

The tropical rivers of northern Australia are under increasing pressure due to environmental threats and human activities. The objective of this sub-project is to develop a risk assessment framework applicable to the key focus catchments and significant locations that meet stakeholder needs, within the region of the Tropical Rivers Project. In developing the risk assessment framework, semi-quantitative and quantitative risk analysis will be undertaken where possible, for selected threats. The key focus catchments that will be assessed are: the Daly River Catchment (Northern Territory); Flinders (Queensland); and Fitzroy River Catchment (Western Australia). Throughout this sub-project stakeholders will provide input and feedback.

There a number of key elements in developing the risk assessment framework that will be addressed. Firstly, identification of assets and threats within the focus catchments will be undertaken through a combination of consultations with stakeholders and a review of existing reports and management plans. Both spatial and non-spatial data related to assets and threats will also be collated. Spatial data will then be compiled in a GIS. Secondly, conceptual models for each of the focus catchments will be developed, focussing on the links between key assets and threats. Finally, both semi-quantitative and quantitative risk analysis will be conducted on selected threats.

Responsibilities

Database development and quantitative ecological risk assessments will be led by ERISS. Collation of information on pressures will be led by ACTFR with assistance from ERISS.

Outputs

Within selected major catchments and at important sites: specific analyses of major pressures (eg. weeds, feral animals, infrastructure, water pollution); recommendations for risk reduction/management steps and monitoring; and a database of available information.

Work Plan & Schedule

The project tasks and associated task leads and timeframes are detailed below.

1. Develop risk assessment framework and describe methodology

- 1.1 Prepare internal paper describing the risk assessment framework and proposed methodology, including clarification of terminology (eg. threat v. stressor v. hazard).

2. Problem definition/hazard identification

- 2.1 Agree on risk assessment focus catchments (most likely Fitzroy – WA, Daly – NT, Flinders – Qld) and, in liaison with State/Territory Govts, NRM bodies and TRP Steering Committee, determine need for stakeholder workshops.
- 2.2 Identify key stakeholders (eg. Commonwealth/State/Territory/Local Govts, NRM bodies, industry groups, community groups, environment groups) for each catchment.
- 2.3 Liaise with key stakeholders to identify key catchment assets and threats (may involve workshops).

NB – perceptions of assets and threats will depend on stakeholders interests. This issue will be clearly articulated, with a possibility of defining assets and threats based on 2–3 generic stakeholder types (eg. biodiversity conservation, agricultural development).
- 2.4 Acquisition of relevant spatial and non-spatial data/information on assets and threats.
 - most of the ‘assets’ data will already have been collected as part of sub-projects 1 and 3. Most of the ‘threats’ data will need to be collected as part of this sub-project.
 - A second search/request for new data will be made during the last half of the project.
- 2.5 Compile new GIS data layers based on spatial assets and threats data additional to those acquired in sub-project 1 (and ensure consistency/compatibility with existing GIS datasets).
- 2.6 Recording/creation and updating of metadata and evaluation of data/information quality.

*** Most of Task 2 will be undertaken in parallel for each focus catchment ***

3. Development of conceptual models

- 3.1 Describe the key ecological assets (ecological values) and threats, and their inter-relationships (focus is on conceptualising which assets are potentially at risk from which threats).
- 3.2 Use the above information to develop conceptual models of the interactions between key assets and threats for each focus catchment (the final form of the models is yet to be determined, but for practical reasons, may involve disaggregation of the complex systems into a series of simpler, more useable sub-models).
- 3.3 Seek feedback and confirmation on the models from key stakeholders, and iterate/finalise models as required (may involve workshops).
- 3.4 Agree on scope of semi-quantitative and quantitative risk analyses with respect to the threats and assets being assessed (agreement to be reached internally and with key stakeholders).

*** Focus catchments will be assessed sequentially, thereby focusing resources on one catchment at a time ***

4. Semi-quantitative risk analysis

- 4.1 *Effects/consequence analysis* – collate data/information on documented effects of key threats to key assets (possibly apply a semi-quantitative ‘consequences’ ranking scheme), and document the associated level of confidence in the data/information.
- 4.2 *Exposure/likelihood analysis* – integrate relevant GIS layers to determine extent or likelihood of exposure of key assets to key threats, and document the associated level of confidence in the data.

4.3 *Risk characterisation* – integrate outcomes of effects and exposure analyses to estimate risks of threats to assets. Outputs include: identification of relative risks (and, therefore, highest risk threats); assets least/most under risk; initial indication of cumulative risks; and articulation of uncertainty.

4.4 Describe applications of semi-quantitative risk outputs to catchment management and NRM – ie. how do they inform risk management/risk reduction?.

*** Focus catchments will be assessed sequentially, thereby focusing resources on one catchment at a time ***

5. Quantitative risk analysis

5.1 Based on outcomes of semi-quantitative risk analyses and stakeholder views, select one threat/issue for quantitative risk analysis, and reaffirm/revise the conceptual model for this threat/issue.

NB – for the selected threat, there may exist numerous hazards for which the risks need to be estimated.

At this stage it is not possible to be prescriptive about the quantitative risk assessment methodology to be adopted, and the associated work plan. The decision on this will depend on numerous factors including the nature of the threats that are selected for quantitative analysis, the type, quantity and quality of available data, and linkages to other research projects (eg. NAIF). Nevertheless, some broad boundaries can already be set. For example, where adequate and appropriate empirical data exist, frequentist approaches will be used; where there is combined reliance on empirical data and expert opinion/knowledge, Bayesian networks may be employed. Moreover, where possible, the spatial nature of the assets and threats datasets will be utilised within the risk analysis phase. Depending on data availability (ie. data coverage & level of spatial resolution), it may be possible to do the quantitative ERA at multiple scales if there is a clear benefit in doing so. This could range from the whole catchment, broad ecosystems (eg. rivers, coast, wetlands, etc.), river reaches, down to raster cells of small size. Finally, the risk analysis approach will be consistent with the the most recent national and international risk assessment guidance documents and texts (eg. US EPA 1998, 2003; AS/NZS 2004; Burgman 2005)¹.

Additional details on the approach and tasks for the quantitative risk analyses will be provided to LWA when available.

6. Communication and consultation

6.1 Establish contact with agencies, boards and representative panels in WA, Qld & NT to notify of the commencement of the project, reiterate its objectives and links to the other two sub-projects, and seek collaboration and support and access to information.

6.2 Establish schedule and purpose for continued consultation, including ongoing exchange of information, collaboration and reporting and demonstrating initial analyses and outcomes.

¹ AS/NZS 2004. Risk management. Standards Australia/Standards New Zealand (AS/NZS) 4360:2004, Strathfield, NSW, Australia.

Burgman MA 2005. Risks and decisions for conservation and environmental management. Cambridge University Press (Ecology, Biodiversity and Conservation), Cambridge, UK.

US EPA 1998. Guidelines for ecological risk assessment. EPA/630/R-95/002F, Risk Assessment Forum, Washington, DC.

US EPA 2003. Framework for cumulative risk assessment. EPA/630/P-02/001F, Risk Assessment Forum, Washington, DC.

NB – consultation tasks are embedded in all the tasks described for this sub-project

7. Reporting

7.1 Coordinated final draft risk assessment report.

Timeline for tasks

Task	04-05			05-06												06-07		
	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1.1 Risk assessment framework																		
2.1 Select focus catchments																		
2.2 Identify key stakeholders																		
2.3 Identify key assets & threats																		
2.4 Data acquisition																		
2.5 Compile new GIS layers/datasets																		
2.6 Metadata & data quality																		
3.1 Describe assets & threats																		
3.2 Develop conceptual models																		
3.3 Incorporate stakeholder feedback																		
3.4 Agree on scope of risk analyses																		
4.1 Semi-quant. effects analysis																		
4.2 Semi-quant. exposure analysis																		
4.3 Semi-quant. risk characterisation																		
4.4 Describe application of outputs																		
5.1 Select threat & reaffirm conceptual model																		
Quantitative risk analyses*																		
6.1 Initial consultation																		
6.2 Ongoing communication and consultation																		
7.1 Reporting (interim and final milestones)																		
Risk assessment workshops	To be advised																	

* details to be provided following completion of the semi-quantitative risk assessments.