

**Local Community Management of the Blyth/Liverpool Wetlands, Arnhem Land,
Northern Territory, Australia**

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INTRODUCTION

Management of wetlands in the coastal zone of the Top End (land north of 15°N) of the Northern Territory of Australia was greatly enhanced early in 1996 with the launch of the *Top End Indigenous People's Wetland Program* (TEIPWP). The TEIPWP was funded by the Australian Federal Government and implemented by the Northern Land Council (NLC) to assist Aboriginal land owners (referred to as Traditional Owners) prepare management plans for their wetlands. This is an important initiative as Aboriginal people own 85% of the coastline and most of the vast and important sub-coastal wetlands of the Northern Territory (Storrs and Finlayson 1997). The NLC has a statutory responsibility to look after the interests of Aboriginal people across most of the Top End of the Northern Territory and is increasingly providing assistance with land use planning and management.

The strategy adopted for the TEIPWP is one of Total Catchment Management coordinated within catchments and where necessary between catchments. This recognises that not only are the coastal wetlands inter-connected (Storrs and Finlayson 1997; Whitehead and Chatto 1996), but also that Aboriginal land ownership and kinship can extend across catchments. Individual Aboriginal communities have control of the catchment planning processes and implementation of the management prescriptions for their wetlands. The planning processes involve continuous consultation and liaison by the NLC and others to identify and articulate the aspirations of the land owners for the management of their wetlands and to develop priorities for future research and management.

The initial focus of the TEIPWP was the wetlands within the catchments of the Blyth and Liverpool Rivers in central Arnhem Land (Fig. 1). Aboriginal people own this land under inalienable freehold title under an act of Federal Parliament, the Aboriginal Land Rights (NT) Act 1976 (ALRA). Land ownership in the Blyth/Liverpool region is based on traditional rights and is passed from generation to generation according to patrilineal linkages. Significant matrilineal linkages provide a secondary level of responsibility for 'caring for country'. Many of these rights are not documented nor detailed in formal legal titles. Individual clans 'speak' for particular areas of land and each has the responsibility to physically protect and look after their own and, in particular sites of cultural and religious significance, known as 'dreaming sites' (Chaloupka 1993). Land owners may also have the responsibility to look after neighbouring land and dreaming sites on behalf of others who may reside some distance away.

The Blyth/Liverpool wetlands were chosen as the initial focus for the TEIPWP because of the extensive administrative structure that exists and because of the enthusiasm of the local Djelk Community Rangers. The administrative structure is provided by the Bawinanga Aboriginal Corporation (BAC) which has its base in the township of Maningrida, located about 400 km east of Darwin (Fig. 1). From this base they provide support and services to traditional clans within the catchment..

Features of the management of the Blyth/Liverpool wetlands are presented below as part of an international effort to further develop effective local community input to wetland management. In this instance the international effort is being mediated by IUCN-The World Conservation Union in response to a formal recommendation accepted at the 1996 Conference of the Ramsar Wetlands Convention.

The Bawinanga Aboriginal Corporation

The Bawinanga Aboriginal Corporation (BAC) was established in 1973. Its prime role at that time was to support those Aboriginal people who wanted to live on their traditional estates in central Arnhem Land rather than in the Government administered settlement of Maningrida. Until Maningrida was established in 1957, the majority of people from the area followed hunter-gatherer lifestyles largely unaffected by external influence. The BAC is comprised of all traditional land owners resident in the area. The chairman and committee are elected at an annual general meeting.

The BAC developed in response to major changes in settlement patterns. The development of Maningrida in the 1960s attracted many Aboriginal groups who settled in accommodation of varying design and durability. However, within a decade many wanted to return to small family-based settlements on their own traditional lands. Whilst they still wanted to access modern goods and services they also wanted control over traditional estates where they could pursue elements of a traditional subsistence lifestyle and maintain a vigorous ceremonial life. With support from the BAC many people returned to their land and established small settlements known as “outstations”. Outstations can be established by people with a traditional right to particular land or with agreed access rights.

By the mid-1970s there were about 16 outstations receiving support for material facilities and cultural activities. Over the years, the BAC has grown in response to the increase in outstation numbers, currently about 35, and the populations they support. In the dry season (April-November), there are usually more than 800 people residing on outstations. A further 1200 people reside in Maningrida. The number of people in the outstations falls slightly in the wet season (December-March) when access to Maningrida is restricted.

Developing employment opportunities and generating local revenue sources are key issues for the BAC and outstation populations. The BAC administers a “work-for-the-dole” scheme called the Community Development Employment Program (CDEP) with more than 400 participants engaged in activities such as art and craft production, mudbrick manufacture for local use, road construction and maintenance, building and administration as well as new projects in conservation and sustainable harvesting of native wildlife.

The BAC is conscious of the reliance of the outstation people on CDEP funding and is committed to pursuing much greater economic independence. However, underlying this economic imperative is a determination not to sacrifice traditional social structures and to maintain a relationship with the land which preserves both spiritual and natural values within a continuing and dynamic tradition. As a consequence, applications from external commercial interests have, in the main, been rejected or greatly restricted. Wildlife and habitat management priorities remain oriented towards the maintenance of subsistence harvest.

There is a developing awareness in the outstation communities that formal land management programs are required and that these need funding. Further, community groups need training to enable them to integrate traditional and modern land management practices. This awareness was heightened by the discovery of a small but potentially devastating outbreak of the exotic thorny shrub *Mimosa pigra* on the floodplains of the Tomkinson River in the early 1990s. Negotiations with government agencies secured funding for BAC to undertake an eradication program. This success provided the impetus to establish formal programs and to seek training and resourcing for community-based programs.

The BAC have identified the special values of their wetlands which, in the local Gurrgoni language, is called Djelk. The word Djelk means “land” and “caring for the land”. Thus, the word intricately links the land to its care. The BAC logo (Fig 2) identifies key issues for the community. The fish trap signifies bringing and holding people together for decisions about the land; the water lily links the earth, water and air, it is a thing of beauty and a source of food; the two stems stand for two laws - traditional and balanda (non-Aboriginal); the lily bulbs and roots represent people in the district; and the dilly bag holds important messages for the people of the Blyth/Liverpool wetlands (BAC 1996).

DESCRIPTION OF WETLANDS

Physical

The coastal floodplains of the Northern Territory contain Australia’s largest areas of relatively unmodified wetlands (Briggs 1988). Some of the best examples of these wetlands can be found in the catchments of the Liverpool and the Blyth River systems. These lie within longitudes 12-14° S and latitudes 132-134°50' E. Altitude varies from about 3 m above sea level on the coast to around 20-80 m above sea level in the upper catchment.

The Liverpool River system is the largest of the tidal river systems of northern Arnhem Land and drains a catchment of about 8125 km² (Messel *et al.* 1979). The Liverpool has two major tributaries, the Mann River and the Tomkinson Rivers. The Blyth River system is located further to the east and drains a catchment of 6200 km² (Messel *et al.* 1981). The Cadell River is a major tributary of the Blyth. The areal extent of wetlands is estimated at 100 000 ha.

Climate

The climate consists of uniformly high temperatures with average daily maximum temperatures above 30°C and average annual temperatures around 27°C. The highest maximum temperatures are generally experienced in November. Average annual rainfall at Maningrida is 1291 mm with most of this falling between November and March. Average

annual potential evaporation is approximately 2800 mm; much higher than rainfall. A detailed description of the climate of the nearby Alligator Rivers is given by McQuade *et al.* (1996).

Geology and major landscape features

As has occurred elsewhere in the Top End, the floodplains have formed following the sedimentation of river estuaries drowned during the last post-glacial sea level rise and many are only 2-3000 years old (Woodroffe *et al.* 1985). The floodplain soils are predominantly heavy black cracking clays overlaying estuarine muds and resemble those on the floodplains of the Alligator Rivers further to the west (Finlayson and Woodroffe 1996).

The coastal wetlands are surrounded by gently undulating plains and low plateaux which have formed on lateritised Cretaceous sandstones and siltstones. Predominant soils are sandy red and yellow earths and siliceous sands. The Arnhem Land Plateau contains the mid-sections of the major rivers and the upper reaches of the coastal floodplains. The plateau is a heavily dissected sandstone terrain with skeletal soils and rocky outcrops.

Hydrology

The low flat topography of the Top End coastal plains and seasonally wet monsoonal climate produces widespread and prolonged flooding (Finlayson and Woodroffe 1996; McQuade *et al.* 1996). The duration, depth and extent of flooding on the plains is highly variable, although a generalised pattern with five distinct phases has been discerned by Sanderson *et al.* (1983): i) intermittent heavy rain storms (Nov-Dec); ii) consistent rain and creek flow inundates the floodplain (Dec-Apr); iii) rain ceases and water draw down occurs (May-Oct); iv) flow ceases and the floodplain dries out (May-Oct); v) floodplain is dry (Oct-Nov). The floodwaters on the coastal plains are derived from three sources: direct inputs from rainfall (precipitation dominated); tidal influence; and excess flow from channels (streamflow dominated) (Kingston 1991).

The flooding on precipitation dominated sections of coastal floodplains is a function of topography, antecedent soil moisture, rainfall intensity and duration (Kingston 1991). Runoff occurs after the initial saturation of the soil and evaporative losses are surpassed. This usually happens two to three months after the rains begin. Areas on the coastal floodplains subject to inundation from direct rainfall may pond water well ahead of peak flow in the rivers draining onto the fringes of the plains. The general pattern for these plains is for coastal reaches to be inundated by direct rainfall and the upper floodplain reaches to be inundated by local runoff and periodic overflow from principal rivers (Kingston 1991). The upper reaches often contain perennial freshwater lagoons sustained by groundwater inflow.

Coastal processes have a major influence on flooding in coastal wetlands (Kingston 1991). A combination of coastal and fluvial processes created the coastal floodplains and ground levels may be lower than high tide levels. The flow balance is complicated as surface slopes, storage changes and infiltration components affect flooding patterns on the coastal floodplains.

Major wetland types

A variety of wetland types occur in the seasonally inundated wetland ecosystems of the Blyth/Liverpool rivers. These are characterised by degrees of inundation from permanent to seasonal and at times are extremely difficult to classify due to the temporal hydrological variability (Storrs and Finlayson 1997). Nevertheless an indication of wetland types which occur, based on the Ramsar Convention typology, is given in Table 1. Classification on this basis is preliminary and not yet supported by field-based habitat delineation.

Table 1: Wetland types in the Blyth/Liverpool wetlands (based on codes and terminology of the Ramsar wetland typology).

Code	Habitat type - Marine/coastal wetlands	Code	Habitat type - Inland wetlands
1-A	Permanent shallow marine waters	1-M	Permanent rivers/creeks
2-E	Sand shores	2-N	Seasonal rivers/creeks
3-F	Estuarine waters	3-P	Seasonal freshwater floodplain lakes
4-G	Intertidal mud/saltflats	4-Q	Permanent brackish lakes
5-H	Intertidal marshes	5-R	Seasonal brackish lakes
6-I	Intertidal mangrove swamps	6-T	Seasonal brackish lakes
7-J	Coastal brackish lagoons	7-T	Permanent freshwater marshes/inorganic soils
		8-X	Freshwater flooded forest
		9-Y	Freshwater springs

Major habitats

Distinct vegetation types of the Blyth/Liverpool wetlands are associated with geomorphic features of the plains, such as high floodplains, low lying depressions, paleochannels (old river courses) and drainage depressions. The major habitats are described below.

Intertidal marshes and saltflats

Saltwater marshes are found in Boucaut Bay which is associated with the Blyth-Cadell Rivers. These areas are significant stop-over areas for migratory shorebirds (Storrs and Finlayson 1997). In the narrow paleochannels of the lower reaches of the Blyth floodplain, often adjacent to mangroves, the marshes are dominated by a tall sedge (*Schoenoplectus litoralis*) (Wilson and Brocklehurst 1990). The small flowered beetle grass (*Diplachne parviflora*) and a spikerush (*Eleocharis spiralis*) have been found in some saline depressions on the Blyth/Liverpool. Rice grass (*Xerochloa imerbis*) and sand couch (*Sporobolus virginicus*) grasslands fringe tidal channels, mudflats and mangrove woodland/forest communities on the Liverpool and Blyth lower floodplains.

Mangrove swamps

Saltwater and freshwater mangrove habitats exist in the Blyth/Liverpool wetlands and are an important resource for the local people (Messel *et al.* 1981). Mangroves occupy 315 km² along the Blyth River and large areas of the Liverpool River. Mangrove swamps along the Australian coastline often contain six distinct zones: landward fringe; landward *Avicennia* zone; *Ceriops* thickets; *Brugiera* zone; *Rhizophora* zone; and a seaward fringe - all of which occur in the area (Messel *et al.* 1981).

Plants from the mangroves provide food, medicine and implements, and mangrove fauna makes a large contribution to food resources (Wightman 1989). Shell fish, crabs, worms and fish are all important components of the diet of local people along the coast (Meehan 1982). The mangroves provide significant nurseries and habitats for many fish including barramundi (*Lates calcarifer*), mangrove jack (*Lutjanus argentimaculatus*), bream (*Mulio berda*), several species of mullet (*Liza* spp.) and catfish (*Arius* spp.) (Finlayson *et al.* 1988). The mangroves

of Haul Round Island (Ngarraku), off the coast from Maningrida, are a significant breeding area for the pied cormorant (*Phalacrocorax varius*) (R. Chatto pers. comm.).

Lakes

Permanent lakes and swamps are rare in the Northern Territory and generally restricted to the northern coast (Storrs and Finlayson 1997). Several permanent waterholes are found in the Blyth/Liverpool wetlands. The brackish Marngalgadjurmeh Billabong in the Mann River catchment supports dense stands of the tall sedge (*Schoenoplectus litoralis*) and spikerushes (*Eleocharis* spp.) around its edges and is surrounded by paperbark (*Melaleuca* spp.) forest. Balbbanarra on the Blyth is an important food gathering area as well as a place with great spiritual significance.

Seasonal lakes and swamps occur extensively across the northern and central regions of the Northern Territory (Storrs and Finlayson 1997) and frequently along the water courses and floodplains of the Blyth/Liverpool wetlands. These areas provide important breeding areas for waterbirds, saltwater and freshwater crocodiles (*Crocodylus porosus* and *C. johnstoni*) and dry season refugia for many fishes. They also contain rich communities of aquatic macroinvertebrates with many species still undescribed.

Freshwater marshes and flooded forests

Extensive floodplains occur along the northern draining rivers of the Northern Territory. These are of considerable conservation value and subject to many uses and threats (Storrs and Finlayson 1997). The floodplains are inundated seasonally and contain freshwater marshes and forests that may be inundated for 3-6 months of the year. The marshes are major breeding areas for crocodiles, turtles, fish, and many bird species. They also provide a major dry season refuge for waterbirds and a significant migration stopover for shorebirds.

The high black soil plains associated with the lower reaches of the main river channels are dominated by a sedge (*Cyperus scariosus*) and a variety of grasses. Less common are the paperbark (*Melaleuca* spp.) woodlands often composed of coastal paperbark (*Melaleuca acacioides*) and broad-leaved paperbark (*M. viridiflora*) with an understorey of grasses. The low black soil plains are dominated by wild rice (*Oryza rufipogon*), spikerushes (*Eleocharis dulcis* and *E. sphacelata*), lippia (*Phyla nodiflora*) and a shrub (*Melochia corchorifolia*). Restricted to the Blyth River floodplain are monospecific clumps of a type of bluegrass (*Ischaemum rugosa*).

Noteworthy flora and fauna

No detailed flora or fauna surveys have been conducted for the Blyth/Liverpool wetlands. However, in nearby Kakadu National Park, which contains similar wetland types (Finlayson and Woodroffe 1996), there are more than 220 freshwater wetland plants (Finlayson *et al.* 1989), 18 mangrove species (Wightman 1989), 55 freshwater fish species (Bishop *et al.* 1995), 24 frog species (Tyler *et al.* 1983), 6 freshwater turtle species (Legler 1980), and an indeterminate number of invertebrate species. At Mumeka outstation, which comes under the BAC umbrella, Altman (1987) identified 110 plant and animal species which are utilised by traditional owners, including wetland and non-wetlands species. It is expected that the Blyth/Liverpool wetlands will support a similar species diversity and abundance as nearby

coastal wetlands and exhibit the same realm of production and seasonal dynamics (see Finlayson 1988, 1993; Finlayson and Woodroffe 1996; Finlayson *et al.* 1988, 1990).

A large number of plant species from around the Maningrida area have been identified by Leach *et al.* (1992) as rare or threatened, many are endemic to the Northern Territory. Species such as water lilies (e.g. *Nymphoides exiliflora*) and freshwater mangrove (*Rhizophora lamarckii*) are confined to the wetlands area. The kapok tree (*Bombax ceiba*), though not on the endangered list for the Northern Territory is becoming increasingly rare within the Blyth/Liverpool wetlands because of commercial use (I. Munro pers. comm.). The large corypha palm (*Corypha elata*), which flowers and fruits once in 50-100 years and then dies, is also found in a number of coastal areas of the Blyth/Liverpool wetlands. It has only been recorded from three areas in the Northern Territory.

Endangered waterbirds which are associated with Blyth/Liverpool wetlands include the Radjah shelduck (*Tadorna radjah*), also known as the Burdekin duck, and the little tern (*Sterna albifrons*). The low, sandy sections of Haul Round Island have been recognised as important breeding areas for and are of international significance for the roseate tern (*Sterna dougallii*) and the bridled tern (*Sterna anaethetus*) (R. Chatto pers. comm.).

A commercially important species which commonly occurs in various habitats of the Blyth/Liverpool wetlands are saltwater crocodiles. Messel *et al.* (1981) described the Blyth and Liverpool Rivers Systems as being amongst the best tidal waterways in northern Australia for saltwater crocodile populations.

CULTURAL IMPORTANCE OF WETLANDS

Altman (1987) and Meehan (1982) found that the subsistence economies of outstations in Arnhem Land have remained both resilient and significant. However, the maintenance of this lifestyle is increasingly dependent on outside factors. For many outstation communities the Blyth/Liverpool wetlands provide a very essential supplement to the income received from government unemployment benefits and community employment program. Without the use of this resource base the lifestyle and nutritional standards of the outstation communities would be reduced. Altman (1987) found that this “mixed” regional economy of welfare state, which has only existed in the last 30 years, and the original hunter-gatherer economy has enabled traditional owners to continue to live in outstations and manage their traditional estates. The maintenance of outstation life facilitates the passing from generation to generation of traditional Aboriginal knowledge of the country and culture.

From an ecological perspective, the maintenance of the biological integrity of the Blyth/Liverpool wetlands would assist the protection of water quality and species diversity associated with the area (Thurtell 1997). Thus, when addressing the cultural aspects of the wetlands it is necessary to link the maintenance of a viable lifestyle with maintenance of the biophysical resource that the people both use and care for. Within the wetlands there are many sites and pathways between sites that have specific cultural and spiritual significance. Not all of these have been documented in a contemporary manner, but are well known to many local inhabitants.

Hunting

A large variety of mammals are hunted by wetland communities. These include the feral Asian water buffalo (*Bubalus bubalis*) and feral pigs (*Sus scrofa*) (present only since the early 1980s), field rats (*Rattus colletti*), and brown and black flying foxes (*Pteropus alecto* and *P. scapulatus*). Marsupials form a large part of the nutritional base of outstations, the bandicoot (*Isodon macrourus*) and many types of macropods are regularly hunted. Snakes, such as the file snake (*Achrochordus arafurae*), larger goannas (*Varanus* spp.) and many lizards (e.g. *Chalamydosaurus kingii* and *Tiliqua scinoides*) are also hunted in surrounding wetlands. Turtles (e.g. *Carettochelys insculpta* and *Chelodina rugosa*), which rely on the billabongs and lakes, are highly sought, as are their eggs. Freshwater and saltwater crocodiles are hunted and their eggs gathered. A large variety of fish species are also regularly caught, these include barramundi, mouth almighty (*Glossamia aprion*), mullet (*Liza* spp.), catfish (*Arius* and *Neosilurus* spp.) and others.

Aquatic birds inhabit the wetlands and during the late dry season can be found in densely populated camps and are easily hunted. The magpie goose (*Anseranas semipalmata*) is particularly sought after, but other species which are hunted include the Pacific black duck (*Anas superciliosa*), Radjah shelduck (*Tadorna radjah*), grass whistling duck (*Dendrocygna eytoni*), grey teal (*Anas gibberifrons*), pelican (*Pelecanus conspicillatus*) and various herons (*Ardea* spp.).

Gathering

Many plants associated with the wetlands are regularly collected and used for food, various tools or crafts. Spikerush (*Eleocharis dulcis*), spiny mudgrass (*Pseudoraphis spinescens*), water lilies (*Nymphaea macrosperma*, *N. violacea*, *N. pubescens*), the red lotus lily (*Nelumbo nucifera*), screw palm (*Pandanus spiralis*), pond weed (*Potamogeton elongatus*) and wild rice (*Oryza rufipogon*) are some of the wetland plants which are gathered.

Spiritual

Aboriginal people living in Arnhem Land have social relationships based on a model which divides the humans, as well as the known universe, into two halves or moieties (Chaloupka 1993). The moieties are further divided and each division is associated with a specific set of totemic identities. Totemism is the central feature of Aboriginal religious life, which is based on a philosophy that regards humans, nature and land as one. Much of the daily life of Aboriginal people revolves around ceremony and totemism which has its roots in a mythology based on creation ancestors, art, ceremonies and an oral history. These traditional beliefs are very strong and link people and their culture to the landscape.

“Ceremony is part of our job.”

(Nicodemus, Djelk Community Ranger)

IMPACTS AND THREATS

The Blyth/Liverpool wetlands have experienced human-induced ecological change for thousands of years. Fire management by traditional owners has undoubtedly altered vegetation patterns across the wetlands, creating an environment which favours fire resistant

or fire adapted plant species (Andersen 1996). These species now dominate most of the floodplain and influence the faunal populations. Hunting and gathering may also have affected the floodplain fauna and flora, but the nature of these effects is unknown.

As with other coastal wetlands the Blyth/Liverpool wetlands are under threat of potentially massive change as a consequence of climate change, sea level rise and saltwater intrusion (Bayliss *et al.* 1998; Eliot *et al.* 1998). Other coastal wetlands in the Northern Territory are currently experiencing the destruction of freshwater habitats from saltwater intrusion (Woodroffe and Mulrennan 1993; Lindner 1998). The reasons for saltwater intrusion that has and is still occurring on some floodplains are not clearly elucidated and may have resulted from a combination of factors including the impact of feral water buffalo, destruction of off-shore shoals and changing land management practices. It is expected that climate change and sea level rise will exacerbate these changes and potentially lead to the destruction of many highly productive freshwater wetlands.

Exotic animals, such as cane toads (*Bufo marinus*), buffaloes and pigs threaten the ecological integrity of the Blyth/Liverpool wetlands. These species can alter the ecological character and the economic value of the areas they invade (Storrs and Finlayson 1997). Increasing pig populations have the potential to pollute waterholes and destroy surrounding vegetation. Greater control of feral animals, particularly pigs, is considered to be vital to maintaining the water quality and vegetative cover of the wetlands. The BAC has received limited assistance from government agencies for feral animal management.

The potential threat from the exotic weed mimosa (*Mimosa pigra*), needs to be addressed in a concerted and ongoing manner. The best approach to preventing mimosa from becoming established is “search and destroy”. This is expensive and requires routine surveillance and immediate control processes to be implemented. The experience of Northern Territory and Federal Government personnel is well recognised and the BAC have enlisted their assistance. However, to be successful such programs need to be maintained with sufficient resources for training and continued implementation.

Greater economic returns for the traditional owners of the Blyth/Liverpool wetlands through sustainable use of their wetlands could be used to improve the living conditions of outstation communities and in addition provide more resources for traditional owners to control feral animals and weeds. Such control and management procedures will depend upon external resources and expertise, but to be successful in the long-term, they need to engage the local population who have a cultural/spiritual investment in protecting the land.

“We are working for Caring for Country. That means the whole land, community, outstation, etc. It means jobs like keeping buffalo out of our waterholes and stopping pigs messing up the land and keeping our roads clear and open so we can travel from one place to another.”

(John Ryan and Winston Smith, Djelk Community Rangers)

The Djelk Community Rangers and wetland management planning

The BAC hopes to achieve ecologically sustainable development of their land. They are strongly resistant to many commercial developments and land owners associated with the

BAC have expressed opposition to mining, grazing and tourism. Rather than pursue such activities it is anticipated that the outstation communities will benefit through the implementation of management strategies that focus on sustainable harvesting of native wildlife. For these to be successful they must be formulated through appropriate consultation.

The BAC has a major role to play in developing appropriate land use strategies. The mission of the BAC is to maintain and improve outstation life by keeping the land, culture and people strong by using traditional and non-traditional ways to care for country. The strong feelings that already exist have been formalised through the NLC's Caring-for-Country (CFC) program and the TEIPWP. These programs have enabled the BAC to train community rangers and put in place feral animal and weed control, fire management and other management programs.

Consultation and knowledge

The NLC has ensured that the BAC has retained ownership of the management planning processes initiated under the TEIPWP. This was done through extensive consultation with the local community. Thus, the community defined the most important land management issues and identified potential projects. They have also actively participated in all surveys and projects developed in collaboration with other organisations and government agencies. Further, all research and development enterprises are directly related to identified issues and encompass education and training components. In this manner the community has retained ownership of the research and planning process and the management outcomes.

The Djelk Community Rangers, named from a Guragoni word relating to caring for country, play an important role in the planning and consultation process. The rangers now comprise a senior ranger and 13 trainee rangers, although a far greater number of local people may be involved with ranger projects through CDEP funding. The Community Rangers are keen to develop land management and training projects and to make use of the best available knowledge. They recognise two types of knowledge - traditional and non-traditional or scientific knowledge. The Rangers are encouraged to learn non-traditional management methods to complement their own traditionally-based knowledge which, in many instances, has been passed on by their elders and ingrained through experience. In this manner traditional knowledge can be linked with non-traditional knowledge and not ignored, as has happened in the past.

The Rangers received basic training through the CFC program during 1994 and are currently undertaking formal resource management training through the Faculty of Aboriginal and Torres Strait Islander Studies at the Northern Territory University. As well, a variety of other training programs have been accessed, ranging from feral animal control to coxswains courses. The value of knowledge and training is well recognised within the local communities. Similarly, the dangers of losing traditional knowledge are recognised and treated with great concern with younger members of the community being encouraged to undertake training through traditional and non-traditional means.

“Knowledge is being lost, cause we are loosing all our old people.”

(Peter Bunda Bunda, Assistant Senior Ranger, BAC).

Through the TEIPWP, staff and consultants from the Northern Land Council's Caring-for-Country Unit have assisted BAC to begin a process of wetland management planning as well as providing assistance in locating appropriate funding and research resources. Meetings have been arranged and facilitated between government and research groups that could contribute to their wetland management programs. The most important issues identified by the community are used to direct the planning, research and development processes of these programs.

Documentation and recording

In the past, detailed studies documenting cultural and economic aspects of outstation communities have been completed (e.g. Gillespie *et al.* 1976, Meehan 1982, Altman 1987, Chaloupka 1993). These studies have described rock art, the economy of outstations and the types and amounts of plants and animals consumed by outstation communities. Ecological surveys and studies of the area are limited and tend to concentrate on one taxa, such as crocodiles, or are part of a broad classification of Top End wetlands (e.g. Messel *et al.* 1979; Messel *et al.* 1981; Wilson and Brocklehurst 1990).

Over the past year the Rangers have worked with staff from the Environmental Research Institute of the Supervising Scientist to survey macroinvertebrates and fish in the two river systems (Thurtell 1996; Pidgeon and Boyden 1997; Thurtell *et al.* 1997). These surveys will serve as a baseline for future water quality and ecological monitoring and can also assist in an assessment of the ecological health of the habitats sampled. The surveys are done jointly and knowledge from the traditional owners and survey staff combined. In this manner the documentation and recording of ecological knowledge is enhanced and information shared on an equal basis. Interaction and exchanging information is treated as an important part of the documentation processes.

Collaboration

The BAC has established a close working relationship with the Parks and Wildlife Commission of the Northern Territory (P&WCNT) on a basis of mutually beneficial collaboration, rather than any formalised management agreement. This also facilitates an exchange of information. Recently the P&WCNT hosted a ranger training camp in the area that involved Aboriginal rangers from other areas as well as P&WCNT rangers and researchers.

The Northern Territory University is conducting a study on the use of Geographic Information Systems (GIS) to gather information on wetland use and changes over time. A herbarium is planned for the near future to contain specimens of useful plants; these will include food, medicinal and commercially valuable plants (Thurtell *et al.* 1997). The provision and sharing of facilities by the BAC has been done in order to attract outside experts to work with the Rangers and others. It also provides a mechanism for training and possible employment of local people.

"I have strong ambitions for my peoples training, to be able to have better employment or even further study. I want to prepare my people so they can build the bridge better."

(Dean Yibarbuk, BAC Chairman)

Sustainable harvest

The BAC is involved in two major sustainable commercial wildlife use projects, one involving saltwater crocodiles and the other trepang, particularly the sea cucumber or sandfish (*Holothuria scabra*). Since 1990 the crocodile project has entailed the provision of liaison and administrative services to facilitate the gathering of crocodile eggs from a number of central Arnhem Land river systems. The collection is regulated by the Northern Territory Government's federally-approved Crocodile Management Program and also by the requirements for informed consent and fair dealing prescribed under by the land rights act (ALRA). As the University of Sydney's main field study centre on crocodile biology was located at Maningrida in the early 1970s, there is extensive and detailed data on which to base population monitoring. Monitoring continues to be carried out annually by a commercial firm under contract from P&WCNT.

For some years the participation of local community members in the crocodile harvesting program was limited to annual egg collection for incubation elsewhere. However, in the 1996/97 wet season and under licence from P&WCNT the BAC installed an incubator and successfully produced nearly 2000 hatchlings from eggs collected. The Community Rangers received training in operation of the incubator, recording of hatchling data required under the licence for monitoring purposes and packaging and dispatch of hatchlings to crocodile farms elsewhere. The hatchling project has generated a great deal of enthusiasm amongst the Rangers and proceeds from the first year have paid for equipment and operating costs, although monitoring costs continue to be met by the P&WCNT.

The crocodile program has been extended further with the BAC in association with P&WCNT undertaking a trial harvest of adult saltwater crocodiles for the skin trade and for subsistence consumption of meat. The trial harvest will involve the Djelk Community Rangers.

"Part of our program (Caring for Country) is to do with the future of our children and grandchildren and I would like a better future for my son and myself in the long run."

(Lisa Jelenic, Djelk Community Ranger)

Plans by the BAC to take a leading role in the revitalisation of the trepang industry along the central Arnhem Land Coast are less well advanced. Since the large scale trepang industry involving Aboriginal people and the Macassans was forcibly stopped early this century, there has been only desultory activity despite the fact that Australia probably holds a large proportion of the global trepang resource. Australian resources are currently lightly fished while in other localities stocks have been overfished and management programs neglected. International demand for sandfish is currently high. However little relevant biological information is available to guide the development of a sustainable use strategy. In response to a request for co-operative research in the central Arnhem Land area, BAC nominated trepang as a locally preferred research subject, with a view to establishing indigenous participation in the industry under a sustainable harvest strategy.

With funding from a variety of sources the BAC have attracted interest in studies to examine distribution and abundance fluctuations at a broader scale to determine preferred habitat characteristics and core areas of abundance. In areas of known occurrence the research will model biomass dynamics and measure the effects of harvest following depletion of selected sites (Carter and Yibarbuk 1996). The research arrangements emphasise local benefit from collaboration and involve the Community Rangers as an essential part of the research team. Research planning is carried out collaboratively and the community receives ongoing reports of research results. Although it will be some time before there is an adequate information base to create a scientifically based management prescription for sustainable harvest, BAC is committed to the 'long haul'.

Research cooperation

The BAC has recognised the need for further research and have successfully taken steps to support research staff from other organisations and to develop training programs for their Rangers and others. Land management and research activities in the Blyth/Liverpool wetlands will largely take place through the Djelk Community Ranger Program. However, the existence of the Djelk Community Rangers does not circumvent the rights of traditional land owners. The Rangers only undertake work on particular clan estates at the invitation of the land owners; thus operating as "contract" land management workers.

The BAC has almost completed building a ranger station about 20km out of Maningrida which incorporates a field laboratory which will allow more technical aspects of collaborative research to be carried out and where rangers may observe, receive training and participate in scientific studies and surveys. The vision for the Djelk Community Ranger program includes construction of an extensive training and research centre. This will be used to attract further collaborative research and capacity building aimed at maintaining the near-pristine natural biota and in developing sustainable uses for wildlife.

"Have to know not to take too much, move around from place to place, in our own traditional knowledge we know how to manage our land, but we need to be recognised."

(Lisa Jelenic, Djelk Community Ranger)

The TEIPWP is being used as a vehicle for collating technical information for a document that will form a basis for drafting a wetland management plan for the Blyth/Liverpool wetlands. The plan will be developed by the BAC through consultation with the land owners. Research staff are assisting with the documentation and providing advice on specific threats and management issues. In this process the research and information collation are seen as means of providing training and assisting the land owners develop their land in a manner that suits their aspirations and lifestyle. In turn, the BAC and land owners are exchanging knowledge and experience with the visiting research personnel. This mutual cooperation is seen as a key to providing an information base that will enable effective management prescriptions to be developed.

Management outcomes

The Blyth/Liverpool wetlands are currently managed by small communities of indigenous people who have a strong cultural and spiritual connection with the land. As a consequence there is widespread continued maintenance and inter-generational flow of traditional ecological knowledge between people who largely live a subsistence lifestyle. However, the wetlands are facing increasing pressures. Foremost amongst these pressures are those imposed by invasive weeds and animals. At the same time, the local communities are facing difficult economic choices that can lead to improved living conditions and health services for example, but which also potentially erode the basis of their subsistence lifestyle. Many communities, however, are committed to pursuing economic independence. This commitment combined with the continued existence of a strong traditional knowledge base provides a distinct advantage for developing appropriate management prescriptions for the resource rich wetlands.

Under guidance from the BAC, a wetland management philosophy has been articulated and a community ranger program successfully implemented. The Community Rangers have received training and provide a focus for management and research activities that have been agreed through a process of consultation and exchange of ideas and information. This exchange has been encouraged and mediated by the NLC in conjunction with the BAC and has successfully attracted assistance for developing sustainable harvest programs, control of pest species and ecological surveys for specific purposes. All such activities have included a training element and an exchange of knowledge between indigenous and scientific personnel.

The success of these programs has been facilitated by the existence of the administrative structure provided by the BAC and the active involvement of people from the outstations. This structure has reinforced the determination to maintain customary values and to maintain traditional land tenure as a foundation for land management planning. This has been augmented by a commitment to dialogue and consultation which has further empowered the local people to make decisions and feel comfortable when dealing with non-indigenous people and their technical expertise. In this manner ownership of the planning processes and outcomes have been retained by the local communities.

Throughout the consultation process there has been a commitment to 'care for country' using methods developed through cross-cultural information sharing and the development of trust. The feelings of trust and ownership have been integral to the successes achieved and provide a basis for developing long-term beneficial programs that encompass sustainable development and conservation.

Training and information exchanges have also been key outcomes of the consultation processes and are seen as a major component of further activities, whether commercial or scientific in nature. The Djelk Community Rangers are keen to supplement their traditional land management knowledge and practices with non-traditional scientific approaches and appreciate the value of sharing information and ideas. This reflects a confidence that comes with empowerment and trust.

Conclusions

1. The federal government funded TEIPWP has provided the means to develop local community driven management planning in the Blyth/Liverpool wetlands. The management planning is “issues directed” with the issues being determined by the social and economic imperatives of the local community. Further, the program is facilitated by a “lower-level” organisation, the NLC, which has the requisite knowledge of land ownership and anthropological issues, and which has the interests of the local community foremost.
2. The TEIPWP has been successful in assisting the BAC and the Djelk Community Rangers develop management prescriptions for their wetlands. However, the success of this process was dependent on the existence of an effective local administrative structure and the readiness of the local community to engage in dialogue and consultation. Thus, for the Aboriginal community to retain a position of control and ensure maximisation of local benefit there is a need to ensure that the pace of incursive interest does not outstrip local capacity to participate and give direction. The BAC was able to facilitate these steps.
3. The TEIPWP provided a means of bringing technical research facilities and personnel into the Aboriginal domain, under Aboriginal terms. Hence, from the outset there was a strong emphasis on the development of collaborative approaches to management planning and research that was largely driven by the local community. Thus, issues of most concern to the local people were brought to the fore.
4. The BAC recognise the need for and value of modern techniques and technology and have, for example, created a web site (<http://www.peg.apc.org/~bawinanga/mac.html>) for publicity and information exchange purposes. The need for and value of modern (non-traditional) education is also recognised. However, this is not at the expense of traditional knowledge and practice. The local community have a wealth of knowledge that they are prepared to share (with some cultural and spiritual exceptions) and even jointly document. Thus, there is recognition that knowledge comes from many sources and can be shared. This knowledge should be documented in a way that can be readily used by the community (e.g. by using video tapes rather than written reports).
5. The management planning process introduced under the TEIPWP did not involve any formal agreements or processes. It relied and continues to rely on the goodwill and trust of the local people which is, in part, facilitated by recognition of their rights as land owners. Formal agreements and processes may be required for specific commercial enterprise or law enforcement. However, such formal processes were not a feature of the initial management planning processes which were, to repeat a critical message, based on consultation and recognition of the traditional rights of the landowners.
6. Management of the Blyth/Liverpool wetlands is firmly within the hands of the traditional land owners. The BAC and Djelk Community Rangers do not make decisions for individual land owners - the prerogatives remain with the owners themselves. Joint agreement to conduct any project or task is possible and often direct support is required (e.g. for weed control). Under the land tenure arrangements that exist in the Blyth/Liverpool area (and across Arnhem Land) a further institutional layer is not (at

least at present) required for land management. Legal enforcement processes are required for certain activities (e.g. control of poaching and trespass by non-Aboriginal people), but would require consultation and agreement to be effective.

7. Based on the experience with the BAC and TEIPWP a critical aspect of encouraging local participation in wetland management is recognition and support of existing traditional structures, noting that these structures are increasingly facing new and complex issues. Material support and training are just part of the process that empowers the local community to manage their traditional land within a contemporary administrative and management context.

Recommendations

The material provided in this case study of the Blyth/Liverpool wetlands is used to draw out recommendations of a generic nature for involving local communities to effectively participate in wetland management. It is stressed that these recommendations are situation-dependent and may not apply in all cases. A key ingredient for effective involvement of local communities in wetland management is trust and demonstrated good faith by individuals and institutional groupings

1. Local and indigenous communities have a vital role to play in wetland management. This is especially so when they own the wetlands and/or depend fully on them for their livelihood and/or survival. The case for complete involvement is strengthened when there are substantial cultural and spiritual links with the wetlands that not only affect the biophysical management of the wetlands, but also the preferred or traditional lifestyle of the people concerned.
2. A critical factor for local involvement in wetland management relates to ownership of the resource. Many indigenous people place great importance on land rights, or the right to access traditional resources.
3. Local communities often have a tremendous reservoir of knowledge about wetlands, but may not be conversant with modern management practices and intrusions, either culturally or biophysically. Support in terms of training and assistance with specific technical planning and implementation may often be required. This can take the form of ecological survey or specific intervention to control particular threats.
4. Effective local governance is critical. A process of self-management should be established or encouraged to develop and take responsibility for all wetland management actions. Support for local government structures can provide a means of sustained management that can outlast a burst of outside assistance.
5. Consultation plays a large part in developing effective management. However, this is particularly effective if it is driven by the community itself and not imposed. If the community is not prepared to consult or is "bribed" to participate the process may not be that effective. It can not be assumed that all communities or individuals within communities will share a common belief or view of wetland management. In such instances an education and/or awareness effort may be a requisite step. Where the local

community has a strong and traditional attachment to the wetland the process may proceed more readily.

6. Ownership of the consultation and management entire process should rest with the community. Ownership extends across the resource, the process and the outcomes, including any data and information that is collated or collected. Demonstrating that the community has this right is an important process.
7. Written agreements for wetland management or resource use may be a necessity, especially when dealing with commercial realities and land title. In such agreements equity between communities and cultures needs consideration.
8. An important step for wetland management is one of demonstrating good will, whether this be through consultation or returning information and advice to the community in a manner that they can utilise. It could also mean taking 'no' for an answer.
9. Negotiation with local communities is a process based on good will and time, involving listening and understanding.
10. Law enforcement steps may be critical for ensuring effective wetland management processes are implemented, especially if trespass and poaching are involved. Giving sufficient legal power and/or resources to ensure that enforcement is rapid and done locally can be an effective process, especially if conventional law enforcement processes are not located nearby or are seen as socially punitive. What ever enforcement process is implemented it must be seen to work - it is equitable and just.
11. Local associations of one form or other can be effective management agents if local long-term interest is seen as a paramount and shared goal. Technical support and advice can be provided through ancillary processes that provide services and advice, but which do not dictate or subvert.
12. Monitoring is considered an essential component of management, especially of resource use. Involving local people in protecting their resource base can be very effective. Such programs can also provide local employment, develop a knowledge base, or build on an existing knowledge base. Demonstration of the usefulness of the monitoring information whether it is collected through local or external expertise is also recommended. Thus, at least the evaluation should involve the local community.
13. Support from all tiers of governmental structures is necessary if local communities are to have effective control over their resources. This immediately requires the removal of political and socio-economic impositions that have seemingly caused the problems being addressed, for example, disenfranchisement or lack of support for local community governance structures.

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Figure captions

- Figure 1** Location of the Blyth\Liverpool wetlands in central Arnhem Land, northern Australia
- Figure 2** Logo of the Bawinanga Aboriginal Corporation