CSIRO PUBLISHING

SPECIAL ISSUE

Marine and Freshwater Research, 2018, **69**, i–ii
https://doi.org/10.1071/MFv69n7_FO

Foreword

Kakadu's wetlands – increasing research and ecological knowledge in Australia's tropics

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Over the past 4–5 decades, the wetlands of northern Australia's Kakadu region have attracted a large amount of scientific interest given their diversity, dynamism and beauty. These wetlands are the subject of this special issue of *Marine and Freshwater Research*.

Much of this interest has centred on the floodplain wetlands within what has been called the Alligator Rivers Region – a geographic entity based on the catchments of the West Alligator, South Alligator and East Alligator rivers and encompassing most of what is now Kakadu National Park, as well as part of the Aboriginal land to the east. The first iteration of Kakadu National Park was designated in 1979 with subsequent extensions extending the area to ~20 000 km^2. The National Park area encompasses the grandeur of the wider landscape, including the imposing sandstone escarpment and plateau, an extensive lowland plain of savanna woodlands, the rivers and seasonally inundated flood plains with a veritable kaleidoscope of species abundance and diversity, and a narrow coastal plain with imposing mangrove forests and extensive tidal flats.

In addition to the natural grandeur, the wealth and value of the cultural heritage has been recognised through World Heritage Listing and through everyday management. The biodiversity of the wetlands also led to the Park being listed as a wetland of international importance under the Ramsar Convention on Wetlands. The Park is managed through a joint management arrangement between the federal government and traditional Indigenous owners. The cultural and natural values of the Park have also become better known and accessible to an increasing number of national and international tourists.

The region is also known for the presence of the Ranger Uranium Mine, adjacent to the eastern boundary of the Park. Much of the history behind the development of the mine and establishment of the Park is reported in the *Ranger Uranium Environmental Inquiry* (Fox *et al.* 1977). I consider the report from the Inquiry to be a profound document that articulates many of the features of what we nowadays call a social–ecological system along with all the complexity and uncertainty that we ascribe to 'wicked problems'. The Inquiry had a major influence on the decisions that ultimately led to the establishment of the Park and uranium mining, and also on the development of a concerted environmental-research effort that included the wetlands that are the subject of this special issue.

The interest in the Park and the tension generated by the mining of uranium led to a large research effort including that covering the streams and wetlands, in particular along the Magela Creek that flowed past the Ranger mine site and spread out across the flood basin known as the Magela floodplain before reforming as a channel and joining the East Alligator River. Much of the initial research was done through the federal government-funded Australian Atomic Energy Commission and then the Alligator Rivers Research Institute, later renamed the Environmental Research Institute of the Supervising Scientist. Collations of this research include the Alligator Rivers Environment Fact Finding Study (Christian and Aldrick 1977), and in the proceedings of a workshop on Environmental Protection in the Alligator Rivers Region (Supervising Scientist for the Alligator Rivers Region 1983). At this stage, the research effort was already immense and the complexity of the biophysical environment, including the many interconnections that occurred across the wider landscape and within the wetlands, was becoming known.

A purposeful extension of wetland research in the early 1990s led to further collations of regional and local knowledge about wetlands (Finlayson 1995) including those that extended the work beyond Kakadu's wetlands (Finlayson *et al*. 1997; Storrs and Finlayson 1997). Increasing interest in the information resources that were available led to a description and literature review of the flora and vertebrate fauna of Magela Creek (Gardner *et al.* 2002), which included the following comments that I consider hold true today:

> Preparing this review was very nostalgic. It unearthed a history of tremendous effort and adventure by many students, technicians and scientists who 'battled' the elements to provide an information resource possibly unparalleled in tropical Australia. This review, which is based on that information, is a tribute to the wisdom, work and support of these people. The impact of this information resource has extended far beyond the boundaries of the Alligator Rivers Region. Tropical ecologists and wetland managers in many countries have benefitted directly and indirectly from the survey and research efforts undertaken along the Magela Creek. Locally, much of what was carefully collected and described is now taken as common knowledge – an undoubted sign of success.

The reach of the research also expanded with the knowledge and expertise being transferred to other wetlands, both formally through publication as well as through personal interactions and

collaboration with multiple institutions, and support from newer funding programs, such as the National Environmental Research Program. The international influence of the research effort has also been demonstrated through initiatives at the site level in Africa and Asia and by engagement with and transference of knowledge through the technical program of the Ramsar Convention on Wetlands and through the global analysis of biodiversity and ecosystem services undertaken in the Millennium Ecosystem Assessment (MEA 2005).

The key in my mind to the successes that can be demonstrated and celebrated through the papers in this special issue is the collaboration – between individuals and local people, between researchers and their institutions, and through a combined belief in the value of scientific knowledge for informing wetland management both in Kakadu and further afield. This praise for the research initiatives comes alongside a wider recognition that scientific knowledge is not the only source of such information – the importance of traditional knowledge and the wisdom of local people has long been established and openly acknowledged, and seen as critical for addressing the complexities and uncertainties that characterise the 'wicked problems' associated with managing tropical wetlands.

This special issue of *Marine and Freshwater Research* reports on some of the more recent wetland-related research, including projecting what the future may hold in store for these ecosystems. The research has evolved and it is now 40 years since the federal government established the institutional structures that supported much of the research. It is evident from the authorships and employment attributions provided with the papers included in this special issue that this area of research is active and healthy, and has certainly built on the foundations provided by past decisions and research activity.

I am pleased to acknowledge the guest editors and the many authors involved and their organisations for supporting them to undertake the research and prepare the manuscripts that are contained within this special issue. The lead authors were particularly important in these processes and we accept and further acknowledge that much of the research has been built on team efforts and in collaboration with the Park administration and staff as well as Traditional Owners. The combined effort has resulted in a valuable contribution to the literature and knowledge about tropical wetlands. In particular I am pleased to acknowledge and pay tribute to Dr Wayne Erskine, who sadly passed away some months after submitting his manuscript to the special issue. Dr Erskine had been employed by the Environmental Research Institute of the Supervising Scientist for several years, and had an even longer and productive association with the Institute, its staff and many research initiatives. His contributions to the wider knowledge are widely known and highly appreciated (Saynor 2018).

In concluding, I extend my personal thanks to the Environmental Research Institute of the Supervising Scientist for the opportunity to have undertaken research in these wetlands over a period of ~15 years – the administrative, managerial and financial support were invaluable and possibly unrivalled for wetland research in Australia. Importantly, a large amount of the research was done from a base within the Park which enabled research staff ready access to the wetlands and facilitated contact with local communities and others with a direct interest in and knowledge of the immediate environment. The Institute can be proud of its past and continuing contribution to the ever increasing knowledge that we now have on tropical wetlands, and also to the wider development of science in Australia through the training and personal development offered to its staff, many of whom have moved to other institutions, and to others.

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