



Restoration and  
monitoring of the  
ecological character of  
wetlands

Paper presented at 2<sup>nd</sup> Reunion  
Internacional de Expertos Sobre  
la Regeneracion Hidrica de  
Donana, Huelva, Spain,  
26–28 November 2001

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June 2003



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Summary and powerpoint slides of presentation made at  
2<sup>nd</sup> Reunion Internacional de Expertos Sobre la Regeneracion  
Hidrica de Donana, Huelva, Spain, 26–28 November 2001

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## **Summary**

The Ramsar Wetlands Convention has developed guidance for wetland restoration with the general purpose of assisting interested parties develop programs to restore the ecological character of important sites. As a prelude to describing the components of this guidance the concept of ecological character is first described. In doing this it is noted that ecological character includes both the biological, chemical and physical features of a wetland and the values and benefits derived from a wetland. That is, there is recognition that people use wetlands and such uses need to be considered alongside the recognised biodiversity values. Further consideration is given to core information or data fields that can be used to describe the ecological character of a wetland. These are taken from the data fields proposed in the Convention's framework for wetland inventory. Restoration issues are addressed through the Convention's (draft) guidance on this subject under three headings – principles; goals, objectives and performance measures; and guidelines. In conclusion, information is provided on the monitoring concepts in place for the World Heritage and Ramsar listed wetlands of Kakadu National Park, Australia.

# **Restoration and monitoring of the ecological character of wetlands**

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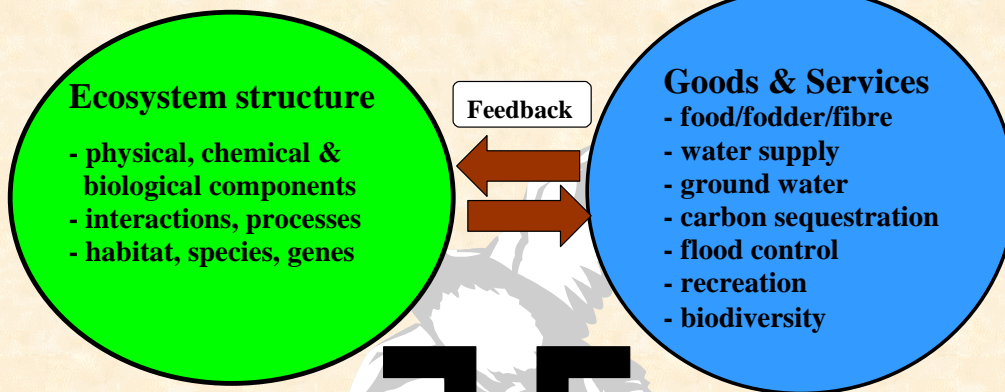
## **Wetlands - ecological character, restoration and monitoring**

- **Ecological character of wetlands - concept and core data elements**
- **Restoration - principles and guidelines**
- **Monitoring - Kakadu National Park, Australia**



# 1. Ecological character

The *ecological character* of a wetland is the sum of the individual biological, chemical, and physical components of the ecosystem and their interactions which maintain the wetland and its products, functions and attributes.



## Ecological Character

The sum of the individual biological, chemical, and physical components of the ecosystem and their interactions that maintain the wetland and its products, functions and attributes (Ramsar 1999).

Ecological character = *Ecosystem Structure* and *Goods & Services*

## Change in ecological character

Change in ecological character is the ***impairment or imbalance*** in any biological, physical, or chemical components of the wetland ecosystem, or in their interactions, which maintain the wetland and its products, functions and attributes.



## Description of ecological character

Information on biophysical and management features often derived from

- National wetland inventory
- Ramsar Information Sheet



## **Description of ecological character - biophysical information**

- Site name - official name of site and catchment
- Area and boundary - size and variation, range and average values
- Location - map coordinates and projection, 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 ground water
- Water chemistry - salinity, pH, colour, transparency, nutrients
- Biota - vegetation zones and structure, animal populations and distribution, special features including rare/endangered species

## **Description of ecological character - managerial information**

- Land use – 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 or coastal zone

## **Change in ecological character?**

- **Change based on comparison to agreed reference/baseline condition, including natural fluctuations**
- **Extent of unacceptable change needs to be agreed by stakeholders**
- **Measure of unacceptable change needs to be shown through valid monitoring**



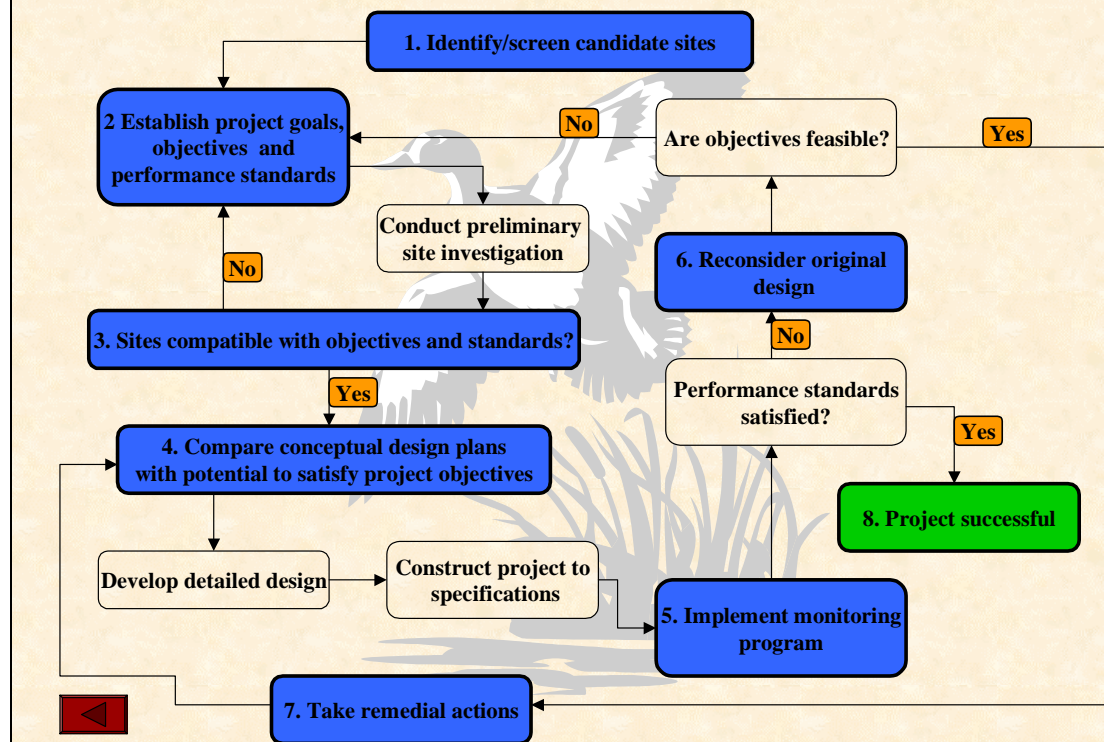
## **2. Ramsar (draft) guidelines for wetland restoration**

- **Goals, objectives and performance standards**
- **Guidelines for restoration**

## Restoration - goals, objectives and performance standards

- **Goals** - general statements about desired outcomes
- **Objectives** - specific statements about desired outcomes
- **Performance standards** - observable or measurable attributes that can be used to judge success

## Ramsar (draft) restoration guidelines



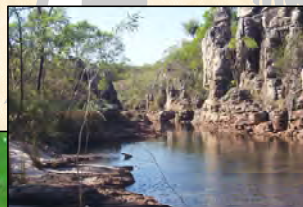
## Monitoring - definition

*Monitoring* is based on surveillance and is the systematic collection of data or information over time in order to ascertain the extent of compliance with a predetermined standard or position.



## Monitoring - Kakadu National Park

- National Park - 1978 - Northern Australia
- 2 million ha World Heritage & Ramsar site
- Aboriginal land ownership & management
- Approx 2000 population & 250 000 tourists



## Kakadu National Park - major pressures

- Uranium mining - most attention
- Risk assessments and intensive aquatic monitoring
- Monitoring - ecotoxicology, fish and invertebrate community structure, bioaccumulation, water chemistry and sediment



*Gudgeon*



*Daphnia*



## Kakadu National Park - major pressures

- Introduced plants and animals



*Cane toad*



## **Kakadu National Park - major pressures**

- Tourism



- Fire regime



- Climate change and sea level rise



## **Kakadu National Park World Heritage monitoring considerations**

- Cultural and biophysical - consultation and involvement; different sources of information

- Landscape perspective - GIS multi-scalar mapping and distribution analyses

- Multiple pressures - ecological risk assessment

- Monitoring and assessment - early warning and trend analysis



