5.3 Facing the challenges of managing urban wetlands in Australia: the way forward

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Abstract

The development of urban wetland management strategies must be informed by good science but, perhaps of equal importance, must engage with the community and policy makers. Juggling the ecological, social, financial and political priorities will not be simple but will nonetheless be made more difficult in an absence of suitably trained and engaged wetland scientists and managers. Throughout this manual, a framework has been provided to answer many of the questions regarding the strategies currently available to protect, monitor and manage urban wetlands. This concluding chapter, however, is designed to raise more questions. Most importantly, how can we design a roadmap for managing urban wetlands in Australia into the future? In particular, can we manage, restore or create wetlands in amongst the complexity of rapidly expanding urbanisation? While also contending with the uncertainty being imposed by global environmental change?

Introduction

Urban wetlands are not only important for a diverse range of plants and animals, they are a critical component of our cities and towns. Their protection and rehabilitation is crucial, not only for the conservation of biodiversity and ecosystem services but also for engaging the community, particularly future generations, so that the value of wetlands is maintained. As urbanisation continues, perhaps urban wetlands and the "free range wildlife" they support will become the primary contact point between children and a part of the Australian environment kept increasingly out of reach by urbanisation.

Notwithstanding the ecological role of urban wetlands, these habitats may also provide valuable services to our growing cities. Constructed wetlands can assist with waste-water treatment and water conservation while coastal wetland may provide a buffer against sea level rise and storm events forecast to increase its frequency and intensity under the influence of a changing climate. They may also assist in food production by providing environmental infrastructure for commercial fisheries and could prove essential in assisting carbon sequestration.

Unfortunately, urban wetlands face challenges on many fronts (Finlayson *et al.* 2013). As our cities grow, the encroachment of human activity, pollution and the spread of plant and animal pests poses threats to existing wetlands. Adaptive management strategies are required to protect these valuable resources. As well as protecting our wetlands, many require rehabilitation and, in some locations, the construction of new wetlands can compensate for previous losses.

Perhaps the greatest challenge may be the impact of climate change. The IPCC report in September 2013 makes it clear that the climate is changing. However, there is a significant lack of information on the response of wetlands to these changes but all wetlands will be affected. There is a need for a range of adaptation strategies to prevent the loss of wetland ecosystems.

Simply protecting wetlands from destruction or degradation is a priority. However, for constructed and rehabilitated urban wetlands, the development of strategies for management requires an understanding of the science behind the drivers of threaten processes that may range from urbanisation to climate change. Throughout the preceding chapters in this eBook, the authors have laid out the kind of challenges and strategies

Figure 5.3.1. Urban wetlands have the potential to provide important habitat for local wildlife. (Photo: Cameron Webb, Medical Entomology.)

Figure 5.3.2. Adaptive management strategies must be based on an appropriate monitoring program focused on key aspects of the local wetland. (Photo: Cameron Webb, Medical Entomology.)

associated with managing urban freshwater and estuarine wetlands in Australia. Unfortunately, there is not a "one size fits all" approach. What works in one type of wetland may not work in another. As well as differences in wetland type, there is likely to be differences between geographical regions. While a framework for wetland management is provided in this manual, adapting strategies to local wetlands will require wetland managers to design a site-specific monitoring program. If informed by appropriate monitoring and research, effective strategies can be incorporated into a site-specific Plan of Management.

Figure 5.3.3. Protecting existing wetlands is important but to maximise their potential to provide ecosystem services, some rehabilitation may be required. (Photo: Cameron Webb, Medical Entomology.)

Figure 5.3.4. Compensating for the losses and degradation in the past, rehabilitation and wetland construction projects are improving the outlook for coastal wetlands. (Photo: Cameron Webb, Medical Entomology.)

Why do we need to manage wetlands?

As we look forward, perhaps it is timely to revisit the objectives of managing urban wetlands? What has been the objective of wetland management in recent times? In some instances, wetlands have been managed to provide the most suitable conditions (or perhaps refuges) for key species or simply to protect those remnant wetlands from urbanisation, physical disturbance and pollution. Is it enough that we simply protect the physical space of wetlands? How can we manage wetlands to protect a whole community of species whilst also continuing to provide locally important ecosystem services? Without an understanding of what drives those processes, how can management strategies facilitate their effective delivery (Euliss *et al.* 2008)?

Protecting wetlands has always been a challenge. Too often considered refuges of bad smells and biting mosquitoes, it has often been difficult to convince the community and politicians of their values. However, these attitudes and understandings have been improving. There is legislation at both an international, state and federal level that are intended to protect wetlands. While such international acknowledgment is important, the critical issue moving forward is that a national coordinated approach to wetland legislation on a local scale be undertaken, whether it is an urban wetland such as The Towra Point Nature Reserve (Sydney) or a farm dam in Singleton, a township in New South Wales.

Even with a coordinated legislative and policy approach to wetland management, it is important at a local level to better understand how wetlands function. Also, as we construct and rehabilitate wetlands, will the ways we define them change the way they are managed? Is it possible to effectively manage wetlands if we cannot draw them on a map? Perhaps a nationally recognised system of categorising wetlands is important to assist wetland management?

How do we value wetlands?

Defining wetlands is important but the question is, do we value them adequately enough? As government funding for environmental science and wetland management is under increasing pressure and political priorities keep shifting away from effective conservation commitments, it will become increasingly difficult to secure the necessary funding to effectively manage our wetlands. A key priority for wetland scientists is to reach out to social scientists and collaborate in new ways to truly value our wetlands. The time has come when it is not good enough to simply lock away the land as a wetland and wave a list of plant and animal species. Should we instead be treating our wetlands as complex social-ecological systems? This approach is even more troublesome when the wetland is within an urban catchment and influenced by complex site-specific challenges.

What alternatives do we have for valuing wetlands? In an interesting approach to understanding the public perception of wetlands, a Victorian study (Dobbie 2013) measured the aesthetic preferences of wetlands by the general public and found that

perceptions of "perceived" wetland naturalness and environmental health were important factors. While there may not be a measurable link between the visual aesthetic and the ecosystem services of a wetland, it is important to acknowledge that engagement with the community is critical. Perhaps small aesthetic "concessions" in the design in constructed or rehabilitated wetlands could work to increase the connections between community and wetland. These increased connections may then provide a greater willingness of the public and politicians to support management initiatives?

While wetland scientists may be resistant, or unable, to assign an economic value to the wetlands as a whole or its individual components, providing such a value may be increasingly important in securing the support of politicians and funding bodies. Importantly, it is not just an economic valuation of the services a wetland may provide but the economic costs of the losses that may occur when a wetland becomes increasingly degraded or destroyed completely. For example, what may be the increased economic impact of storm surge damage if a coastal wetland "buffer" is removed? Wetland scientists are accustomed to collaboration with other wetland scientists, do we need to collaborate more with social scientists and economists? And in doing so adjust our traditional way of working in and looking at wetland values?

Feet in the water and on the ground

While it may be useful to have wetland scientists involved in policy development, without those getting their feet wet collecting field data, the success of management strategies may be compromised or irrelevant. Many components of Australian wetlands have been explored in this manual; from fish to birds, frogs to mosquitoes and mangroves to algae. While expertise is required to develop site-specific management strategies, it should not be forgotten that the links between each of these wetland components must be understood. A wetland cannot be effectively managed unless we know about the microbes that lie beneath the sediments as well as the local apex predators. There is still much to learn. Survey and sampling techniques for biological assessments of wetlands may be well developed but ensuring that the data is analysed appropriately is important. Interpretation of data, with regard to informing wetland management strategies, is critical.

It is not enough to know the abundance and distribution of wetland flora and fauna. There must be an understanding of the hydrological and geological architecture upon which the wetlands occur. Hydrological factors directly influence ecological processes. Manipulating the hydrology of a wetland is becoming an increasingly important component of management strategies, particularly in urban wetlands. How then do we assess the ecological significance of a wetland in which water levels are far from "natural" and are, in fact actively managed in an attempt to achieve a range of ecological and aesthetic objectives? The potential of a small urban wetland to engage and educate the local community may be of far greater importance than the ecological role it plays in the local ecosystem. Managing wetland hydrology is

Figure 5.3.5. Wetlands are increasingly incorporated into new residential developments in metropolitan regions but they must be adequately managed to ensure their ecosystem services are maintained. (Photo: Cameron Webb, Medical Entomology.)

Figure 5.3.6. Urban wetlands can assist Water Sensitive Urban Design strategies applied to new and renewed residential and industrial developments. (Photo: Cameron Webb, Medical Entomology.)

Figure 5.3.7. The key to addressing the emerging challenges faced by urban wetlands in Australia is the provision of training for scientists and managers. The Wetlands Education and Training (WET) program at Sydney Olympic Park has provided educational opportunities to hundreds of people over the past decade. (Photo: Stephen Doggett, Medical Entomology.)

a big challenge and this is further confounded by the influence of climate change and the sea level rise. It is critical that as well as accommodating the hydrological factors of today, scientifically informed climate modelling needs to be considered in hydrological decision-making; so is an adaptive mind and measure.

While much of the monitoring programs in local wetlands are focused on measuring water quality, abundance of birds or growth rate of vegetation, it is important not to forget the linkages between these diverse components. It is these linkages that can develop our understanding of the ecosystem services provided by each of these components. For example, the use of stable isotopes to accurately pin-point food chain linkages between wetland plants and animals will assist the management of wetlands. As technologies evolve, new opportunities arise that help fill gaps in our knowledge about wetlands. It may be satellite imagery that tracks the encroachment of mangroves into saltmarshes or molecular techniques that identify prey in the faecal pellets of vertebrate predators.

As we adopt new technologies and extend our conceptual understanding of wetlands we do, as wetland scientists, need to 'get our feet wet'. Further, where feasible, we need to bring the local community with us and explore with them the beauty and value of the wetlands in their neighbourhood.

Education and engagement is the way forward

To secure the future of our wetlands, we must ensure that our understanding of what drives their local ecosystem services continues to improve. We need to communicate our scientific research in such a way that the public and politicians can easily appreciate them. To do this, we need a steady stream of young and enthusiastic scientists turning their minds to the gaps in our knowledge and unravelling the complexities of our wetlands.

From primary school students to post-graduate researchers, a diverse range of scientists working in our wetlands can only improve the outcomes of wetland management. Wetlands continue

to be featured in our school curriculum and an opportunity to provide a 'living laboratory' has the potential to deliver spectacular place-based and interpretive learning opportunities. Urban wetlands also provide an opportunity for many university students to get their first taste of research-based learning. Through the development of 'citizen science' programs, the broader community can be involved as well.

For more than a decade, the Wetland Education and Training (WET) program coordinated by the Sydney Olympic Park Authority has provided training to hundreds of students, professionals and the general public. These professional development programs for environmental managers, academics, policymakers and teachers, through workshops and other styles of programs, help professionals build their skills through research-sharing and expert tuition. Even those who have a focused interest in species-specific management objectives can leave workshops with a better understanding, and perhaps be prompted by new ideas, of wetland management strategies.

There will always be a passionate group of scientists keen to continue researching into Australian wetlands, their ecosystem services and the biodiversity that they support. For the future of wetland conservation, a mechanism needs be worked out for a better engagement of the broader community for conserving urban wetlands in Australia. We can do this locally by fostering linkages between individuals and with organisations, such as those involved with the Regional Centre of Expertise on Education for Sustainable Development – Greater Western Sydney (RCE-GWS). We can also do it by engaging with international initiatives where we can both contribute and learn by interaction with other local communities – urban wetlands and the management of urban wetlands are global issues that are dependent on local action. Sydney Olympic Park by virtue of its' name, geography and history is well placed to participate in such initiatives, and provide an ongoing focus for wetland education and training designed to inform wetland managers of the future.

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