BENEFITS OF URBAN MANGROVE MANAGEMENT STRATEGIES FOR RIVERINE FORESHORES

Dawn Couchman*, Chris Lupton*, John Beumer*, John McDougall** and Alan Barton***

*Department of Primary Industries and Fisheries; GPO Box 46, Brisbane Qld 4001;
**Bundaberg City Council, PO Box 538, Bundaberg Qld 4670
***Brisbane City Council, GPO Box 1434, Brisbane Qld 4001

ABSTRACT as submitted

INTRODUCTION

Mangroves are key and very visible components of the intertidal plant community. The total area of about 11, 500 km^2 of mangroves in Australia represents the 3rd largest area of these marine plants in the world (Duke, 2006) with a high diversity of some 41 species. Distribution and diversity are greatest in the tropics reducing to a single species, *Avicennia marina*, in Victoria and South Australia. Adapted to highly stressful conditions of salinity, temperature and regular tidal inundations, mangroves have successfully colonised estuaries and river deltas in many coastal systems along the east coast of Australia, particularly in Queensland where the Great Barrier Reef in the north and large sand islands in the south reduce high wave energy and promote mangrove development. Mangroves may form large stands extending several 100 meters inland or narrow foreshore communities of 1 to 5 metres fringing coastal rivers and estuaries. As a result, mangrove communities are often the interface between coastal development and aquatic activities such as boating and fishing.

Mangrove functions and values

In Australia, early Aboriginal use for food, shelter and medicine was followed by a long period of destruction and reclamation of mangrove and adjacent saltmarsh communities as coastal development, free of any planning regimes or other constraints, was conducted in a fairly indiscriminate and adhoc manner.

Belatedly the benefits of mangroves, social, environmental and economic, have been recognised and incorporated within the statutes, planning instruments and management plans of the Queensland and Local Governments. The recognised benefits include inshore and offshore fisheries production (commercial, recreational and traditional), shoreline protection, nutrient fixation, carbon sequestration and sink, deltaic development, honey production, and habitats for epiphytes, mammals, birds, reptiles, fishes and invertebrates.

As fish habitats, mangrove communities provide structural complexity, shelter for food organisms and for juvenile and forage fishes at high tide, and feeding opportunities for fish, crabs and molluscs although quantification of the contribution remains insufficiently documented (Couchman *et al*., 2006). With 75% by weight and 80% by volume of the Queensland commercial fishing catch derived from species that spend all or part of their life in mangrove associated estuarine habitats (Quinn, 1992), the contribution of these habitats to fisheries production is some $250M annually. Queensland recreational catch, targeting many of the same estuarine species as found in the commercial catch, generates some additional $50M per annum based on equivalent prices paid to commercial fishers.

Protection afforded to mangroves

Currently all marine plants in Queensland are afforded protection under the provisions of the *Fisheries Act 1994*. Through its ESD objectives and as part of the recent integration with the *Integrated Planning Act 1997* (IPA), there is scope to grant authorities to lawfully remove, damage or destroy a marine plant.

CURRENT MANGROVE MANAGEMENT

The marine plant vegetation within Queensland has been mapped from the Tweed border to the NT border. Mangroves occur in approximately 18% of the coastal environments. In many estuaries, the mangrove communities are relatively pristine but in larger coastal centres, urban mangrove foreshores are under increasing threat from private and public interests. The Department of Primary Industries and Fisheries (DPI&F) role in mangrove foreshore management is to retain mangroves to ensure fisheries sustainability as a key priority.

Original riverine mangrove communities have frequently been cleared to allow foreshore development and dams and weirs have restricted water flow. Natural colonisation has established new communities of mangroves, with the extent being influenced by the change to the tidal prism and flow regime. For example, the Ben Anderson barrage, 26 km from the Burnett River mouth, has reduced the tidal prism by 40% and reduced the mangrove foreshore distribution by some 16.5 km. In the Brisbane River, removal of river mouth sandbars and islands and construction of impoundments upstream has extended the tidal prism, with mangroves now some 80 km upstream due to a reduced freshwater inflow into this system (Duke et al., 2003). These mangrove community changes present 'moving' management targets, underlining the need for a strategic approach.

Currently Councils are able to undertake maintenance works under IPA through a self-assessable code that defines the nature of works and the extent of clearing or trimming that may be conducted. As part of Councils' obligations to satisfy the Planning Scheme requirements of IPA, DPI&F recognised an opportunity to link the future management of urban mangroves to the Planning Schemes and related instruments being developed by Councils across Queensland.

TOWARDS A MORE STRATEGIC APPROACH

With increasing urban development along major waterways, public expectations for foreshore access and river views have risen. These expectations, together with a Local Government requirement to manage foreshore erosion along public foreshores and provide certain public infrastructure such as pontoons and jetties, led to increased ongoing liaison between Council staff and their DPI&F development assessment counterparts.

The challenge then was to look at these divergent management objectives and find common ground which could result in both Council and DPI&F staff, on behalf of the State Government, being satisfied that an acceptable management regime could be developed and multiple public expectations could be addressed. To meet this challenge, the DPI&F hosted an Urban Mangrove Management Workshop in April 2004 at which invited Councils, fisheries staff, interstate and overseas mangrove/riparian experts participated.

An outcome of the 2004 Urban Mangrove Management Workshop was the development of specific Urban Mangrove Management Strategies (UMMS) with Local Governments responsible for management of development and infrastructure along river banks within their Local Government Area. The broad aims of the strategic approach are:

- To foster shared understanding of the importance of marine fish habitats to fisheries production and to the social, economic and environmental values of the local community.
- To provide a consistent framework for Councils planning and undertaking public infrastructure maintenance and development works within and adjacent to sensitive marine fish habitats.
- To support innovative mangrove management techniques such as trimming, canopy lifting and restoration within agreed sections of riverine mangrove communities to achieve long-term protection of these fish habitats and to meet community requirements for passive recreation and access (e.g. fishing, viewing and river based activities).
- To reduce costs of administration (to both Local Government and DPI&F) associated with the integrated development assessment process and fisheries development approvals.

Within Queensland there are 46 Councils with coastal foreshores and of these, 35 have responsibility for major river systems and are under increasing urban pressures. To date, Bundaberg and Brisbane City Councils have proceeded with the development of Urban Mangrove Management Strategies for the Burnett and Brisbane Rivers respectively. A further 5 Councils (Livingstone Shire, Mackay City, Townsville City, Burnett Shire, Cairns City) have expressed an interest in or have commenced the development of a strategy.

DEVELOPMENT OF UMMS FOR URBAN FORESHORES

Bundaberg and Brisbane City Councils and DPI&F share a common objective of a long-term approach that documents the fate of urban mangroves and that provides each Council with certainty to plan, budget and undertake agreed works for public benefit along riverine foreshores. The agreed strategic approach that is being adopted by both Councils has the following elements:

- Develop mangrove management categories to apply to foreshore mangrove communities.
- Select a section of river for agreed management.
- Undertake bank vegetation mapping and an audit of bank condition.
- Undertake an audit of existing/proposed structures.
- Subdivide the nominated section of river into management units.
- Apply the mangrove management categories to these units.
- Draft an urban mangrove management strategy.
- Key stakeholder consultation.
- Develop site-based operational plans for units requiring higher resolution management prescription.
- Implement actions identified within existing approval process.
- Amend the fisheries legislation to further streamline approval process to accommodate the endorsed strategies.
- Joint evaluation of implementation of Strategy every 12 months.

OUTCOMES FOR EACH ELEMENT

Develop mangrove management categories for foreshore mangrove communities.

To reflect the overall strategy for the area under consideration (river, estuary, lake, etc.) and its diverse objectives, four categories of management were developed, each of which could apply to one or more sections of the waterway selected. The categories are:

- Protect mangroves – areas where existing mangrove communities are retained and natural processes, such as further colonisation and mangrove community development, are allowed to occur. These areas benefit directly from being linked to terrestrial vegetated buffers to provide long-term protection.
- Restore mangroves – areas where opportunities to enhance existing mangrove communities exist and actions may be taken to reduce or remove threatening processes to support natural regeneration and further colonisation.
- Mangrove free – areas which are mangrove free and maintained in that state with maintenance activities not specifically promoting colonisation by mangroves.
- Multiple use (mangrove modification) – areas where impacts to mangroves are minimised while meeting specific public use requirements and where works may include treatments that remove or modify mangroves. A site-based operational plan will identify the most appropriate treatments (e.g. canopy lifting, trimming, thinning or replacement of taller varieties of mangroves with smaller or lower-growing forms).

Select a section of river for agreed management.

The selection and extent of the river section to be covered by the mangrove management plan are determined by each Council.

Undertake bank vegetation mapping and an audit of bank condition

This element provides a baseline of the extent and condition for both the riparian (terrestrial) and marine plant (including mangroves) communities. It also allows for an assessment to be made of bank condition, especially identifying erosion prone foreshores where remedial works may be necessary to protect mangroves and public and other infrastructure. Sites requiring weed control are also documented. It further identifies existing vegetated buffers to the foreshore/bank and opportunities for bank rehabilitation to give further protection to the adjacent mangrove community.

Undertake an audit of existing/proposed structures

An audit of the existing structures and of where proposed structures will be required is a key element in identifying the current maintenance requirements and the potential extent of new works along foreshores that may impact on the mangrove community.

Subdivide the nominated section of river into management units

This element allows separation of the river section into management units that are practical and reflect the priorities for works. Units may be classed as 'River Bank Units' (RBUs) as used by Bundaberg City Council or 'Corridor Precincts' as used by Brisbane City Council, with the latter being further sub-divided into 'site-based management' plans where the 'multiple use' category applies. Clear priorities for addressing each unit can then be documented.

Apply the mangrove management categories to these units

This sees one or more of the 4 mangrove management categories being applied to a management unit, recognising existing conditions and the management objectives are to be met over an agreed period.

Draft urban mangrove management strategy

The key elements of a draft marine plant management strategy are to include the following:

- information on how it links to the Council Planning Scheme and any other relevant strategic planning instruments (e.g. flood maps, urban stormwater quality environmental management plans, asset management plans);
- explore and take up external funding opportunities to develop and implement the agreed Strategy;
- the responsibilities and jurisdiction of DPI&F and the Council in terms of marine plant protection and management and seek to meet the objectives of the DPI&F Fish Habitat Management Operational Policy for the Protection and Management of Marine plants FHMOP 001 (Beumer & Couchman, 2002);
- detailed maps, preferably recent aerial photographs overlain with the proposed mangrove management treatments for each section / river bank unit / precinct, plus a larger map showing the overall extent of the strategy;
- an insight for the community and developers to the desired future environmental outcomes for the river/estuary/lake and be the basis for an agreed planning instrument for future activities with the Council and relevant Council agencies; and
- a clear process for development of the site-based operational plans and links to the agreed mangrove management categories described above.

Key stakeholder consultation

An appropriate level of public consultation is to be conducted through comment on a draft mangrove management strategy, targeting key foreshore stakeholders with existing access or related issues. This can also involve the establishment of a local Steering Committee or similar group with carriage for moderating contrasting views and expectations during development of the Strategy and for overseeing its implementation. The composition of such a group would include

but not be limited to Local Government, State Government, port authority, fishing industry sectors, conservation and wildlife organisations.

Develop site-based operational plans for each unit

These plans incorporate the mangrove management categories and broad actions to be taken to achieve the agreed strategic level of management. These also provide more detailed specifications at ground level for maintenance tasks and a works program for built structures owned and/or controlled by Council. The plans identify usage patterns, role and function of riparian zones, current threats to mangroves and list the specific actions for each sub-section of the unit.

Implement actions identified within existing approval process

At this stage Councils will be required to apply for a development approval under IPA. DPI&F will facilitate applications within the approval process, assessments having been undertaken as part of the development of the site-based plans with conditions of approval linked to the strategy and the relevant plan. Monitoring of the actions and their impacts are a key component of the implementation.

Amend fisheries legislation to further streamline approval process to accommodate endorsed strategies

This is an ongoing element for DPI&F to resolve. A self-assessable code under IPA has been drafted to cover site-based management plans. When gazetted this will allow agreed works within these plans to proceed subject to compliance with the strategy, plans and self-assessable code without requiring further approvals under IPA.

Joint evaluation of implementation of Strategy every 12 months

Conduct joint evaluation of the implementation of the Strategy actions, with an adaptive management approach to modify the direction of the Strategy as appropriate. This applies particularly to mangrove manipulation activities such as canopy lifting and trimming where the responses of different species are poorly understood.

THE EXPERIENCE SO FAR

As indicated above, Bundaberg City Council and Brisbane City Council have developed UMMS. DPI&F has endorsed the strategy for the Burnett River. The strategy for the Brisbane River is expected to be endorsed by December 2007.

Many of the elements of each Strategy have been addressed with implementation occurring through trials with innovative practices such as mangrove trimming, canopy lifting and placement of rock gabions to protect and enhance foreshore mangrove communities.

Mutual benefits identified to date of the two Strategies developed with Bundaberg City Council and Brisbane City Council include the following:

- Productive collaboration between State and Local Governments
- Agreed management strategies which balance competing and diverse demands
- Capacity to attract funds for Strategy development and implementation
- Integration with other Council planning instruments
- Key mangrove communities retained and shared understanding of roles of these marine plants as foreshore assets
- Alerts adjacent river bank development to constraints and agreed treatment of river banks
- Sites identified for restoration
- Reduced approvals and rationalised bureaucracy

- Enhanced achievement of public expectations
- Works program certainty for Councils
- Budget planning and management enhanced
- Innovative best-management practices supported
- Collaborative monitoring and data exchange

CONCLUSION

Development of the urban mangrove management strategies has administrative, economic and environmental advantages. Key learnings from the experience to date are that a 'champion' needs to be identified within Council to promote and facilitate debate and resolution; that the process may take several years of concerted efforts from Council and DPI&F staff; and that mutual benefits result. The interest expressed by 5 other Councils is testament to the real benefits seen across local government with adopting a more strategic approach to urban foreshore management of mangrove communities.

TAKE HOME MESSAGE

UMMS - a better way of doing business with coastal communities.
Urban mangrove communities are important fish habitats. Each coastal local government is encouraged to engage with DPI&F to develop its Urban Mangrove Management Strategy and reap the rewards of reduced administrative burden and costs and of fish and fishing for the future.

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