



Australia's northern
rivers. Untapped
resources? Priceless
natural heritage?
Research and
information needs.

Paper presented at River
Symposium, Brisbane,
2-6 September 2002

CM Finlayson, G Lukacs,
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June 2003



Supervising Scientist

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Abstract

Compared to southern Australia it is generally considered that wetlands in northern Australia are generally 'intact' and possibly close to 'pristine'. With the exception of a few specific areas we accept the comparison, but balk at making a categorical statement that supports the impression that northern wetlands are in good condition. Without getting into an esoteric debate about concepts we provide an analysis of pressures on northern wetlands and point to major concerns for the future. We do this by assessing the extent of wetland inventory information and recommend that a coordinated approach using standardised protocols and core data is needed to complete the picture and make this available to users. Further, ecological assessment, including structured risk assessment of pressures is urgently needed. This not only provides a considered base for management actions but also for further prioritisation of research effort. We then identify major research topics that need to be addressed.

Our analysis is essentially based on the biophysical features of northern wetlands. These are valuable and in some instances well known and protected. However, in order to conserve and ensure wise use of wetlands we contend that this approach is insufficient. We propose that a strong emphasis be placed on sustainable use of the goods and services that wetlands provide humans. The challenge in doing this is to demonstrate through research activities that the provision of these goods and services is dependent on the maintenance of wetland habitats and their species. The case for doing this is illustrated through a framework relating goods and services to ecosystem components and thence to pressures that could degrade these, including the emerging pressures of globalisation of trade and global climate change, and the research required to understand these sufficiently well to support management responses.

Powerpoint slides

Australia's northern rivers: untapped resources? priceless natural heritage? research and information needs

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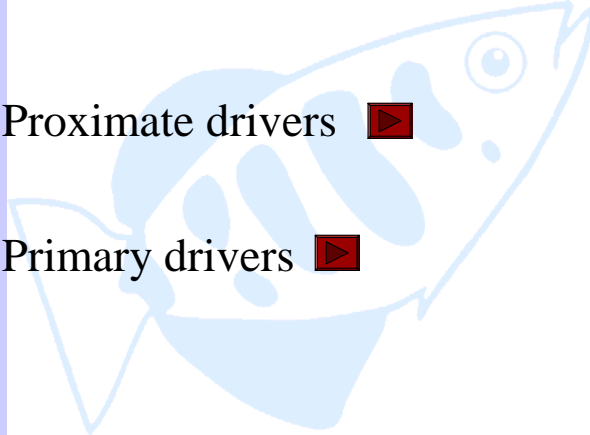
⁴National Centre for Tropical Wetland Research

Australia's northern rivers

- Rivers in northern Australia are priceless and untapped resources 
- Information base for rivers is insufficient 
- Assessment of major pressures is needed 
- Research required on ecological processes and interactions 
- Integrated inventory, assessment and monitoring framework required 

Major pressures on Northern Australia wetlands

- Proximate drivers 
- Primary drivers 



Proximate drivers

- Invasive species
- Hydrologic modification
- Clearance/drainage
- Over harvesting
- Pollution
- Climate change



Primary drivers

- Demographic
- Lifestyle
- Technological
- Social and political
- Economical/Globalisation



Wetland Inventory

- Standardised and updated information set needed 
- Ramsar Wetland Convention provides a framework for wetland inventory 



Wetland information base - uneven, outdated, lacking

Wetland area (km²) in wet-dry tropics

Auslig 250k	89 704
Digital Chart of the World	70 078
Matthews natural wetlands	35 649
DISCover land use - IGBP	4 727
Directory of Important Wetlands	30 849
CSIRO wetland database	18 539



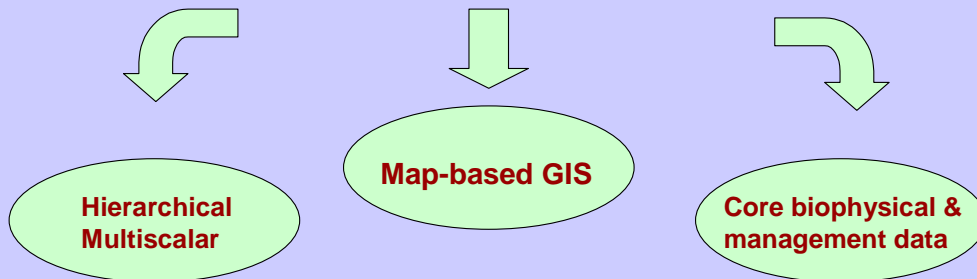
Framework for wetland inventory

Step






- 1. State the purpose and objective**
- 2. Review existing knowledge and information**
- 3. Review existing inventory methods**
- 4. Determine the scale and resolution**
- 5. Establish a core or minimum data set**
- 6. Establish a habitat classification**
- 7. Choose an appropriate method**
- 8. Establish a data management system**
- 9. Establish a time schedule and extent of resources**
- 10. Assess the feasibility & cost effectiveness**
- 11. Establish a reporting procedure**
- 12. Establish a review and evaluation process**
- 13. Plan a pilot study**



Framework for wetland inventory



Status of wetlands in Northern Australia

- Wetlands in northern Australia are under pressure 
- Information base for wetland management is insufficient 
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Biophysical data

- Site name (official name of site and catchment)
- Area and boundary (size and variation, range and average values)
- Location (projection system, map coordinates, map centroid, elevation)
- Geomorphic setting (where it occurs within the landscape, linkage with other aquatic habitat, biogeographical region)
- General description (shape, cross-section and plan view)
- Climate – zone and major features
- Soil (structure and colour)
- Water regime (periodicity, extent of flooding, source of surface water and links with groundwater)
- Water chemistry (salinity, pH, colour, transparency, nutrients)
- Biota (vegetation zones and structure, animal populations and distribution, special features including rare/endangered species)

Managerial data

- Landuse – local and in the river basin and/or coastal zone
- Pressures on the wetland – within the wetland and in the river basin and/or coastal zone
- Land tenure and administrative authority – for the wetland critical parts of the river basin and/or coastal zone
- Conservation and management status of the wetland – including legal instruments and social or cultural traditions that impinge on the management of the wetland
- Ecosystem values and benefits (goods and services) derived from the wetland – including products, functions and attributes and, where possible, their worth to humans
- Management plans and monitoring programs – in place and planned within the wetland and in the river basin and/or coastal zone

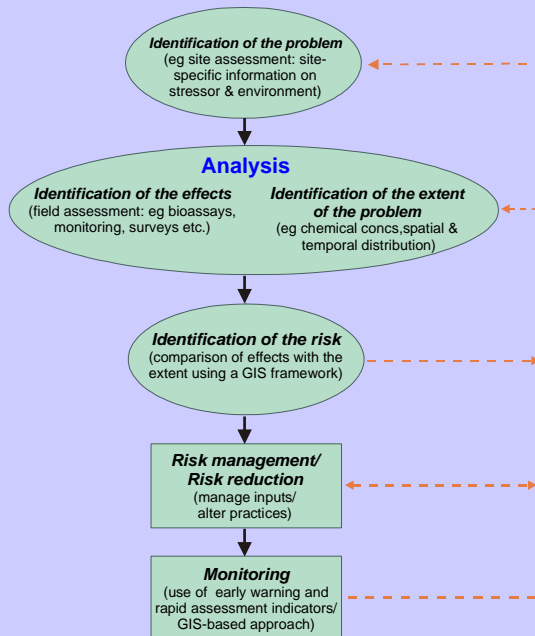
Wetland Inventory

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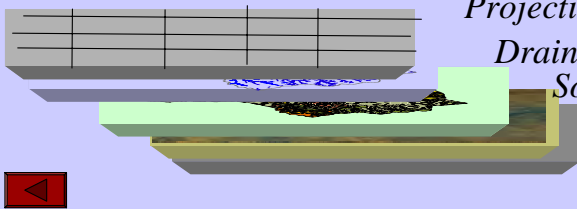
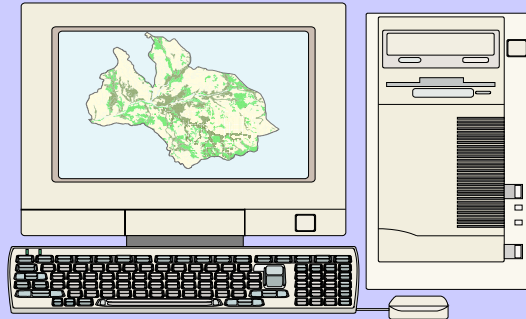


The Risk Assessment Framework

(modified from van Dam *et al.* 1999; Ramsar 2000)

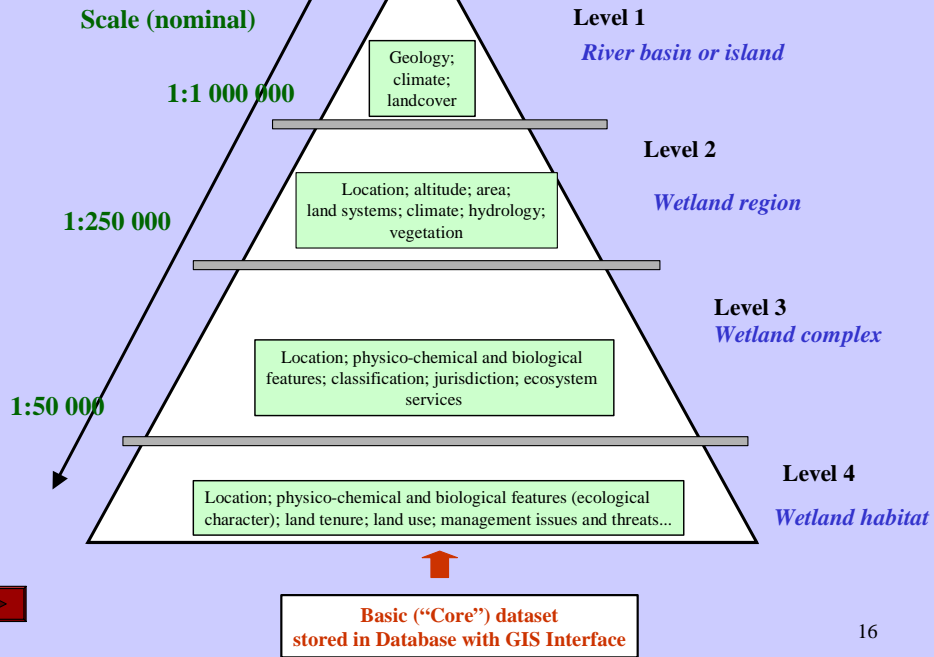


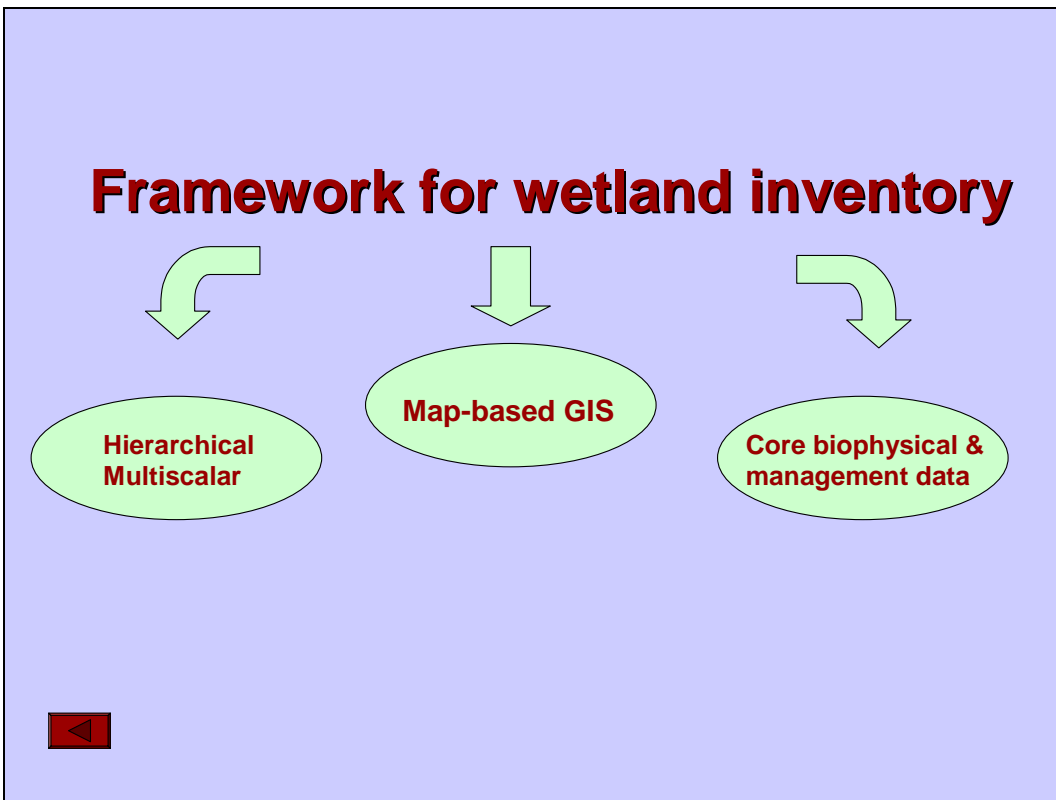
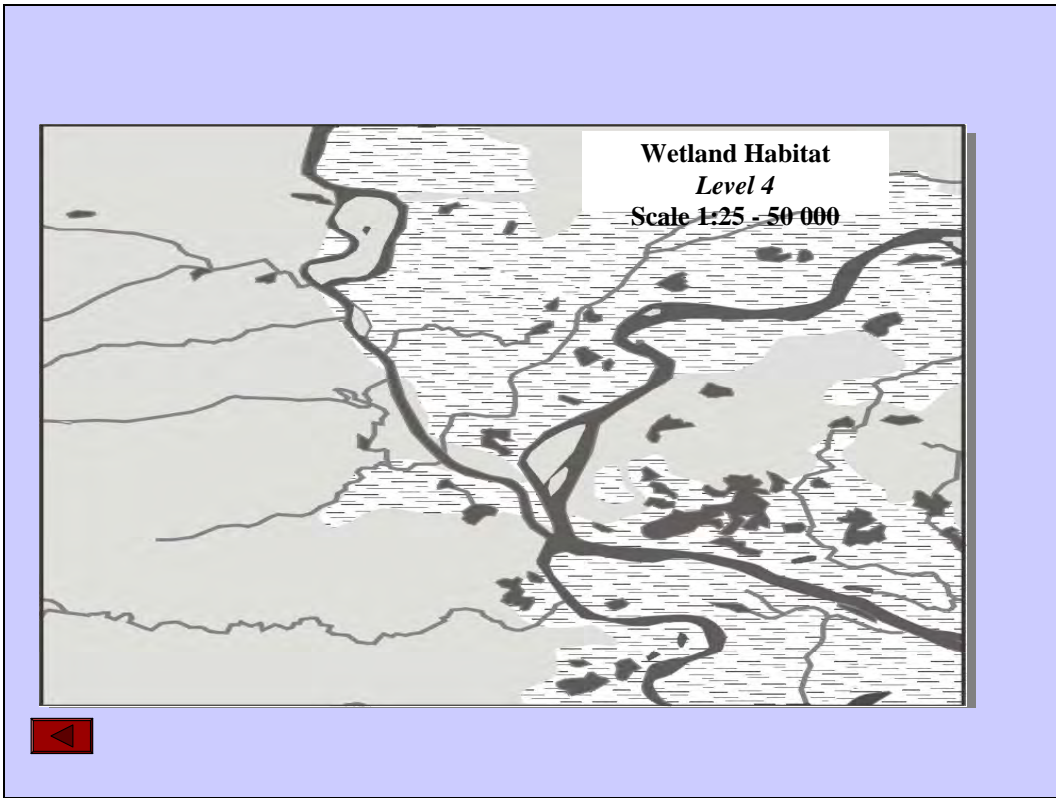
Map - based GIS



Projections / datum grid
Drainage / hydrology
Soils information
Remote sensing
Study area base

Hierarchical approach to wetland inventory





Status of wetlands in Northern Australia

- Wetlands in northern Australia are under pressure ▶
- Information base for wetland management is insufficient ▶
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- Research required on ecological processes and interactions ▶
- Integrated framework required ▶

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Research required and ecological processes

- Provision of Water for environmental benefits ▶
- Prevention of pollution and contamination of wetlands ▶
- Prevention and reduction of salinisation of non-saline wetlands ▶
- Prevention of further drainage and infiltrating of wetlands ▶
- Management of grazing in wetlands ▶

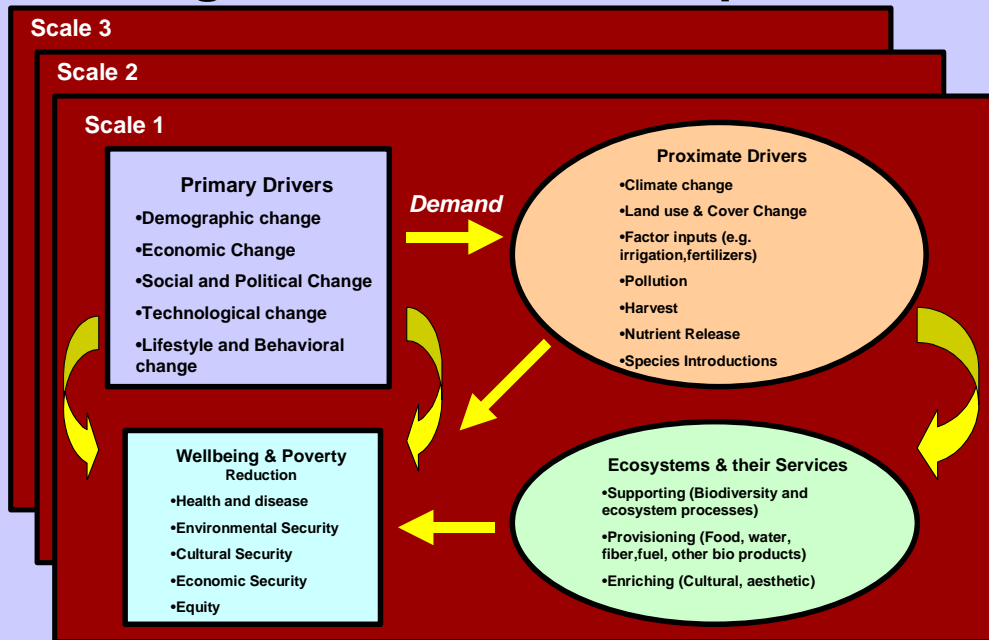


Research required and ecological processes

- Restoration and protection of riparian vegetation ▶
- Prevention and control of invasive species ▶
- Adaptation to and mitigation of climate change and sea-level rise ▶
- Development of rigorous inventory, assessment and monitoring protocols ▶



Integrated framework required



Provision of water for environmental benefits

- Ecological responses to variation in flows
- Water requirements for aquatic species
- Techniques for determining water allocations



Prevention of pollution and contamination of wetlands

- Ecological responses to nutrients and pollutants
- Pollution pathways and interactions
- Techniques for rapid and early assessment
- Techniques for rehabilitation of polluted habitats



Prevention and reduction of salinisation of non saline wetlands

- Ecological responses to salt
- Techniques to lower watertables
- Techniques for rehabilitation of salinised habitats



Prevention of further drainage and in-filling of wetlands

- Techniques for rehabilitation of degraded habitats



Management of grazing in wetlands

- Techniques for rehabilitation of degraded habitats
- Techniques for selective grazing
- Assessment of biodiversity effects of introduced pasture species



Restoration and protection of riparian vegetation

- Ecological links between energy and nutrients pathways
- Techniques for rehabilitation of degraded habitat



Prevention and control of invasive species

- Ecological impacts of invasive species
- Biology of invasive species
- Techniques for effective control
- Early warning and prevention of invasion



Adaptation to and mitigation of climate change and sea-level rise

- Techniques for integrated vulnerability assessment
- Techniques for mitigation of climate change
- Assessment of adaptation options



Development of rigorous inventory, assessment and monitoring

- **Protocols for designing projects**
- **Standardised procedures for collecting, holding and disseminating information**
- **Early and rapid assessment techniques**
- **Techniques for assessing condition and trends**

