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Research opportunities

WETLAND RESEARCH IN THE WET-DRY TROPICS

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ABSTRACT

Wetland research in the wet-dry tropics of Australia has produced a valuable but uneven amount of information suitable for management purposes. At ***eriss*** *we propose to develop a wetland research program that addresses the gaps or inadequacies in past wetland research effort and assists managers, users and owners of wetlands to manage them in a sustainable manner. Habitats that will be covered by this research include streams, floodplains, billabongs, mangroves, salt flats and estuaries. We propose to undertake research to assist with classification and inventory of wetlands, including the important processes that enable the ecological character of a wetland to be maintained, assess the extent of threats and risks to wetland values, and develop suitable monitoring techniques and programs. This research will be done under the following three general headings: description of the ecological character of wetlands; risk assessment and restoration of wetlands; and monitoring of ecological change.*

Keywords: Tropical wetlands, Ramsar Convention, monitoring, inventory, classification

1 Introduction

The Environmental Research Institute of the Supervising Scientist (***eriss***) has embarked on a research program for the protection and management of wetlands in tropical Australia, particularly those in the wet-dry tropics. In a general sense the ecological character of these wetlands has been described and the major threats or management problems identified (see reviews by Finlayson et al 1988, 1991 and Finlayson & von Oertzen 1992). However, these reviews and more recent reports (see for example Finlayson et al 1994, Jonauskus, in press) have also identified major gaps in our knowledge on basic ecological processes and threats to wetlands and, in the more isolated areas, even the character of the wetlands. The inadequate and uneven information base for wetlands in northern Australia makes it extremely difficult to manage individual wetlands or threats let alone place these within the context of state/territory or national conservation priorities.

In recent years a major international effort has resulted in guidelines for the wise use and conservation of wetlands (Davis 1993). This effort not only reflects a growing international awareness of the value of wetlands, but also an awareness of the alarming rate of wetland loss and degradation. Comprehensive information on the extent of wetland loss and degradation in the wet-dry tropics of Australia is not available. However, given the relatively low population density across Australia's wet-dry tropics there is every expectation that much of what we value in our wetlands is either still intact or not irrevocably degraded.

Over the past 15 years research undertaken by ***eriss*** has been partly directed towards the protection of wetlands located near the uranium mines in the Alligator Rivers Region. This research has provided a valuable information resource for the Alligator Rivers Region and, by

implication, to other wetlands in tropical Australia. The scope of this research has now been broadened to directly include other wetlands and wetland management issues from across the wet-dry tropics of northern Australia. In this manner ***eriss*** can further assist wetland managers, owners and users by providing data and information to underpin strategies that ensure the protection and sustainable utilisation of these valuable wetland resources.

2 The wet-dry tropics

The wet-dry tropics of the world comprise about one quarter of the land mass that is generally referred to as being tropical (Ridpath 1985). Landsberg et al (1966) defined the wet-dry tropics as those areas with an annual rainfall of 600-1600 mm spread over 4-7 months. Within the Australian context this corresponds to the northernmost parts of the continent with a south-eastern extension along the western side of the Great Dividing Range (figure 1). More recent efforts to divide Australia into biogeographical regions (Thackway & Cresswell 1995) could well provide a further breakdown of this region if required.

In a general sense we propose to undertake research for the protection and management of wetlands in northern Australia with a particular emphasis on those in the wet-dry tropics. Noting that the northern or tropical part of Australia does not comprise a single biological region and is indeed, very diverse, we will, on occasions and where practicable, undertake research across the tropical region of Australia. We will endeavour to maximise our resources and concentrate our efforts on those wetland habitats near our base in the Alligator Rivers Region and extrapolate our findings to other sites. However, we acknowledge that this may not always be possible and it may be necessary to extend our research across the broader reaches of tropical Australia.

3 Wetland types

The Ramsar Convention for Internationally Important Wetlands defines wetlands as '*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 does not exceed six metres*'. This definition has attracted a large amount of debate and dissatisfaction within Australia (see McComb & Lake 1988) and internationally (see Finlayson & van der Valk 1995). However, given that definitions are derived for specific purposes and that the Ramsar definition is purposefully broad it has been generally more accepted in recent years both within Australia and internationally with deliberate modification for specific purposes (Finlayson & van der Valk 1995).

In determining which habitats we should target in the wet-dry tropics we have adopted the broad-based Ramsar definition of wetlands. We have also taken note of calls for wetland protection and management to be conducted on a catchment and holistic basis. Thus, we have chosen to include the following habitats within our research program: perennial and seasonally flowing escarpment streams, waterfalls and plunge pools, lowland perennial and seasonally flowing streams, permanent billabongs or lagoons in stream channels, seasonally inundated plains (flood basins as well as plains), estuaries and tidal reaches of streams (including seagrass beds), and mangroves and salt flats. This is a broad spectrum of habitats and we do not propose to treat them equally, but we also do not propose to deliberately ignore any.

4 Information needed for wetland protection and management

In recent years more and more attention has been directed towards ecologically sustainable development of natural resources and the maintenance of biodiversity. This has culminated in a number of national policies that have direct relevance for the protection and management of wetlands in tropical Australia. These include the *National Strategy for Ecologically Sustainable Development* (Commonwealth of Australia 1992), the *National Strategy for the Conservation of Australia's Biological Diversity* (Anon 1994) and the *Endangered Species Protection Act* (Commonwealth of Australia 1994). These policies provide a strong philosophical base to underpin the research that is needed to ensure that the goals and objectives of the policies can be achieved. We have adopted the philosophical base of these national policies along with the Wise Use provisions of the Ramsar Convention (Davis 1993, Finlayson, in press) as the basic building blocks for our wetland research program.

In line with international consideration of information needs (Dugan 1990, Finlayson, in press) we have chosen to address the following broad topics: management planning, classification, inventory and monitoring. The topics themselves are not new, but what do they actually encompass? By addressing these particular topics we expect to develop a research program that can underpin the various conservation strategies that affect wetlands in the wet-dry tropics.

4.1 Management planning

The development of a management plan is the basic starting point for ensuring the protection and management of any habitat. The plan provides the means of linking goals and objectives with specific actions. The Ramsar Convention has produced general guidelines for developing management plans (Ramsar Convention Bureau 1993) and provided the following rationale for such plans: '*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.*' The Ramsar document also points out that management planning is a flexible and dynamic way of thinking and contains three basic steps - describing, defining objectives and taking necessary actions. This 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. How far do you have to look to find examples of these pitfalls?

4.2 Classification

The classification of wetlands is beset with difficulties and often consumes an inordinate amount of time and effort (Finlayson & van der Valk 1995). When considering wetland classification the purpose of the process must be clearly recognised and an appropriate scheme adopted. A summary of approaches taken for wetland classification at the national and international levels can be found in Finlayson and van der Valk (1995b). These authors stress that classification should be used to promote unity of purpose and not serve as a dampener to further innovation and management; classification is only a tool for conservation and should not become a time consuming obstacle. The important point in classifying wetlands is not the detail of the classification, but the usefulness of the classification for management purposes.

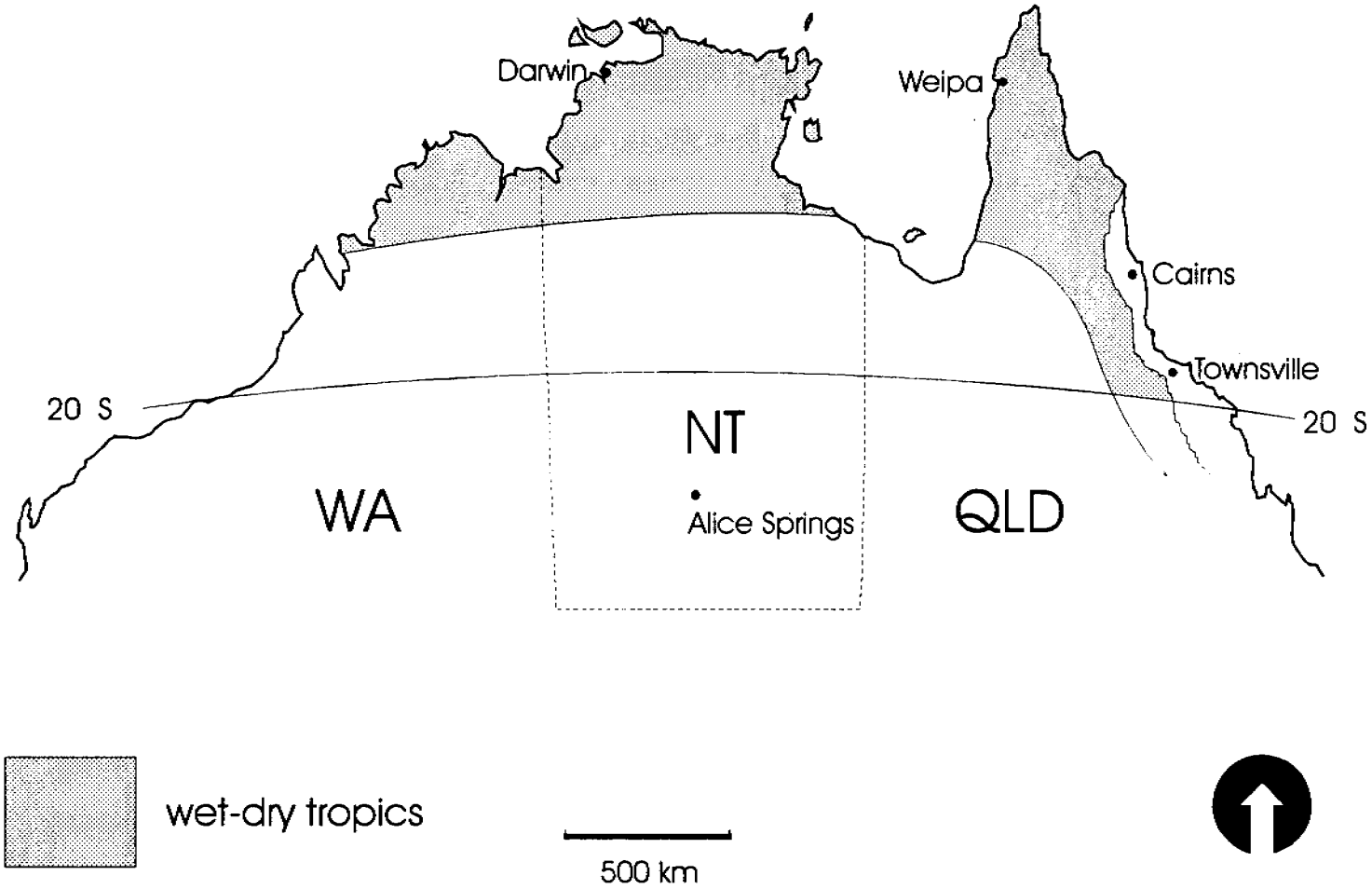

Figure 1 Northern Australia showing the wet-dry tropics

4.3 Inventory

Much of the information required for wetland management can be collected in a directory or inventory of wetlands. A directory and an inventory are used to compile the same type of information, but the former is limited to current information and is generally not comprehensive. This is an important distinction that often gets overlooked in the enthusiasm of producing a new directory volume that is, in reality, outdated at the moment it is published. An inventory includes investigative steps to obtain more information and thereby presents a comprehensive coverage of sites. Thus, a directory may often be the precursor of an inventory.

Wetland inventories are nowadays regarded as a necessary prerequisite for wetland conservation and management at a holistic level as they provide the information base for planning and decision making (Dugan 1990; Hollis et al 1992). They can assist in the identification of conservation priorities, establish the basis for monitoring the ecological character of wetlands, promote awareness of wetland sites and management issues, and facilitate exchange of information and comparisons between sites and regions.

The usefulness of inventories can quickly diminish if they are not regularly updated. To enable rapid updating the data/information should be stored in a centralised location and be easily accessible through standardised or interchangeable computerised formats. Even when inventories are available they may only be of limited usefulness, particularly if the information is not comprehensive or is restricted in scope and coverage, or is not brought to the attention of government officials responsible for setting policies that affect wetlands.

Techniques used in wetland inventories vary (see papers in Finlayson and van der Valk 1995b, in press b) from basic field and literature surveys to highly sophisticated technological approaches using aerial photography and satellite imagery. 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. Thus, they must be framed in a manner suitable for management purposes.

4.4 Monitoring

The adequacy of techniques for monitoring of aquatic and wetland habitats has received a great deal of attention in recent years (eg Maher & Norris 1990, Moser et al 1994). This attention has arisen as the awareness of the extent of degradation has increased. However, guidelines that can be used to determine what constitutes unacceptable (ecological) change in wetlands do not exist.

Before an effective monitoring program can be implemented the objectives of the program must be clearly identified and agreed. Any deficiency in the objectives will influence all other components of the program. Before the objectives of a monitoring program can be finalised it goes without saying that the purpose of the program should be determined. Equally important, but less frequently done, the processes for utilising and interpreting the data need to be agreed. In other words, will the processes for providing the data be appropriate for the decisions that will need to be taken? Will the data be compatible with other data to be used in the decision making process? It is also important to reiterate that the data must be available in sufficient time for management decisions to be discussed and agreed.

Monitoring techniques for detecting ecological change in aquatic/wetland habitats exist and are being used in different parts of the world (see papers in Moser et al 1994). Many factors influence the choice of an appropriate technique, but it needs to be reiterated that the technique(s) chosen must be able to satisfy the objective(s) of the monitoring program. The

technique is the tool by which the objective is achieved. In most circumstances a suite of techniques may be required.

With all monitoring techniques there is a need to establish a starting point or to obtain baseline data. Changes in ecological character need to be related to a baseline that identifies the key functions and values of the site. Thus, the functions and values of a particular site need to be defined and a baseline established. It is critically important to emphasise that establishing the baseline is an essential prerequisite for a monitoring program; ecological change cannot be quantified without a basis for comparison to control sites.

5 *eriss* research

In many instances the information base required for wetland management is simply not available. Research is required to fill this gap. At ***eriss*** we propose to conduct research on wetland processes, functions, attributes and values in line with internationally recognised procedures. Thus, we propose the following general goal

> *To conduct research and provide information for the conservation and sustainable development of wetlands in tropical Australia.*

But, how should we organise this research to maximise the return from our investment? As a starting point we propose to rigorously assess the status of information collected in the past, and where necessary, ensure that it is made available, along with new information, to both the wetland scientific and management communities. Thus, the program will need to be multi-disciplinary and holistic and provide information to wetland managers in a manner that they can effectively utilise. We cannot easily achieve the above goal by developing excellence in acquiring information without also developing excellence in transferring the information to wetland managers.

As we do not know of any appropriate models for wetland research of this nature we have proposed our own (figure 2) as a starting point for further discussion and development. The model contains three broad topics that are linked by the premises of describing and monitoring, and where necessary, restoring the ecological character (or health) of wetlands in the wet-dry tropics.

- Description of the ecological character of wetlands
  - develop wetland survey and inventory techniques
  - identify and quantify wetland processes, functions and values
  - develop data management systems for wetland managers
- Risk assessment and restoration of wetlands
  - assess the extent of ecological change in wetlands
  - develop standards for maintaining wetland processes and functions
  - develop procedures for restoring degraded wetlands and to replace lost wetlands
- Monitoring ecological change in wetlands
  - develop techniques for monitoring ecological change in wetlands
  - assess the significance of ecological change in wetlands
  - assess the effectiveness of strategies to restore or create wetlands

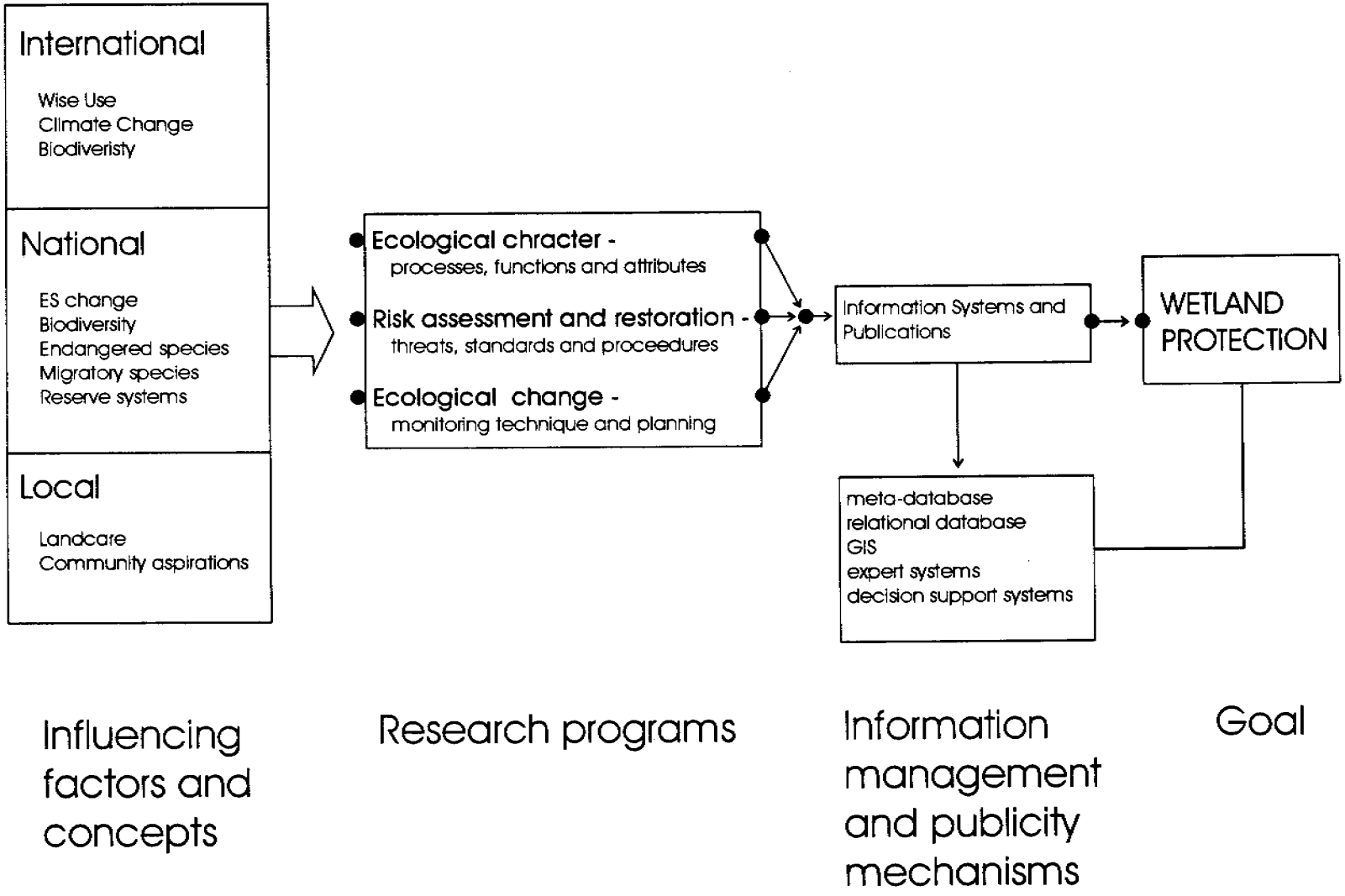

Figure 2 Schematic representation of a proposed wetland research program

We recognise that these topics are not independent, and indeed, that they overlap. We also recognise that to achieve the above goal partnerships with other agencies and individuals are essential. ***eriss*** is keen to develop partnerships and demonstrate that research can play a much greater direct role in ensuring that wetlands are protected and managed in accordance with the principles that underpin modern conservation ethics. We would like your advice on how we can best contribute to this hitherto seemingly evasive target.

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