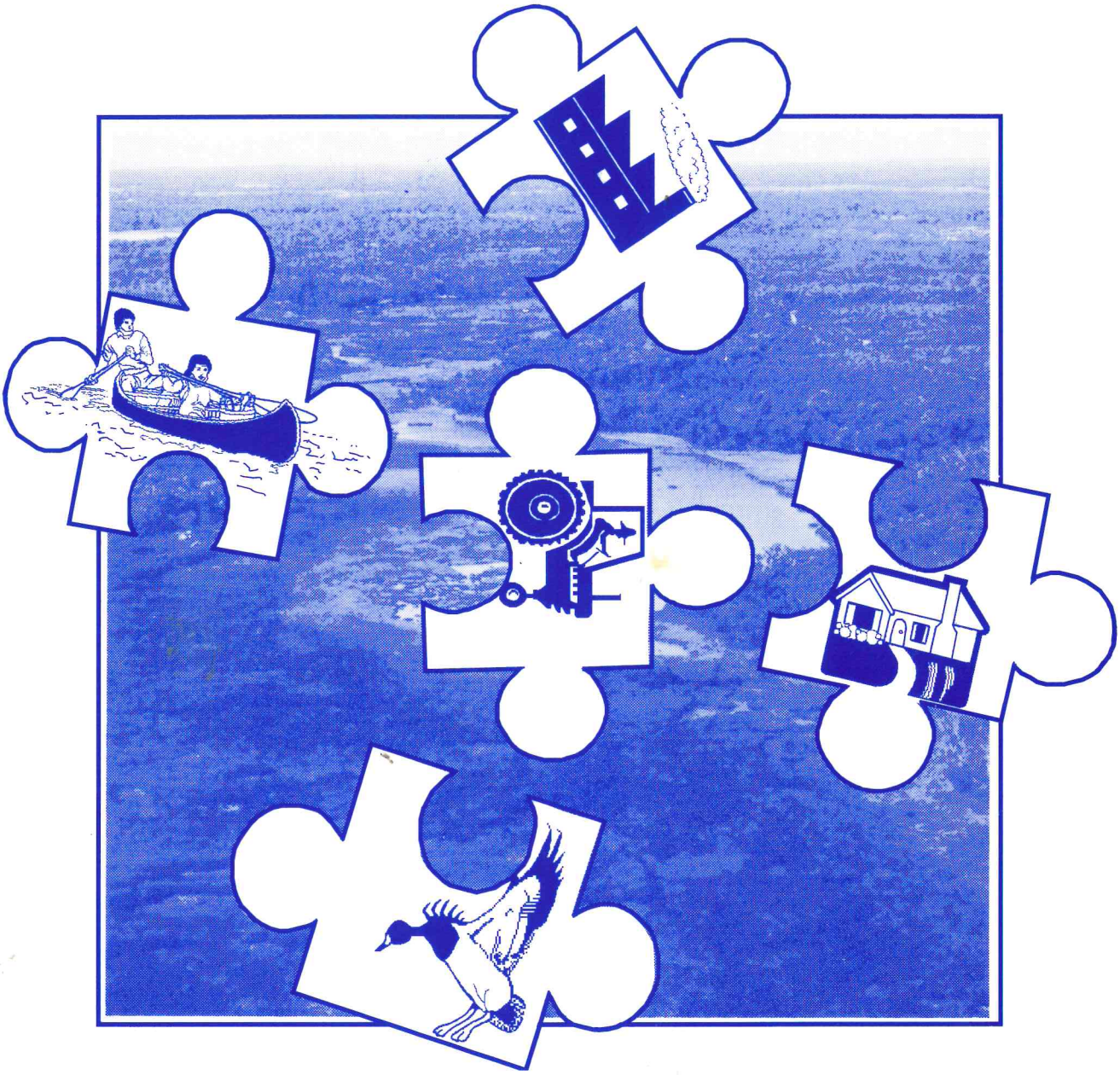
C. Nicholson

PLANNING AND MANAGEMENT

FOR WETLAND CONSERVATION



15 JUNE 1988

A CONFERENCE:

WETLANDS IN CRISIS

WHAT CAN LOCAL GOVERNMENT DO?

ABSTRACTS

"A contribution to the State Conservation Strategy"

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WETLAND CONSERVATION

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WHAT CAN LOCAL GOVERNMENT DO?

15 June 1988

Jointly Organised by

Murdoch University, School of Biological and

Environmental Sciences

and the

Western Australian Environmental Protection Authority

ABSTRACTS

A contribution to the State Conservation Strategy

PREFACE

The wetlands of the Swan Coastal Plain are a valuable part of our natural environment and possess considerable social, recreational and conservation value.

Urban development and agricultural activities are placing great stress on wetlands. The environmental quality of many wetlands is rapidly deteriorating.

This conference brings together various groups concerned with wetland management and research. Special emphasis is placed on the role of local government authorities who are responsible for managing many wetlands and for local planning and management decisions.

The conference papers and the problems and management solutions identified by the participants during the conference sessions will provide a major input to a booklet on Planning and Management for Wetland Conservation. The booklet is being produced by the Environmental Protection Authority to provide practical guidelines for local government authorities and others directly involved in urban planning and wetland management in Western Australia. Users will include planners, engineers, landscape architects and land managers.

The EPA is seeking viewpoints, information and ideas which would contribute to the booklet. If you have any comments, please contact:

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CONTENTS

THE VALUE OF WETLANDS

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Wetlands are lakes, swamps, tidal marshes and mudflats, estuaries, rivers and streams. The people of Perth are fortunate in having many wetlands nearby on the Swan Coastal Plain, despite the fact that 80% have been lost since European settlement due to filling and draining. However, increasing public appreciation of our wetlands can be expected to generate resistance to any further erosion of this natural asset.

Wetlands support an abundance of wildlife of which waterbirds are certainly the most spectacular. Over 80 species live on the Swan Coastal Plain wetlands for all or part of the year. The greatest numbers are seen during the summer when inland lakes become dry and the local population is further swollen with the arrival of transequatorial migratory birds. Many other flightless vertebrates also depend on wetland habitats.

Much of the wildlife seen at the wetlands results from a largely unseen mass of life beneath the water's surface. Small aquatic plants and animals comprise an intricate food web which sustains many waterbirds and other high order consumers. Not surprisingly, a number of rare and endangered species depend heavily on our remaining wetlands.

Individual wetlands vary enormously in their characteristics, but all are components of a total life support system. Waterbirds, for example, have very different feeding and breeding requirements, and very few of our wetlands provide for all their needs at the one time or throughout the year. Thus there is an ever-changing pattern of wetland use by waterbirds and it is misleading to consider some wetlands important and others not.

A range of wetland habitats is also needed to maintain genetic diversity within a species, so essential to its survival.

Australia has made specific commitments to conserve wetlands under the Ramsar Convention and the Japan Australia Migratory Bird Agreement. It is encumbent on us to give substance to these commitments. Wetlands are considered a valuable resource for education and recreation as well a wildlife.

The high commercial value of wetlands is reflected in real estate prices for views across water. Their value to the fishing industry is also considerable since estuarine shallows function as fish nurseries. For the tourist industry too, wetlands have great potential, judged from overseas experience.

The wealth we have inherited has been gained at considerable cost to the environment. If we now consider ourselves custodians of the wetlands, future generations will have something of greater value to inherit. To this end we must be prepared to make major commitments with a timescale extending well beyond the immediate future.

THE HISTORY AND TENURE OF WETLANDS

Jim Singleton,
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The history of perceptions, attitudes towards, and uses of wetlands in the Swan Coastal Plain goes back many thousands of years.

Aboriginal society made widespread use of wetlands for a long period prior to European settlement. Aborigines understood the wetlands, appreciated them and depended upon them. Wetlands provided water, abundant food, sacred sites and places of ritual. Aboriginal empathy, integration and spiritual attachment with nature extended to wetlands.

Early European settlers struggled to survive in what they often perceived as an alien and hostile environment. Wetlands were an obstruction to travel, difficult to alter and not generally viewed as visually pleasing. Yet they provided accessible water supplies and were soon recognised as suitable locations for cultivation of essential food.

As Western Australian society matured and grew, so did its appreciation and understanding of the local environment. While an aesthetic appreciation developed for locally distinctive landscapes such as wetlands, a utilitarian attitude generally prevailed. Such issues as drainage and flood control, health and the need for fertile productive soils dominated.

Latterly there has been enormous expansion of population and development on the coastal plain. We can now look back on a complex pattern of usage and change in wetlands. In recent years there has been an upsurge in interest, understanding and concern for wetlands. The way in which wetlands are perceived has radically altered.

Tenure of wetlands is correspondingly varied and complex. Possibly every variation of tenure and control could be found to apply to some wetland or other. This includes Crown Land, alienated land, combinations of both, single ownership, multiple ownership, control under many Acts including those governing water resources and land use development.

Tenure can be viewed as a tool for exerting control and rights over an exploitable resource. Tenure as it is applied to wetlands is in this sense the end product of cultural practices, societal perception of the environment, society's technological capacity, and society's exploitive tendencies and preferences.

PROBLEMS: CAUSES, CONSEQUENCES AND CORRECTIVES

Bob Humphries
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and
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The most obvious problems of Perth's urban and near-urban wetlands are caused by the excessive availability of the major plant nutrients, phosphorus and nitrogen.

Such excessive nutrient availability results in a variety of symptoms, including:

- algal blooms, with consequent shoreline fouling and decomposition odours;
- excessive growths of water weeds including the rush *Typha* spp.;
- plagues of non-biting midges, and in some cases mosquitoes;
- waterfowl deaths; and
- loss of valuable wetland habitat, wetland biota and aesthetic and recreational value for people.

In addition to excess nutrients, wetlands may be damaged by altered water regimes, inflow of polluted ground and surface waters, including urban and road runoff, rubbish tip leachate, agricultural drainage waters, and inadvertant chemical spills, and by deliberate application of pesticides, filling, modification or alienation. Most of the above problems result from ignorance of wetland processes, and ignorance of the consequences of altering these processes.

The consequences of such deleterious changes are diverse, and include:

- diminished environmental quality and reduction of public amenity;
- loss of wildlife habitat at local and regional scales;
- complaints to local and state government authorities, and sometimes political agitation for remedial action;
- administrative and technical difficulties in managing wetlands; and
- high public costs of wetland restoration and on-going management.

The solutions to these problems are not easy, and in some cases management may not be technically possible. However, much can be done, including:

- reduce nutrient inputs to wetlands, reduce nutrient storage within wetlands or increase nutrient export from wetlands;
- develop biologically "soft" pest control measures, and minimise pesticide applications;
- develop better urban design and drainage strategies;
- instigate better land-use planning and management practices;
- continue investigation of cost-effective technical remedies for damaged wetlands;
- engender public awareness of, responsibility for and participation in wetland management; and
- confront and deal with the administrative and financial constraints to good wetland management, and clarify the definitions of responsibility for wetland management.

WETLAND FUNCTION

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The shallow permanent and seasonal wetlands of the Swan Coastal Plain are surface expressions of the underlying groundwater and water levels vary with the height of the water table.

Groundwater is an important water resource in the Perth region and the wetlands are part of this resource. The wetlands are also valued for wildlife conservation and as areas of open space within the city. A knowledge of wetland function and wetland processes is vital for the appropriate management of Perth's wetlands.

The wetlands are areas of high biological productivity and directly or indirectly support most of the wildlife of the Swan Coastal Plain. Their importance for wildlife conservation also extends beyond the coastal plain as they are visited by migratory wading birds from the northern hemisphere and by water-birds which move to the coastal area when inland water bodies dry during summer.

Wetland plant communities are central to all wetland processes. They provide a range of habitats for aquatic and terrestrial fauna and constitute the primary production that is the basis of all wetland food-webs. Waterbirds are the most conspicuous members of wetland foodwebs but aquatic macroinvertebrates are also important and responsible for a significant proportion of the secondary production occurring in wetlands. The macroinvertebrate fauna forms two interconnected wetland food chains: a grazing food chain and a detrital food chain.

Excessive nutrient enrichment or eutrophication is a major problem in many urban wetlands and the presence of excess nutrients results in greatly altered food webs. Massive algal blooms occur in spring and summer with attendant odour problems and bird deaths. Detrital food chains are enhanced by the presence of increased organic matter (which results when the algal blooms decay) and the result may often be the occurrence of nuisance swarms of midges. Pesticides and exotic fauna (in particular the mosquito fish, *Gambusia affinis)* may also serve to indirectly reduce water quality through alterations to invertebrate food chains.

Too much or too little water also disrupts wetland ecosystems. Because they are shallow waterbodies (depth <3m), long-term changes in watertable elevation from the normal seasonal variations may present a serious stress to wetland ecosystems. Successive dry years and overpumping of groundwater may result in some wetlands having too little water to support aquatic flora and fauna. Other wetlands may receive too much water from increased urban runoff, leading to increased depth and a loss of seasonality.

Wetland ecosystems appear to be quite resilient. Much of the flora and fauna is adapted to withstand the stresses of drying and filling and many mechanisms for recolonizing waterbodies appear to exist. These factors indicate that degraded wetlands with poor water quality can be rehabilitated with appropriate catchment and in-lake management. However it is important that all the possible effects of a management action on wetland processes are known, and considered acceptable, before any action is undertaken.

WETLANDS - A MANAGEMENT PERSPECTIVE

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and
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The responsibility for the management of most wetlands of the Swan Coastal Plain rests with local government. The responsibility is not matched by adequate funding resources.

In the past, local government has used wetlands for purposes such as waste disposal and drainage disposal. Greater realisation of the conservation value of wetlands is now acknowledged. However urban development around wetland areas requires a balanced assessment of the competing demands placed on wetlands.

From a local government viewpoint, competing demands include stormwater disposal, recreational use, conservation and preservation, appearance, and safety and comfort needs of adjacent residents.

Urban development abutting wetlands results in demands on local government for action to overcome resident complaints on matters such as odours, midges, rubbish, safety and appearance.

The provision of an adequate buffer between urban development and wetlands substantially reduces this pressure. However, costs are involved in setting aside buffer areas. There is a need to identify these costs as a basis for making proper management decisions.

Wetlands in Special Rural Zone environments have given local government very few problems. The impact on the wetland from the development is minimal with few demands being placed on local government.

The type of management given to a wetland area is a function of the surrounding development. If conservation of a wetland area is deemed desirable from a regional perspective, funding for its protection must be a regional cost imposed on all the community, not just the local authority in which the wetland is situated.

Local government is well equipped to determine the correct management procedures to be adopted for any given wetland area. Local government must be involved in the planning processes that determine the uses of wetland areas within its boundaries.

MANAGEMENT OF WATER RESOURCES

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One of the Water Authority's primary corporate objectives is:

"To conserve, assess and efficiently manage the State's water resources for the continuing benefit of the community."

In the past, this has been largely achieved through the proclamation of water resource management areas. This provides the Water Authority with a statutory mechanism to ensure that activities in proclaimed areas do not degrade the quantity and quality of water and to enable the equitable allocation of the resource between public and private users. To a large extent, the proclamation of water resource management areas has also allowed for protection of the environment.

The objective of protecting areas of the environment became much more overt with the proclamation of the Wanneroo Groundwater Area in 1982. This was undertaken specifically to protect the valuable wetlands in the area. Acceptable wetland water levels are the major determinant in setting the availability of the groundwater for public and private use.

In March 1988, the Minister for Environment set a number of conditions on the next phase in the development and management of the Gnangara Mound groundwater resources. The conditions are founded on ensuring adequate protection and management of wetlands. The EPA has indicated that the Water Authority has the role of "total water resource manager". Where this management impinges on the environment, such as with wetlands, the Authority must also manage that environment to meet specific criteria.

Existing criteria for the protection of wetlands are fairly rudimentary. There is a real challenge to develop better water level and quality criteria which more effectively protect the valued attributes of wetlands. A number of research projects are being initiated to address this problem.

The recommendations of the Perth Urban Water Balance Study, if implemented by Government, will further facilitate the protection of wetlands, particularly those in urban areas.

CATCHMENT MANAGEMENT AND IN-LAKE SOLUTIONS

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Waterbodies, be they wetlands, lakes, rivers or estuaries, can be changed by direct modification or by alterations in drainage from somewhere in the catchment. Changes to drainage may increase or decrease the amount of water flowing in, alter discharge patterns or decrease water quality.

Nearly all problems arising from these changes require a package of management options involving both the waterbody and its catchment. There is rarely a single or easy solution.

This paper outlines a systematic approach to developing a strategy for managing water quality problems. The approach is based on an understanding of the problem, the waterbody and its catchment. It is, however, not reliant upon a 'complete' knowledge of the environment, as this is a luxury nobody can afford.

Having described the waterbody and its problem, a 'suitable' suite of management options is selected, evaluated and modified to suit the particular case.

The types of management actions contemplated could include:

- manage drainage to control volume discharged;
- treat polluted drainage water;
- create artificial wetland filters;
- treat point sources of pollution (e.g. factories);
- manage non-point sources of pollution (e.g. fertilizer use);
- change land-use;
- harvest weeds;
- remove sediments;
- inactivate sediment nutrients.

The process of evaluation is guided by the level of improvement sought to achieve desired beneficial uses, cost, social impacts and feasibility in relation to existing land and water uses.

Once a decision is made on appropriate management actions, an adaptive management strategy is implemented. This involves monitoring, evaluation and adjustment of management actions as necessary to effect the desired improvements.

REGIONAL PLANNING

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The value of wetlands to the urban and rural environment is accepted by the community and local government, particularly along the Swan Coastal Plain but also elsewhere in Western Australia.

The means available to protect these wetlands and ensure their use as areas of natural habitat, untouched ecosystems, and urban leisure areas lie primarily with the State Planning Commission in the first instance. Regional Plans can identify areas for protection and reservation and can co-ordinate the locations of various activities and transportation links to avoid those protected areas.

Regional planning is not new in Western Australia. The Metropolitan Region Scheme, as a Statutory Plan, dates back to 1963. Other regional plans, although not statutory, relate to places like Bunbury, Shark Bay and the Leeuwin-Naturaliste area.

Regional plans form the basic framework within which local government can undertake detailed planning, and other instrumentalities can co-ordinate activities such as catchment management, forestry and agricultural uses.

WETLANDS AND LOCAL PLANNING

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The City of Cockburn contains a significant number of formal and informal wetlands.The formal wetlands are those clearly defined in two western and eastern linear chains. The western chain comprises Manning Lake and Lake Coogee and the eastern chain includes Bibra Lake, Yangebup Lake and Thomsons Lake.The informal wetlands are characterised by those areas of high watertable confined to the south-eastern sector of the district.

The wetlands have a significant influence on the development and land-use patterns of the area.

Wetlands should be retained where possible in an endeavour to preserve remnants of the natural environment within urban areas. At the same time, however, wetlands within an urban setting should perform a drainage, recreational and aesthetic function. It is difficult to see how wetlands in this situation can be retained in their natural state.

The Council has had experience in dealing with wetland issues in respect to urban and rural development. This has resulted in the adoption of scheme provisions, the formulation of policies and the establishment of, and involvement in, steering committees.

The significant wetlands in the City of Cockburn are not in crisis based on the protection that is likely to be afforded to the formal wetlands as a result of the System 6 recommendations and the Beeliar Regional Park proposals. However, the informal wetlands which are located mainly within rural land are subject to development pressures.

There are a number of actions local government authorities can take to conserve and protect significant wetlands:

(1) Recognise the importance of wetlands to their district.

(2) Identify wetlands that are or will be under development pressure and attempt to determine their ultimate function and value to the community.

(3) Make provisions in their Town Planning Schemes.

(4) Define conservation precincts.

(5) Pass preservation or conservation resolutions.

(6) Formulate policies.

(7) Establish steering committees.

In conclusion, planning is by nature a process of compromises. The planning and development of wetland areas is no exception.

It is important that wetland conservation, development, community values and expectations are brought together to ensure that the environment on which we depend for our survival and wellbeing is not lost to development and that the development on which we rely for our living is not minimised by the need to preserve the natural environment.

The key to this complex issue is to apply solutions which allow for wetlands and urban areas to coexist in a mutually beneficial relationship.

THE NEED FOR MANAGEMENT PLANS

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Most reserves in Western Australia are subject to management action in various forms. Individual problems are sometimes seen in isolation, using a specific information base in a local context, with little or no public input. The result is that solving one problem sometimes causes other problems. A management plan provides a broader framework within which these problems can be solved. It should provide an integrated summary of the resources of a reserve, how it works, how it fits into a regional framework, and how people feel about it. It defines objectives for future management, and provides co-ordinated guidelines for management of the reserve.

Management plans must be acceptable to the local community, if they are to be successful. Close liaison with the public, interest groups, local and State government is necessary. In addition, the implementation of the proposals must be monitored, and if necessary changed, to ensure that they achieve the desired objectives.

PUBLIC PARTICIPATION IN WETLAND MANAGEMENT : THE ROLE OF LOCAL GOVERNMENT

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In a recent study of public attitudes towards groundwater and wetlands in the Jandakot area, we found a great deal of interest and knowledge about local wetland issues. Wetland conservation was regarded as a highly salient issue and received much support. We also noted that there was some confusion as to the alternative roles of the various State government planning authorities in wetland management. Of significance to this seminar, local government was nominated by slightly over a quarter of our respondents as a preferred source of information about wetland management.

In this paper, we describe attempts by twelve local government authorities to involve the public in wetlands planning and management. The commitment to public participation varied, apparently depending upon the strength of the local public comment. Most local governments have restricted public input to submissions on management plans or occasional public meetings. Those Councils experiencing some degree of concerted wetlands conservation action by their residents have moved to formalise relationships with active interest groups. This is usually in the form of on-going committees incorporating State and local government representatives as well as members of local community groups. These committees may provide a useful basis for on-going participation.

HOW TO PREPARE A MANAGEMENT PLAN

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What should a management plan include? This varies greatly depending on the land, its management problems and community concerns. However, all should include the following:

- management objectives;
- resource information (e.g. plants, animals, level and type of public use, educational values);
- management strategies or actions;
- implementation.

Who prepares management plans? One approach is to get existing management staff to use part of their time to prepare management plans. This rarely works as most management staff are fully committed to existing programs. Other approaches are to employ consultants, or use students or community groups. Each has its advantages and disadvantages.

How long should it take to prepare a management plan? This varies greatly depending on the size of the reserve, complexity of management problems, level of public involvement and amount of staff time committed to the project. Generally, plans take 6 to 12 months to prepare. Public involvement is important as it helps to achieve community acceptance.

Why is implementation important? Plans are of limited use unless they are implemented. Plans can become out-of-date so it is important that they have a limited term, for example 5 to 10 years. Once they expire they should be reviewed and a new plan prepared.

Management plans will not succeed if they are produced as an isolated event. Their preparation and implementation must be closely interwoven with a particular agency's functions, resources, policies and practices.