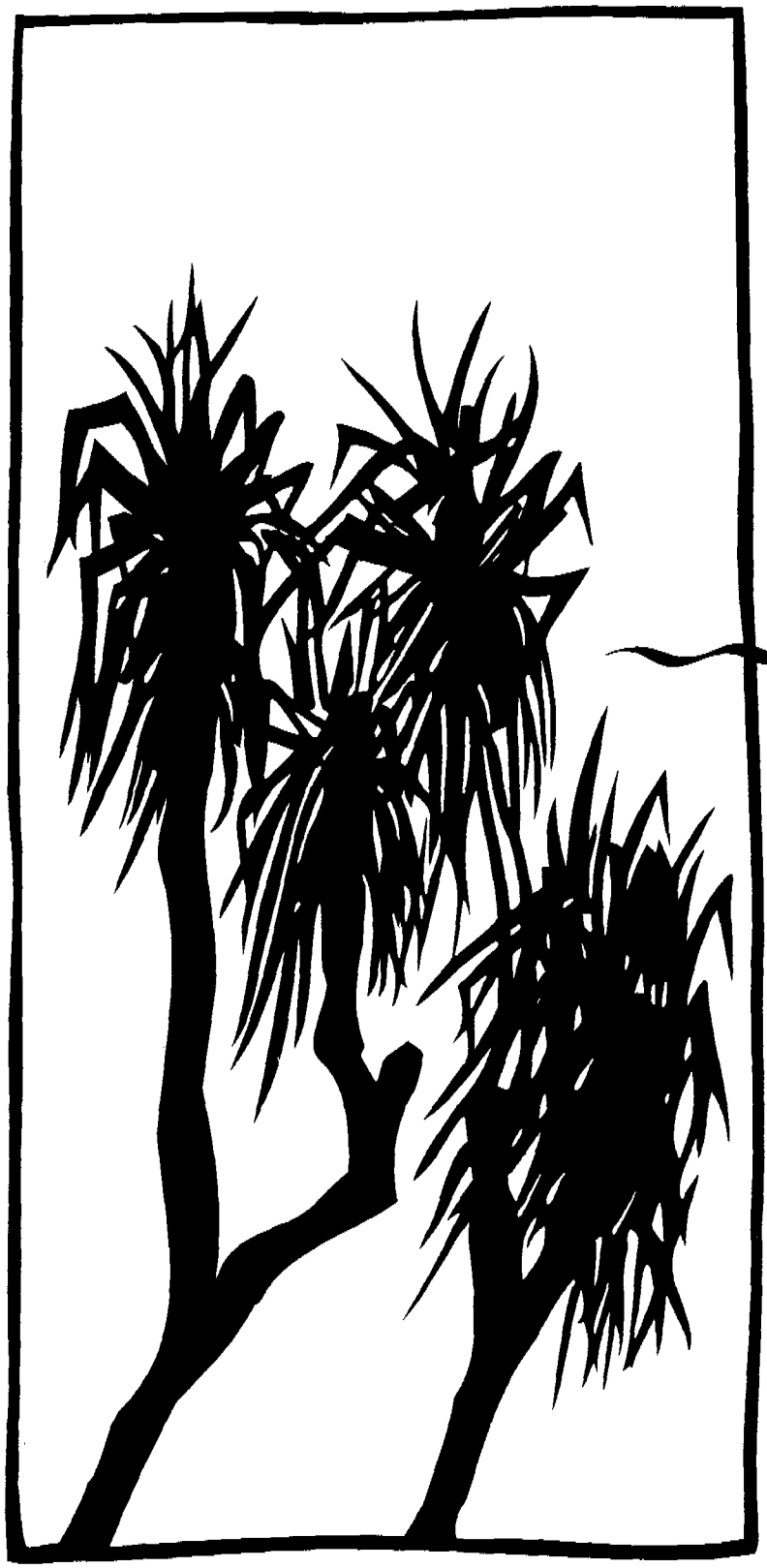
internal report **285**



Values and benefits derived from wetlands & Monitoring Ramsar wetlands

CM Finlayson

May 1998

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Values and Benefits Derived from Wetlands

&

Monitoring Ramsar Wetlands

Notes and overhead sheets used in two informal presentations to the

Macquarie River Catchment Committee

3 June 1998

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VALUES AND BENEFITS DERIVED FROM WETLANDS

Notes for discussion at the Macquarie River Management Committee, June 1998

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1 Introduction

Wetlands have many values and benefits that make them important for society. These include tangible returns from wetland products (eg fisheries, grazing, water) and less tangible returns from wetland functions (eg groundwater recharge, flood control, nutrient retention, recreation/tourism) and attributes (eg biological diversity, cultural heritage). In order to maintain, or even to enhance or restore them, the ecological processes that underpin the products, functions and attributes need to be maintained and the habitats managed in a sustainable manner.

Thus, wise use of wetlands provides the means by which wetland values and benefits are maintained. However, when faced with hard-nosed and user-pays commercial imperatives the values and benefits of wetlands do not seem to be well recognised. If this was not the case we would not still see the continuing loss and degradation of wetlands. Unless there is greater recognition of the values and benefits derived from wetlands we will struggle to make wise use and hence struggle to maintain them. In many parts of the world the value of wetlands is belatedly being recognised and ambitious restoration programs are now in place. However, despite the claims of slick commercial operators it is often impossible to actually replace the lost values, at least in the short-term, or over vast areas without the expenditure of vast sums of money. Millions of dollars are being spent on large projects that attempt to undo the damage of past eras. This in itself is recognition that we have lost values and we need to replace them.

2 Wetlands values and benefits

Wetland values and benefits are taken to include products, functions and attributes. The functions performed by wetlands include water storage, flood mitigation, shoreline stabilisation, groundwater recharge, water purification, retention of nutrients and sediment, and stabilisation of local climatic conditions. These functions all occur in Australian wetlands, but their relative importance in specific wetlands or wetland complexes has not been widely ascertained. Similarly, with the possible exception of fishing in the coastal floodplains/streams and mangroves the importance of harvestable wetland products has not been ascertained. Similarly, the high value of many wetlands for grazing has not been universally recognised, as shown by the extreme and non-sustainable practices that detract from the industry. The value of water has been recognised, but many would argue usually at the expense of the wetland!

Possibly the most valuable attribute of wetlands in Australia is the biodiversity. Due to the rainfall variability there is a spatial and temporal patchiness of wetland habitats with idiosyncratic annual variations in vegetation pattern superimposed on underlying patterns dictated by local topography, hydrology or soils. This diversity of wetland habitats and the highly seasonal, intermittent or episodic nature of the climate has provided a wealth of productive and abundant species.

The Ramsar Convention and other international groups have directed a large amount of effort towards identifying and even pricing the values and benefits derived from wetlands. It is difficult, partly because the effort has not been made and there are even claims that this effort has been hindered by vested interests. Regardless of such arguments there is an increasingly strong economic case for retaining wetlands and not destroying them for other purposes that have often been underpinned by social and economic policies that are being increasingly questioned.

Table 1 Definition of wetland values and benefits.

Functions performed by wetlands include the following: water storage; storm protection and flood mitigation; shoreline stabilisation and erosion control; groundwater recharge; groundwater discharge; retention of nutrients, sediments and pollutants; and stabilisation of local climatic conditions, particularly rainfall and temperature. These functions are the result of the interactions between the biological, chemical and physical components of a wetland, such as soils, water, plants and animals.
Products generated by wetlands include the following: wildlife resources; fisheries; forest resources; forage resources; agricultural resources; and water supply. These products are generated by the interactions between the biological, chemical and physical components of a wetland.
Attributes of a wetland include the following: biological diversity; geomorphic features; and unique cultural and heritage features. These have value either because they induce certain uses or because they are valued themselves.
The combination of wetland functions, products and attributes give the wetland ***benefits and values*** that make it important to society.

3 Conclusion

The values and benefits derived from wetlands have been increasingly recognised, often as we realise the cost of having destroyed them. Amidst calls for social factors to be factored into economic analyses there is as strong an argument for also including mechanisms to price such values and benefits and to cost their loss and/or recovery. First, we need to identify the values and benefits.

4 An invitation

I have presented a very quick introduction to the concepts of values and benefits that are derived from wetlands. These extend from a local level to the catchment and even beyond. The Australian delegation to the 1996 Ramsar Conference played a major role in requesting further effort to identify and price such values and benefits.

Thus, please feel free to discuss, debate and even disagree. The purpose of this paper is to not just inform you about these issues and ideas, but to also engender interchange and advice on practical ways of enhancing management of the marshes through effective economic and social analysis. Further, I guess that we would all agree that the major decisions already made about water allocation processes should be subject to review. Thus, we require valid information for such a review, and some of this information would be supplied by such analyses.

VALUES & BENEFITS DERIVED FROM WETLANDS

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(Macquarie River Management Committee June 1998)

VALUES & BENEFITS DERIVED FROM WETLANDS

- **Why consider values and benefits?**
- **What are values and benefits?**
- **What values and benefits do we derive from the marshes?**
- **What is the economic worth of these values and benefits?**

(Macquarie River Management Committee June 1998)

VALUES & BENEFITS DERIVED FROM WETLANDS

Functions **performed by wetlands include:**

storm protection & flood mitigation
shoreline stabilisation & erosion control
groundwater recharge or discharge
retention of nutrients, sediments & pollutants - water storage
stabilisation of local climatic conditions

These are the result of interactions between the biological, chemical and physical components of a wetland.

(Macquarie River Management Committee June 1998)

VALUES & BENEFITS DERIVED FROM WETLANDS

Products **generated by wetlands include:**

wildlife resources- fisheries

forest resources - forage resources

agricultural resources -water supply

These products are generated by the interactions between the biological, chemical and physical components of a wetland.

(Macquarie River Management Committee June 1998)

VALUES & BENEFITS DERIVED FROM WETLANDS

Attributes **of a wetland include:**

biodiversity - geomorphic features

cultural and heritage features

These have value either because they induce certain uses or because they are valued themselves.

(Macquarie River Management Committee June 1998)

VALUES & BENEFITS DERIVED FROM WETLANDS

What are values and benefits?

The values and benefits derived from a wetland include a combination of wetland *products*, *functions* and *attributes* that make the wetland important to society.

(Macquarie River Management Committee June 1998)

MONITORING RAMSAR WETLANDS

Notes for discussion at the Macquarie River Management Committee, June 1998

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1 Introduction

The Ramsar Convention for Wetlands of International Importance was agreed in the Iranian town of Ramsar in 1974. The Convention came into force in 1975 with the advent of seven Contracting Parties, including Australia, which was the first signatory in 1974. The convention contains a number of obligations for Contracting Parties, but possibly the most important is that associated with maintaining the ecological character of Ramsar listed wetlands by making wise use of them. If the ecological character of a site is changed or is likely to change (adversely) the relevant Contracting Party is required to notify the Convention and to undertake necessary remediation. However, for this to be done a number of important concepts have needed clarification, foremost amongst these are those of ecological character and change in ecological character. Further, Contracting Parties have requested guidance as to how adverse change can be recorded.

The following text describes the concepts of ecological character and change in ecological character and outlines guidelines for designing monitoring programs and reporting on adverse change.

2 Ecological character and change in ecological character

In 1996 the Ramsar Convention (Resolution 6.1) adopted 'working' definitions for these concepts. Thus, ecological character was defined as:

> *the structure and inter-relationships between the biological, chemical, and physical components of the wetland. These derive from the interactions of individual processes, functions, attributes and values of the ecosystem(s).*

Change in ecological character was defined as:

> *the impairment or imbalance in any of those processes and functions, which maintain the wetland and its products, attributes and values.*

These definitions have recently been assessed again by the STRP and a recommendation that they be changed has gone forward. However, this does not alter the basic concept of linking the biological, chemical and physical components of a wetland with the uses of the wetland (the functions attributes and values). Without this linkage we have a definition of ecological integrity which does not directly relate to the Ramsar concept of making wise use of a wetland.

3 Wise use of wetlands

Contracting Parties to the Ramsar Convention are obliged to "*.... promote ..... as far as possible the wise use of wetlands in their territory.*" The following definition of wise use was adopted by the Convention in 1987:

"*The wise use of wetlands is their sustainable utilisation for the benefit of mankind in a way compatible with the maintenance of the natural properties of the ecosystem.*"

Sustainable utilisation is defined as:

"*Human use of a wetland so that it may yield the greatest continuous benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations.*"

Guidelines for the implementation of wise use have also been adopted and call upon Contracting Parties to

- Adopt national wetland policies
- Develop programs for wetland inventory, monitoring, research, ...
- Take action at particular sites

4 Monitoring wetlands

In a general sense, environmental monitoring addresses the broad issue of change or lack of change through time and at particular places.

> ***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.*

The effectiveness and complexity of monitoring varies considerably. An effective monitoring program is neither necessarily complex nor expensive. Effectiveness is gauged by the relevance and timeliness of the data or information collected rather than the complexity of design. Simple approaches to monitoring can be very effective and inexpensive.

Monitoring is a process which provides information for management purposes and should be supported by a management structure and a well-developed inventory. The management structure provides the support for the program and the inventory provides the broad baseline against which change can be judged and management actions decided.

Wetland monitoring has received more and more attention in recent years as awareness of the extent of wetland degradation and loss has increased. Such is the concern at the extent of global wetland degradation that more and more effort is being directed towards developing effective management processes and responses to problems. In many instances this effort is being held back by a lack of relevant information, such as that contained in an inventory and collected through monitoring.

A framework for assisting with the design of a monitoring program has been developed. The framework applies to all forms of monitoring but it does not provide a recipe for specific techniques. It presents a series of steps that will assist with designing a monitoring program suitable for individual situations.

The framework contains the following headings:

- identify the problem or issue

- set the objective
- establish the hypothesis
- choose the methods and variables
- assess the feasibility and cost effectiveness
- conduct a pilot study
- collect the samples
- analyse the samples
- report the results
- evaluate the project

After evaluation the program may be continued, altered or terminated. These steps are described further in the attached table.

Monitoring is needed to prevent further unchecked exploitation and degradation of wetlands. Thus, there is a need to assess the impact of human development and minimise ecological change. Success in such programs will depend on our ability not only to detect and monitor changes in the quality of wetlands, but also to provide early indications of likely change and thereby take action to prevent this change from occurring.

The Ramsar Convention has recognised the need to design effective monitoring programs and has adopted the abovementioned framework. However, a recent comment on wetland monitoring by a scientific colleague and myself has lamented the lack of effective monitoring programs in Australia and recommends that all programs are rigorously designed and implemented. For Ramsar sites there is a moral obligation that this is done and that adverse change in ecological character is reported to the Convention. In the past Australia has chosen not to make use of this provision of the Convention; an attitude that attracted widespread comment from non-governmental groups at the 1996 conference of the Convention in 1996.

5 Conclusion

It is my contention that for effective management of wetlands such as the Macquarie Marshes we require effective (ie well-designed and implemented) monitoring programs. To be effective these programs need to be technically rigorous, answer specific questions and contain regular and transparent reporting procedures. Further, the program needs regular re-assessment and if it has achieved its objective, or can not achieve its objective, it should be terminated. In the latter case it should be replaced.

Unfortunately, not many wetland monitoring programs appear to meet the proforma recommended by the Ramsar Convention. General and vague surveillance programs can not substitute for monitoring. Surveillance is by nature a more vague exercise than monitoring and is less likely to be as cost-effective. Surveillance programs have their place, but not at the expense of problem-directed monitoring. The Ramsar proforma provides guidance on developing a cost effective and scientifically defensible monitoring program.

I will finish this discussion on a salient point that I think is worth pondering. A poorly designed monitoring program can be expensive and yet fail to provide sufficient warning of impending 'doom'. Even worse, it could wrongly attribute 'blame' for such 'doom'.

6 An invitation

I have presented a very quick overview of the basis of designing monitoring programs as recommended by the Ramsar Convention. The Australian delegation to the 1996 Conference played a major role in developing the Ramsar guidelines. If these are not workable we would appreciate such advice.

Thus, please feel free to discuss, debate and even disagree. The purpose of this paper is to not just inform you about the Ramsar proforma, but to also engender interchange and advice on practical ways of enhancing management of the marshes through effective monitoring of the marshes and the catchment. Further, I guess that we would all agree that the major decisions already made about water allocation processes should be subject to review. Thus, we require valid information for such a review, and this information is supplied by monitoring.

Table 1: Summary of key points to consider when using the framework for designing a wetland monitoring program.

Problem/issue	State clearly and unambiguously State the known extent and most likely cause Identify the baseline or reference situation
Objective	Provides the basis for collecting the information Must be attainable and achievable within a reasonable time period
Hypothesis	Supports the objective and can be tested
Methods & variables	Specific for the problem and provides the information to test the hypothesis Able to detect the presence of and assess the significance of any change Identifies or clarifies the cause of the change
Feasibility/cost effectiveness	Determine whether or not it can be done regularly and continually Assess factors that influence the sampling program: availability of trained staff; access to sampling sites; availability and reliability of specialist equipment; means of analysing and interpreting the data; usefulness of the data and information; means of reporting in a timely manner Determine if the costs of data acquisition and analysis are within the budget
Pilot study	Time to test and fine-tune the method and specialist equipment Assess the training needs for staff involved Confirm the means of analysing and interpreting the data
Sampling	Staff should be trained in all sampling methods All samples should be documented: date and location; names of staff; sampling methods; equipment used; means of storage or transport; all changes to the methods Samples should be processed within a timely period and all data documented: date and location; names of staff; processing methods; equipment used ; and all changes to the protocols
Sample analysis	Sample and data analysis should be done by rigorous and tested methods The analyses should be documented: date and location; names of analytical staff; methods used; equipment used; data storage methods
Reporting	Interpret and report all results in a timely and cost effective manner The report should be succinct and concise and indicate whether or not the hypothesis has been supported and contain recommendations for management action, including further monitoring
Evaluation	Assess the effectiveness of the program and, if necessary, terminate

MONITORING RAMSAR WETLANDS

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MONITORING RAMSAR WETLANDS

- **Ecological character and change in ecological character**
- **Wise use of wetlands**
- **Monitoring framework**
- **An invitation**

(Macquarie River Management Committee June 1998)

MONITORING RAMSAR WETLANDS

Ecological character

"the structure and inter-relationship between the biological, chemical and physical components of a wetland. These derive from the interactions of individual processes, functions, attributes and values of the ecosystem(s)."

(Macquarie River Management Committee June 1998)

MONITORING RAMSAR WETLANDS

Change in ecological character

"the impairment or imbalance in any of those processes and functions, which maintain the wetland and its products, attributes and values."

(Macquarie River Management Committee June 1998)

MONITORING RAMSAR WETLANDS

Wise use of wetlands

"The wise use use of wetlands is their sustainable utilisation for the benefit of mankind in a way compatible with the maintenance of the natural properties of the ecosystem."

(Macquarie River Management Committee June 1998)

MONITORING RAMSAR WETLANDS

Sustainable utilisation is the

"human use of a wetland so that it may yield the greatest continuous benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations."

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MONITORING RAMSAR WETLANDS

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."

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MONITORING RAMSAR WETLANDS

Monitoring framework

identify the problem or issue

set the objective

establish the hypothesis

choose the methods & variables

assess the feasibility and cost effectiveness

conduct a pilot study

collect the samples

analyse the samples

report the results

evaluate the project

(Macquarie River Management Committee June 1998)