

1 An introduction to wetland management

Information needs for wetland management

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Abstract

Wetland management is today receiving far greater attention within the framework of both general and specific conservation policies. Many jurisdictions have realised the full value of their wetland resources and have begun to implement specific management activities. For these activities they require further information to ensure the resources are managed and used in a wise manner. Information on the current status of wetlands, the extent of wetland loss and degradation, conservation procedures and the success of monitoring strategies is required. This information can be collected through ongoing wetland inventory (incorporating classification) and monitoring programs. Wetland managers in northern Australia can draw upon an increasing amount of information from other regions of the world, but they will still need an interactive inventory process to provide locally relevant information. Management actions also require monitoring to ensure their effectiveness. In turn, monitoring requires the support of management procedures to ensure it is effective and that the outcomes are interpreted and acted upon. A management plan can provide such procedures and ensure that the available information is presented in a form that can be readily used for management actions.

1 Introduction

Over the last decade considerable effort has been directed towards the conservation and wise use of wetlands in northern Australia (Jonauskas 1996, Finlayson et al 1997, Fleming 1993, Blackman et al 1993, 1995). However, despite having compiled a general level of knowledge the information base is not even. Whilst reasonable data/information exists for some wetlands and/or threats to wetlands, a comprehensive inventory at the most basic level (encompassing, for example, information on physical and ecological features, values and benefits, land tenure and uses, threats and disturbances, and monitoring and restoration) of all wetlands across this vast region is not available (Storrs & Finlayson 1997, Finlayson et al 1997).

The wise use and conservation of wetlands in northern Australia will be partly reliant on a greatly expanded information base. Information on the ecological character of wetlands, the extent of wetland loss and degradation, conservation procedures and the success of monitoring strategies will be required. In turn, this information base requires linkage and integration with managerial processes – a management planning procedure provides this.

Integral to obtaining this information is the application of the basic, but often controversial process (see Finlayson & van der Valk 1995) of classifying wetlands. Classification and inventory of wetlands are processes designed to provide a summary of knowledge on wetlands and their resources. A review of the basic concepts of wetland classification and inventory is presented along with a summary of the concept of ecological character of a wetland (Dugan & Jones 1993, Finlayson 1996a) and the importance and role of monitoring (Tomas Vives 1996) and management plans (Davis 1994) for the wise use of wetlands. Management plans are presented in the role of processes that integrate management actions and monitoring to ensure

that the ecological character of the wetland concerned is maintained whilst being used for specified values and benefits to society.

2 Definition of wetlands

The term 'wetland' groups together a wide range of habitats that share a number of common features, the most important of which is continuous, seasonal or periodic standing water or saturated soils. Despite a number of national/regional wetland surveys (see McComb & Lake 1988, Finlayson & von Oertzen 1993) there is no standard definition of wetlands in Australia (Barson & Williams 1991, Pressey & Adam 1995). The recent *Directory of Important Wetlands in Australia* (Usback & James 1993, ANCA 1996) uses the Ramsar International Wetland Convention definition of a wetland:

wetlands are areas of marsh, fen, peatland, or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres.

Paijmans et al (1985) undertook a national overview of wetlands and used the following definition

land permanently or temporarily under water or waterlogged. Temporary wetlands must have surface water or waterlogging of sufficient frequency and/or duration to affect the biota. Thus the occurrence, at least sometimes, of hydrophytic vegetation or use by waterbirds are necessary attributes.

LWRRDC in a national review of wetland research and development needs (Bunn et al 1997) adopted the Paijmans et al (1985) definition. Thus, when considering wetland classification and inventory it is important to ascertain the breadth of 'wetland' habitat that will be covered (ie determine what definition is being used). In northern Australia the broad-based Ramsar definition is being increasingly used (Finlayson 1995, Storrs & Finlayson 1997).

3 Ecological character

An important obligation under the Ramsar International Wetland Convention is for each Contracting Party to 'designate suitable wetlands within their territory for inclusion in a List of Wetlands of International Importance'. The Convention also states that wetlands should be Listed according to their 'international significance in terms of ecology, botany, zoology, limnology or hydrology'. Whilst listing a site as internationally important is an important obligation under the Convention, it may not constitute anything more than a passive conservation step. Thus, the Convention also contains an obligation to 'formulate and implement their planning so as to promote the conservation of the wetlands included in the List' and to inform the Ramsar Bureau 'if the ecological character of any wetland in their territory and included in the List has changed, is changing, or is likely to change as the result of technological developments, pollution or other human interference'. Thus, under this Convention there is an obligation to maintain (or restore) the ecological character of Listed sites (and, in fact, of all wetlands).

In 1992 the International Waterfowl and Wetland Research Bureau (IWRB) discussed the concept of ecological character and accepted a working definition that was proffered by Dugan and Jones (1993). The Ramsar Convention Scientific and Technical Review Panel (STRP) refined the definition (Finlayson 1996a) and this is presented below.

The ecological character of a wetland is the sum of the wetland's functions, products, and attributes that are derived from the individual biological, chemical, and physical components of the ecosystem and their interactions.

This wording reflected an international consensus and was presented as a working definition that could be changed following further discussion. This in fact occurred at the next conference of the Wetland Convention in 1996 and the following working definition was adopted:

The ecological character is 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).

The main difference between the definitions is that the first deliberately includes wetland values and benefits (functions, products and attributes) in addition to biophysical features. Thus, the ecological character of a wetland is, in part, defined by the uses made of it by people. In the second instance the direct reference to wetland values has been removed, although it is acknowledged that the use of the wetland can affect the ecological character. This change was made as there was unease at the direct linking of ecological and socio-economic concepts. It is noted, however, that the latter is also presented as a working definition and it could be changed.

Both definitions refer to wetland functions, products and attributes (values and benefits). These terms have been previously described within the Ramsar context (Dugan 1990, Davis 1993, 1994) and are presented below.

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.

The above terms provide a theoretical basis for describing the ecological character of a wetland, but do not assist with the practical issues of describing the character – what is an adequate level of baseline description and can this be used as a basis for assessing the significance of any change? Thus, there is a level of consensus (but not agreement) on the key concept (ie definitions) of ecological character, but the harder questions relating to the ecological meaning of change when it is detected have yet to be agreed. Monitoring can provide the necessary information, but it does not necessarily provide the basis for interpreting the significance of change.

Within the context of the International Wetland Convention change in ecological character was considered as meaning adverse change. (It was noted that positive change could occur and that this was already covered by the management planning and restoration guidelines developed by the Ramsar Convention.) This concept is captured in the definition of change in ecological character proposed by Dugan and Jones (1993) and slightly modified by STRP (Finlayson 1996a):

Change in ecological character of a wetland occurs as the result of technological developments, pollution, or other human interferences with the biological, chemical, and/or physical components of the ecosystem (and/or the interactions between them), to such an extent that a reduction and/or an ongoing imbalance occurs in any of those functions, products and attributes which give the wetland benefits and value to society.

However, even with this definition we are no closer to ascertaining what exactly constitutes an unacceptable ecological change. To define an unacceptable ecological change we need firstly to establish the values and benefits of the wetland, assess the ecological status of these and then monitor them to ascertain when (if) an adverse change is likely to or has actually occurred. At a superficial level this may seem a straight forward exercise, but in reality all three steps are bedevilled by technical and/or socio-economic difficulties that can undermine the management, including monitoring, and wise use and conservation of wetlands (Hollis et al 1992, Finlayson 1994, 1996b, Hollis & Finlayson 1996).

The same comments apply to the definition of change in ecological character adopted by the Convention in 1996

Change in the ecological character of a wetland is the impairment or imbalance in any of those processes and functions which maintain the wetland and its products, attributes and values.

Thus, there is broad agreement on the basic need to assess and describe the ecological character of a wetland, but further attention is required to assessing the significance of any change. For the latter to occur, further attention to inventory (that provides the basic description of the wetland) and monitoring (that describes the extent of any change) is required.

4 Wetland classification

The classification of wetlands is beset with difficulties (Finlayson & van der Valk 1995) and these seemingly multiply when a regional or an international approach is sought (Scott & Jones 1995). The purpose of wetland classification is to standardise and define the terms being used to describe the various wetland types. At an international level a uniform set of terms is needed (Cowardin & Golet 1995, Scott & Jones 1995, Zoltai & Vitt 1995). Pressey and Adam (1995) argue that at a local or national level this may not be necessary, although there would seem to be little argument that the adoption of standardised terms and definitions has definite advantages for comparative and broad planning purposes (Cowardin & Golet 1995, Hughes 1995, Zoltai & Vitt 1995).

Scott and Jones (1995) issued a warning concerning the level of sophistication required for classification in relation to the amount of information required for management. Careful consideration of the need for information and the requirements for management purposes are points strongly made by Pressey and Adam (1995). The important point in classifying wetlands is not the detail of the classification, but the usefulness of the classification for management purposes.

Many national wetland classifications now exist (see Cowardin & Golet 1995, Lu 1995, Pressey & Adam 1995, Semeniuk & Semeniuk 1995, Zoltai & Vitt 1995). These invariably incorporate local terms and definitions that are not necessarily known or accepted elsewhere. For national purposes this may not be a major problem, but for comparisons and management at an international level these differences may present difficulties. However, even at the national level it can be extremely difficult to develop a classification that is acceptable to all wetland scientists and experts (Cowardin & Golet 1995, Lu 1995, Pressey & Adam 1995).

An overview of the classification of northern Australian wetlands has been provided by Finlayson and von Oertzen (1993). They list four completely different approaches (table 1) and can now be complemented by two further systems (Semeniuk 1987, Semeniuk & Semeniuk 1995, 1997, ANCA 1996). The inconsistencies within classifications similar to that adopted by the Ramsar Wetland Convention (such as that used by ANCA 1996) have been pointed out by Semeniuk and Semeniuk (1995, 1997).

Inconsistencies identified in wetland classifications

- not all types of wetlands are clearly or unambiguously described
- repetition of types that are named 'marshes'
- some wetlands remain ill-defined and encompass a number of types
- mixed criteria are used to separate wetlands

In order to overcome such inconsistencies, Semeniuk and Semeniuk (1995, 1997) propose a geomorphic approach to wetland classification based on landform setting and hydroperiod. It is systematic with a hierarchical use of descriptors added to core wetland types.

Table 1 Wetland classification schemes used in northern Australia

Basis of classification	Region	Reference
Hydrologic	Queensland	Stanton 1975
Vegetation structure and floristic	Australia	Briggs 1981
Hydrologic and vegetation	Australia	Paijmans et al 1985
Physical	Pilbara	Masini 1986
Geomorphic, hydrologic and vegetation	Australia	ANCA 1996
Geomorphic	Australia	Semeniuk & Semeniuk 1997

5 Wetland inventory

The information collected through wetland inventories is nowadays regarded as a necessary prerequisite for wetland conservation and management at a holistic level, involving planning on a national, regional and international scale (Dugan 1990, Hollis et al 1992, Taylor et al 1995, Hughes 1995, Naranjo 1995, Scott & Jones 1995). An inventory is regarded by Dugan (1990) as the first step in assembling an information base for wetland management. In fact, Contracting Parties to the Ramsar Convention undertake to compile an inventory as part of the process of developing and implementing a national wetland policy for the wise use of all wetlands on their territory. Strategically developed wetland inventory (or inventories) should provide managers and/or policy makers with the information base that they require not only to manage individual wetlands or threats, but to also place the conservation value of wetlands within the context of broadscale (catchment, regional or even national) land use and sustainable development priorities.

To be effective in promoting the conservation of wetlands these inventories must be available to and understood by all those formulating and implementing wetland management policies (Naranjo 1995, Pressey & Adam 1995, Wilen & Bates 1995). Thus, they must be framed in a manner suitable for management purposes. Additionally, to remain useful tools for

management they need to be regularly reviewed and updated (Naranjo 1995, Scott & Jones 1995, Wilen & Bates 1995). Information categories often used in wetland inventories are shown in table 2. Many of the categories do not relate directly to biophysical information, but are management oriented.

Table 2 Data categories used by Scott (1993) in the directory of wetlands of Oceania

Category	Information
Title	Name and reference number
Location	Geographical coordinates
Area	Area and/or length of rivers
Altitude	Average
Overview	Summary description of site
Physical features	Hydrology, soils, water quality, climate
Ecological features	Main habitats and vegetation
Land tenure	Ownership of wetland and surrounding land
Conservation measures taken	Details of protected areas
Conservation measures proposed	Further proposals
Land use	Human activities
Possible changes in land use	Development plans and ideas
Disturbances and threats	Existing and possible threats
Hydrological and biophysical values	Principal features
Social and cultural values	Principal values
Noteworthy fauna	Important species
Noteworthy flora	Important species
Scientific research and facilities	Major research activities and facilities
Conservation education	Existing programs and facilities
Management authority and jurisdiction	Responsible authority(ies)
References	Key published literature
Reasons for inclusion	Reason(s) designated as important

Inventories are useful in the first stages of developing effective wetland conservation programs (Taylor et al 1995, Hughes 1995, Naranjo 1995, Scott & Jones 1995, Wilen & Bates 1995). They can assist in the identification of conservation priorities, establish the basis for monitoring the ecological status of wetlands, promote awareness of wetland sites and management issues, and facilitate exchange of information and comparisons between sites and regions. As importantly, information gathered for inventories can also illustrate the economic value of wetlands and provide valuable data for resource utilisation decisions.

Inventories are particularly valuable for assessing wetland loss and degradation (Taylor et al 1995, Hughes 1995, Lu 1995, Wilen & Bates 1995). Information on rates of wetland loss and reasons for this loss have proved invaluable for promoting awareness and developing conservation and restoration programs (Hollis & Jones 1991, Hughes 1995, Wilen & Bates 1995). Once the basic information on wetland occurrence, distribution and status has been collated it is essential that it is utilised as the basis of further conservation effort before it becomes dated and not seriously regarded by conservation officials (Naranjo 1995). However, even when inventories are available they may only be of limited use (Hughes 1995, Naranjo

1995). This is particularly so where the information is not comprehensive or is restricted in scope and coverage, or is not brought to the attention of governmental officials responsible for setting policies that affect wetlands.

It is not possible, based on current inventory information, to accurately depict the extent of wetlands across all of northern Australia. A broadscale inventory is lacking, although much information has been collated in the national wetland directory (ANCA 1996). The existence of datasets on wetlands in the Northern Territory was identified by Storrs and Finlayson (1997), but an inventory does not exist. Similarly, in northern Western Australia there has been a recent attempt to collate existing information on major wetlands (Watkins et al 1997), but not a comprehensive inventory. There is much more information on northern Queensland wetlands and this is becoming available (Blackman et al 1993, 1995).

Without a complete inventory of wetlands, management for conservation and sustainable utilisation of wetlands will, in part, continue to be underpinned by an *ad hoc* information base. This is an unsatisfactory situation given the status of wetlands in northern Australia and the value now being placed on them (Finlayson et al 1997, Storrs & Finlayson 1997).

Costa et al (1996) summarised the conclusions of a Mediterranean analysis of wetland inventory. The key points from this summary are given below as a guide to compiling a wetland inventory. Additionally, Costa et al (1996) point out that the undertaking of an inventory allows the development of networks of experts concerned with wetlands, the stimulation of cooperation for undertaking conservation actions, and the promotion of awareness of wetland values and benefits.

Objectives of a wetland inventory

- to identify where wetlands are, and which are priority sites for conservation
- to identify the functions and values of each wetland
- to establish a baseline for measuring change in a wetland
- to provide a tool for planning and management.

In order to achieve these objectives the following recommendations were made.

Recommendations to achieve the objectives of an inventory

- use standardised methods for classification, data collection and storage, delineation and mapping
- incorporate qualitative and quantitative data to provide a baseline for monitoring wetland change and loss
- facilitate analysis of loss of wetland functions
- be regularly updated
- be easily disseminated and made available to wetland managers, decision-makers and the general public.

For the above to be achieved careful planning and testing of techniques is required. A secure funding source is needed and all changes to protocols should be well documented and assessed. Critically, any limitations on the use of the information should be made apparent at the outset.

6 Monitoring

Environmental monitoring has received more and more attention in recent years. At a global level this has arisen as awareness of the extent of environmental degradation and habitat loss has increased. Wetlands have not been exempt from this general and widescale degradation (see, for example, cases described in Finlayson et al 1992). 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 on the nature of the problem, the cause of the problem and the effectiveness of management procedures and actions. Effective monitoring programs can help overcome these deficiencies.

In a general sense monitoring addresses the issue of change or lack of change through time and at particular places. Thus **monitoring** can be defined as *the systematic collection of data or information over time*. It differs from **surveillance** by assuming that there is a specific reason for collecting the data or information (see Spellerberg 1991, Hellawell 1991, Furness et al 1994). Thus, whilst it is built upon survey and surveillance, it is more precise and oriented to specific targets or goals (Hellawell 1991, Spellerberg 1991).

Survey is an exercise in which a set of qualitative observations are made but without any preconception of what the findings ought to be.

Surveillance is a time series of surveys to ascertain the extent of variability and/or range of values for particular parameters.

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 of monitoring varies considerably. An effective monitoring program is not necessarily complex nor expensive. Effectiveness is gauged by the relevance and timeliness of the data or information collected which, in turn, are influenced by the design of the program.

A framework for assisting with the design of a monitoring program has been presented by Finlayson (1996a,c). The framework applies to all forms of monitoring (eg changes in the area of a wetland, the ecological health of a wetland, or the underlying reasons behind the loss of wetlands). The framework is not prescriptive. It is not a recipe for a particular type of problem or a particular type of wetland – this would be presumptuous given the many differences between sites, the problems and the resources available. It presents a series of steps that will assist those charged with designing a monitoring program make decisions suitable for their own situation. A person using the framework will make these decisions based on some degree of knowledge and/or expertise. The framework is not a substitute for knowledge or expertise.

Before an effective monitoring program can be implemented the objectives of the program must be clearly identified and agreed. In an ideal situation, this should be a straightforward and cooperative process between managers (who make decisions) and scientists (who provide expert advice and interpret the data). In a simple sense, the managers would outline the need for a monitoring program and the scientists recommend the most appropriate techniques and, by an iterative process, an approach that has both scientific rigour and meets the management objectives will be developed. Conflict could arise if, in outlining the objectives, the managers are constrained or influenced by other than scientific considerations. Under such

circumstances it must be remembered that any deficiency in the objectives will influence all other components of the program (Spellerberg 1991).

In a general sense, 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. A monitoring program that simply shows that change (including habitat loss) has occurred can have immense educational and public awareness value and demonstrate environmental trends, but programs that enable steps to be taken **before** such change (or loss) occurs are urgently needed. Without these programs the extent of ecological change (and loss) referred to above will continue unabated.

With all monitoring techniques there is a need to establish a starting point or to obtain baseline data that identifies the key functions and values of the site. Thus, the functions and values of a particular site need to be defined. Spellerberg (1991) considers baseline data to be information collected from the same place and on the same basis as subsequent data and that this is different to reference data which may have been collected from the same site by a different method or even from a different site. Reference data should only be used where it is not possible to obtain valid baseline data. To obtain a direct analysis of the extent and ecological significance of change a valid baseline is needed. However, for all sorts of reasons, it may be necessary to use the more indirect method of comparing to reference data. This still has value, but care should be used when inferring from one method to another or from one site to another.

Even a well-designed monitoring program could have little value if the information that is collected is not utilised or does not influence the management process for that locality or site. Ideally, the locality or site will be subject to an interactive and holistic management plan that provides the means of responding to the information obtained from the monitoring program. If a formal or official management plan does not exist or is not being effectively implemented it is critical that mechanisms to make use of the information collected from a monitoring program are identified and developed.

The diagram in figure 1 (adapted from Constable 1991) outlines the connection between a formal management procedure and an environmental monitoring program. In this case monitoring provides the means of measuring the output of the management procedure – that is, it provides the means of measuring the (observed) state of the environment and the extent to which it may have been altered. If the management objectives are not being met, the existing legislation or regulations that affect the site (or location) are used to adjust the management activities. In the rather ideal procedure shown in figure 1, the monitoring program can be established either before or after a particular management activity is implemented. If monitoring is conducted before a particular management decision is taken, it is essential that the information collected is then used to influence the management activities.

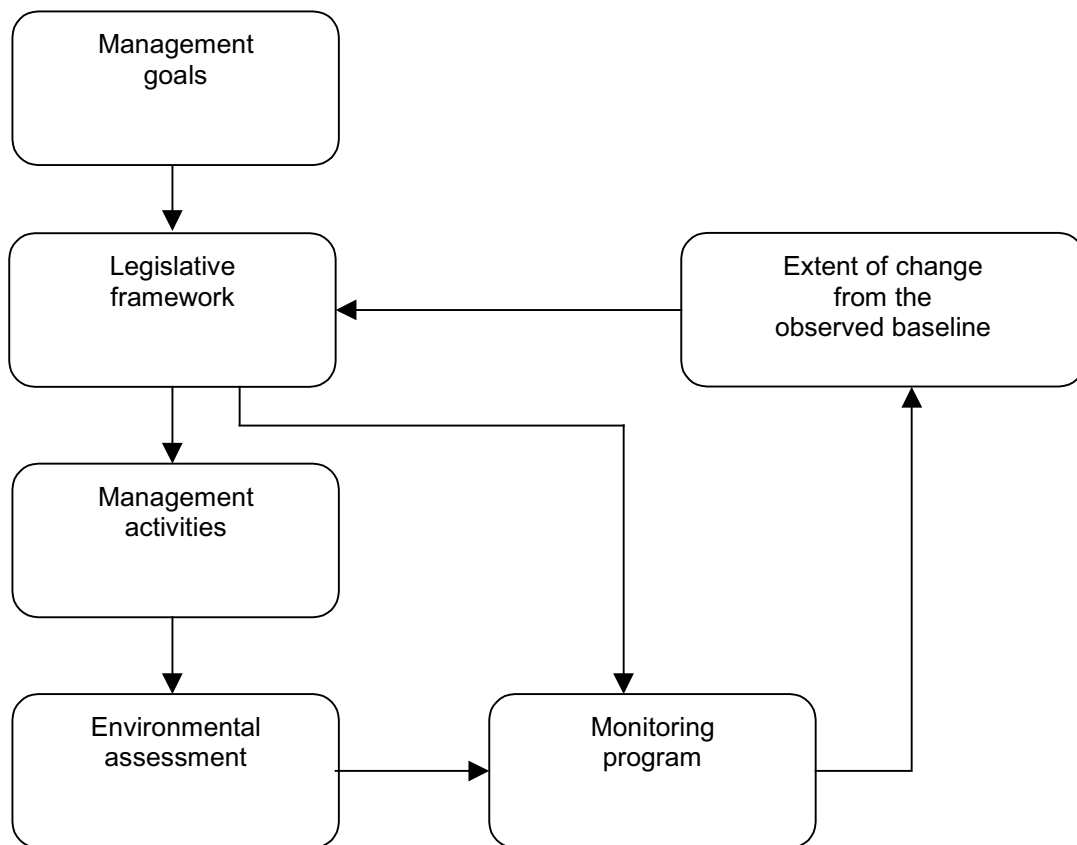


Figure 1 Connection between a formal management procedure (plan) and an environmental monitoring program (based on Constable 1991)

7 Management planning

Wetlands are dynamic areas, open to influence from natural and human factors. In order to maintain their biological diversity and productivity and to allow wise use of their resources by human beings, some kind of overall agreement is needed between the various owners, occupiers and interested parties. The management planning process provides this overall agreement (Davis 1993).

In other words, the management plan provides the basis for maintaining the ecological character of a wetland and to allow wise use of the resources by the owner and/or agreed users. In developing a management plan the following issues need consideration:

- It is a way of thinking that involves recording, evaluating and planning and is subject to constant review and revision and is therefore flexible and dynamic.
- It involves three basic steps of describing the features of the site/area, defining operational objectives and taking necessary management actions.
- Preparation of an elaborate plan is not an excuse for inaction or delay.
- Review of the plan may lead to revision of the site description and operational objectives.
- It should be a technical not a legal document, although it may be supported by appropriate legislation.

Although conditions and resources vary at individual sites the general considerations may be applied widely.

The format of a plan may need to meet various legislative requirements, but it will generally contain a preamble and three major sections (table 3): description of the site; evaluation and objections; and action plan/prescriptions. Technical staff will normally participate in all three stages with policy staff reviewing the first two stages before approving finances and implementation of the third stage.

Table 3 Recommended components of a management plan (Davis 1994)

Preamble
Concise statement of broad governmental policies concerned with the plan.
Statement of the Ramsar obligations of maintaining the ecological character of a listed site.
Description
Establishes the basis for monitoring to identify any subsequent changes at the site.
Evaluation and Objectives
Evaluation
Assessment of the major features of the site.
Long-term management objectives
Concise expression of intent and derived from the evaluation process.
Factors influencing the achievement of long-term objectives
Internal natural factors such as vegetation succession and variations in water level.
Internal human-induced factors such as erosion, disturbance and pollution.
External natural factors such as climate change, variations in current and sea level.
External human-induced factors such as sedimentation and pollution.
Factors arising from legislation or tradition such as treaties or access rights.
Physical considerations such as inaccessibility.
Available resources such as finance and a skilled workforce.
Identification of operational objectives
Taking into account factors that affect the achievement of long-term objectives.
Establishment of the limits of acceptable change.
Action Plan/Prescriptions
Workplan
Provides management options derived from the operational objectives.
Projects
Prescriptions to achieve the individual tasks to required for the operational objectives.
Establishes record keeping and administrative procedures.
Work programs
Derived from the individual projects.
Reviews
Assessment of the success of the workplan, projects and work program.

The above may sound all very simple, but there are pitfalls, such as making the plan too complicated, making the plan the goal rather than the tool, making the plan inflexible and not allocating resources to ensure the plan can be implemented. Importantly, the plan should provide the means of obtaining and using the information needed for effective management of the wetland.

8 Conclusion

Collation of wetland information for northern Australia has been greatly enhanced in recent years, mainly through the national wetland directory. However, resource and conservation agencies across northern Australia have not agreed a definition of wetlands and a classification system. These steps need addressing before a comprehensive wetland inventory can be successful. Individual jurisdictions may proceed independently and gather inventory information, but this will not provide a national picture. Processes to assist in the development of an inventory are readily available and should be used, after due assessment for local relevance. The inventory will require due attention and agreement on a classification system and be supported by effective monitoring that is dependent on the existence of adequate baseline or reference information.

The information requirements should be identified and supported by a site management plan that ensures that the objective of maintaining the ecological character of a site is supported by appropriate actions. The management plan provides the linkage between processes to gather information and to ensure that it is used in a timely and effective manner.

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