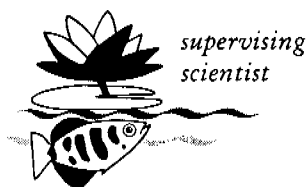


**Wetland research
in the wet-dry tropics
of Australia**



**Workshop
Jabiru NT 22-24 March 1995**

Edited by CM Finlayson



**Land & Water
Resources**
Research &
Development
Corporation

This Proceedings is a publication by the Supervising Scientist

© Commonwealth of Australia 1995

Supervising Scientist

Tourism House, 40 Blackall Street, Barton ACT 2600 Australia

ISSN 1325-1554

ISBN 0 642 24300 X

This work is copyright. Apart from any use as permitted under the Copyright Act 1968, no part may be reproduced by any process without prior written permission from the Supervising Scientist. Requests and inquiries concerning reproduction and rights should be addressed to the Research Project Officer, ERISS, Locked Bag 2 Jabiru NT 0886.

Individual papers are the responsibility of the authors. Views expressed by authors do not necessarily reflect the views and policies of the Supervising Scientist, the Commonwealth Government, or any collaborating organisation.

Printed in Darwin by NTUniprint.

Foreword

Over the past 15 years, staff of the Environmental Research Institute of the Supervising Scientist (*eriss*) have undertaken extensive research on the biology, chemistry and physical processes of the streams, billabongs and floodplains within the Alligator Rivers Region, including Kakadu National Park. This work was directed at understanding the impact that could arise from mining in the region and developing standards, practices and procedures for the protection of the environment from the effects of mining.

Following recent legislative changes and a review of the direction and priorities of future research at *eriss*, we are now extending this research to include other wetland management issues in the wet-dry tropics. We want to use our knowledge and expertise to assist organisations such as the Australian Nature Conservation Agency and the Conservation Commission of the Northern Territory in solving problems that arise in the management of wetlands. In this way we will play our part in ensuring that these extremely important components of the environment of northern Australia are afforded the protection that they deserve.

To assist us in the development of this new program, we held a workshop in Jabiru, Northern Territory, from 22–24 March 1995 on 'Wetland research in the wet-dry tropics of Australia'. The workshop provided a forum for the exchange of information on the key issues and priority research areas. We were delighted to welcome more than 100 participants representing the users, managers, and owners of wetlands of northern Australia as well as research scientists with a broad range of experience in the study of wetlands. Topics that were addressed in both the formal papers and the discussion sessions included baseline information on wetlands, assessment of ecological character, threats to the integrity of wetlands, and how to monitor ecological change. These Proceedings contain the papers presented at the workshop.

I would like to thank all the participants at the workshop for sharing with us their knowledge and expertise; they have been of great assistance in determining the structure and content of our wetlands program. I look forward to continuing cooperation and collaboration as our program develops over the next few years.

DR A JOHNSTON,
DIRECTOR, *eriss*

Acknowledgments

The *eriss* wetland workshop was acknowledged by many participants as not just being well organised, but extremely well organised and fun to attend. Many people helped to make the workshop a success and richly deserve a large vote of gratitude. Stephanie Hunt started the ball rolling and was ably backed up by Denise Lawson with support from Helen Waterson, Gail Barrowcliff and Daryl Lehmann from the *eriss* administrative support unit. Abbie Spiers, David Norton, Ben Bayliss and James Boyden from the Wetland Protection and Management Section ably undertook other logistical tasks with extra support from Andy Ralph, Bruce Ryan and Tony Mount from *eriss*, student Bill McFarlane and volunteer MariaGrazia Bellio. The papers were collated and checked by Deirdre Bull, MariaGrazia Bellio and Gail Barrowcliff before being presented to Jenny Taylor for publication with assistance from Ben Bayliss. LWRRDC kindly made a financial contribution towards the cost of the proceedings and this is acknowledged by including their logo. Then we have the participants, the speakers, the chairpeople and discussion group leaders who kept the program rolling. Thank you, it was an enjoyable and a valuable experience and I feel that wetlands in this lovely part of Australia will be better off because of your combined efforts.

MAX FINLAYSON

Contents

Foreword	iii
<i>B Carbon</i>	
Opening address	viii
1 Research opportunities	
<i>CM Finlayson</i>	
Wetland research in the wet-dry tropics	3
2 Wetlands in Kakadu National Park	
<i>P Wellings</i>	
Wetlands in Kakadu National Park: the management setting	15
<i>G Lindner</i>	
Wetland management issues in Kakadu National Park	23
3 Wetland management, processes and functions	
<i>R James and B Phillips</i>	
Ramsar's future directions	35
<i>D Mitchell, A Chick and G Raisin</i>	
Quantifying the role of wetlands in catchment nutrient dynamics	41
<i>PC Gehrke</i>	
Fisheries research and management in the Murray-Darling River system: some lessons for the wet-dry tropics	50
<i>RWJ Pidgeon and CL Humphrey</i>	
The ecology of freshwater ecosystems in the Alligator Rivers Region: current status of knowledge and information needs for future management	56
<i>R Griffin</i>	
Wetland habitats and barramundi	64
<i>MM Douglas, PS Lake, KA McGuinness</i>	
Fire management in tropical savanna: the effects on stream biota	69
<i>G Graham and R Gueho</i>	
Wetland management and protection in the Kimberley	74
<i>I Fulton</i>	
Multiple use on the lower Mary River wetlands	80
<i>GP Lukacs</i>	
Wetlands of the Lower Burdekin Region, North Queensland	86

4 Wetland inventory, survey and assessment

LL Hess and JM Melack

- Delineation of inundated area and vegetation in wetlands with synthetic aperture radar 95

M Imhoff, T Sisk, A Milne, G Morgan and T Orr

- Remotely sensed indicators of habitat heterogeneity and biological diversity: A preliminary report 104

EJ Hegerl

- Smart information systems: Current evolutionary trends for wetlands database creationists 110

JG Blackman, SJ Gardiner and MG Morgan

- Framework for biogeographic inventory, assessment, planning and management of wetland systems: the Queensland approach 114

CA Semeniuk and V Semeniuk

- Geomorphic approach to classifying wetlands in tropical north Australia 123

R Jaensch, P Whitehead and R Chatto

- Conservation of waterbirds in tropical wetlands of the Northern Territory 129

5 Wetland management issues and threats

P McBride

- Can Ecologically Sustainable Development (ESD) help the Magela wetlands? 141

J Christopherson

- Indigenous people and science 146

PH Woods

- Historical physico-chemical water quality data for some wetlands of the Alligator Rivers Region, Northern Territory 149

BN Noller

- The role of wetlands in controlling contaminant dispersion from mine waste waters 161

H Nisbet

- Wetland filtration research at ERA Ranger Mine 165

RA Alford, MP Cohen, MR Crossland, MN Hearnden and L Schwarzkopf

- Population biology of *Bufo marinus* in northern Australia 173

MJ Storrs and WM Lonsdale

- Developing a weed management strategy for a conservation area 182

IL Miller and CG Wilson

- Weed threats to Northern Territory wetlands 190

GC Schultz and PH Barrow

- The control of *Mimosa pigra* on the Oenpelli floodplains 196

<i>G Cook and S Setterfield</i>	
Ecosystem dynamics and the management of environmental weeds in wetlands	200
<i>J Clarkson</i>	
Ponded pastures: A threat to wetland biodiversity	206
<i>I Butterworth</i>	
A review of Northern Territory wetland rainfall: Current and projected	212
<i>P Waterman</i>	
Assessing the vulnerability of the coastlines of the wet-dry tropics to natural and human induced changes	218
6 Monitoring ecological change in wetlands	
<i>JR Hanley</i>	
Quantitative assessment of mangrove invertebrate fauna	229
<i>CL Humphrey and RWJ Pidgeon</i>	
Some considerations and requirements for monitoring and assessment programs for freshwater ecosystems of northern Australia	235
<i>D Baird, CM Finlayson and C Camilleri</i>	
Ecological impact of contaminants on wetlands: Towards a relevant method of risk assessment	242
<i>SJ Markich</i>	
Behavioural responses of the tropical freshwater bivalve <i>Velesunio angasi</i> exposed to uranium	247
7 Wetland conservation	
<i>MA Brock</i>	
Will ecosystem-level conservation protect wetland biodiversity?	261
<i>SE Bunn and PM Davies</i>	
The LWRRDC National Riparian Program: Research issues and opportunities for the wet-dry tropics	266
<i>PS Lake</i>	
Wetlands research and management in the wet-dry tropics - some thoughts on ecological patterns and processes	271
8 Workshop overview	
<i>D Mitchell</i>	
Workshop overview	279
List of registered participants	282

Opening address

Congratulations for coming—all of you. Congratulations to Arthur Johnston and his staff, Max Finlayson particularly on organising it. I am extremely excited about the number and calibre of people that we have here. Congratulations of course for coming to the brilliant surroundings in this great place. I am sure that like me you feel turned-on to be in Kakadu. Some of you live here, others like me are visiting at the end of the wet to talk about wetlands, and after some months which have been '1-in-100' rainfall, I think it is an exciting time to be here.

Fellow scientists, kindred spirits—Welcome.

Why Wetlands? Why the Environmental Institute of the Supervising Scientist and Wetlands? Well, we think that Australian people put the Supervising Scientist here for three reasons; firstly to be policeman, security blanket, watchdog, researcher looking after and looking over the shoulder of uranium mining in the Top End. We do that and I think we do it pretty well. We provide the honest broker and the security blanket to say if mining is okay or if mining is not okay. I would like to think in the last month that we have reinforced our value in this area. A reinforcement possible only because we have a knowledge based on 15 years of sound research. A lot of it wetland research; though wetland research incidental to the protection from mining. We will continue to do research into environmental protection and mining, we are even extending that research. We recently extended that to new horizons in Tasmania where we are looking for ways to ameliorate the impact, the unacceptable and historic impact, associated with some mining activities around Mt Lyell. We are doing that in conjunction with the Tasmanian Government.

But, we are looking into branching out into our second and third areas. If environmental protection from mining was our first, then we are looking at our second and third areas where we think and believe that Australians should have an expectation of us to make a contribution. Our second area where we want to make a contribution is in the area of the Australian environment. We want to make a contribution. We want Australians, the Australian environment if you like, to be richer for the fact that they have had an organisation here and we have decided to concentrate on wetlands because we think they are eminently worth protecting. The wetlands around this area are important to all Australians, even if they never come here. I am sure they are richer for knowing they are here. And we think work on wetlands would be totally complementary to the work and the research of all the colleagues we have here in the Territory, in different organisations. And we are in the right place to do it.

The other, or third contribution, which we wish to make is to the social well-being of the local people. We have that as our next target, when we get some progress on wetlands. But, back to wetlands.

Our wetlands scope is wide, very wide. We are interested in wetland protection and wetland management. We are interested in making wetlands. We are interested in new wetlands as tools for management. Our version of wetlands includes billabongs, damp lands, estuaries, rivers, tidal lagoons. And we are interested in the animals that live in and around wetlands and the plants which are natural to wetlands and the plants which threaten our wetlands. We are interested in taking the people to the wetlands and taking the wetlands to the people.

Now, before declaring open your workshop and inviting you to take the forum, let me tempt you. We can't possibly do all the things we would like to do. Exciting as they are, we do not have enough people, we do not have enough time and we don't have all the expertise. Perhaps you do. We are asking for people to come here and make a contribution. We are offering fellowships to people to come and work here for 3 months, 6 months, 12 months. Some fully paid with full accommodation. Some partly paid with accommodation and to some people we just offer a brilliant opportunity to help make a contribution. If you are interested, over the next couple of days would be an excellent opportunity to talk to us. That's a commercial.

Again I want to congratulate the organisers. And to all of you again, welcome. Thankyou for coming and please enjoy it.

BARRY CARBON
EXECUTIVE DIRECTOR, SUPERVISING SCIENTIST
Environment Protection Agency,
40 Blackall Street, Barton, ACT 2600