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IN: SUSTAINABLE USE OF WILDLIFE
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10.1 Introduction

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10. Progress towards the Sustainable Use of Dugongs by Indigenous Peoples in Queensland

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This chapter outlines the progress that is being made in meeting the challenge to develop conservation strategies that contribute to maintaining dugong populations at current or higher levels while providing for their traditional use by Aboriginal peoples and Torres Strait Islanders.

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Contemporary Aboriginal peoples and Torres Strait Islanders still greatly value the dugong for its cultural significance and its meat. Unfortunately, existing survey methods are too inaccurate and imprecise to monitor trends in dugong numbers at spatial and temporal scales useful to management. The limited evidence available suggests that the traditional dugong harvest is probably sustainable in the Mornington Island region and the northern Great Barrier Reef region. In Torres Strait, the sustainability of harvests cannot be evaluated without data on catches outside the Protected Zone. In the southern Barrier Reef region, there is evidence for a decline in dugong numbers where dugongs and their habitats are subjected to impacts from commercial fishing and coastal development as well as traditional hunting. Co-management arrangements for dugong hunting are being developed in Queensland with, for example, Councils of Elders. If the traditional harvest of dugongs is to be sustainable in Queensland it will be important to develop these co-management arrangements further. Action will be needed to reduce the impacts of coastal development and commercial fishing on dugongs as well.

The dugong (*Dugong dugon*) is a large marine mammal which reaches lengths of three metres and can weigh up to about 420 kilograms (Spain and Heinsohn 1975). It is of particular significance to the indigenous peoples of the coastal regions of northern Australia. Aboriginal peoples and Torres Strait Islanders value the dugong for its cultural significance and its delicious meat (Chase 1981; Bradley 1991; Johannes and MacFarlane 1991). It is also of great interest to biologists who value the dugong as one of only four living members of the obscure mammalian Order Sirenia, or seacows, and as the only herbivorous mammal which is restricted to the sea (Nishiwaki and Marsh 1985).

'Aboriginal peoples and Torres Strait Islanders value the dugong for its cultural significance and its delicious meat.'

The dugong's range extends throughout coastal and island waters of the Indo-Pacific from East Africa to the Solomon Islands and Vanuatu between about 26-27° north and 26-27° south of the equator (Nishiwaki and Marsh 1985). This distribution spans the waters of over 40 countries. Over much of this range, it is believed that dugongs are now restricted to relict populations separated by large areas where they are close to extinction or extinct or where the habitat is unsuitable (Nishiwaki and Marsh 1985).

The World Conservation Union lists the dugong as vulnerable to extinction (IUCN 1990). Results of studies of the dugong's life history reinforce the need for this listing. Individuals may live for seventy years or more, but a female does not have her first calf until she is at least ten years old, and then only bears a single calf every three to five years after a gestation period of about 13 months (Marsh 1980; Marsh et al. 1984; Marsh 1986). Population simulations indicate that dugong numbers are likely to increase at less than about 5% per year, even if all the females in a population are breeding maximally (Marsh 1986). In addition, adult

Figure 10.1 dugongs are now caught by men from the Western Islands (particularly Mabuiag and Badu) and Top Western Islands (especially Boigu) on dedicated hunting expeditions. Smaller numbers of dugongs are hunted by residents of the Central Islands, Yam having the highest catch. Virtually no dugongs were recorded as being caught by residents of the Eastern Islands. Dugongs are also prized by the Kivai people of the Western Province of Papua New Guinea (Johannes and MacFarlane 1991).

Torres Strait is probably the most important dugong habitat in the world.

Torres Strait, with an estimated population of $24\,225 \pm \text{s.e. } 3276$ dugongs (Marsh and Lawler 1992b), is probably the most important dugong habitat in the world. The data of Harris et al. (1994) indicate that in the Protected Zone, the wet weight of

dugongs landed in 1991–1993 was higher than the weight of any other catch. On an average day in the Protected Zone, four boats land $645 \pm \text{s.e. } 102$ kilograms of dugong. This equates to an estimated annual harvest of $1226 \pm \text{s.e. } 204$ dugongs (Harris et al. 1994) or 5% of the minimum mean estimate of the dugong population. Even without data from Papua New Guinea or from outside the Protected Zone, these catch estimates are close to the estimated maximum annual increase if the mean estimate of the dugong populations is close to an absolute estimate.

10.3.3 Urban Queensland (the coastal cities from Cooktown south)

There are no data on the magnitude of hunting by indigenous urban Queenslanders. After dugongs were protected in 1969,

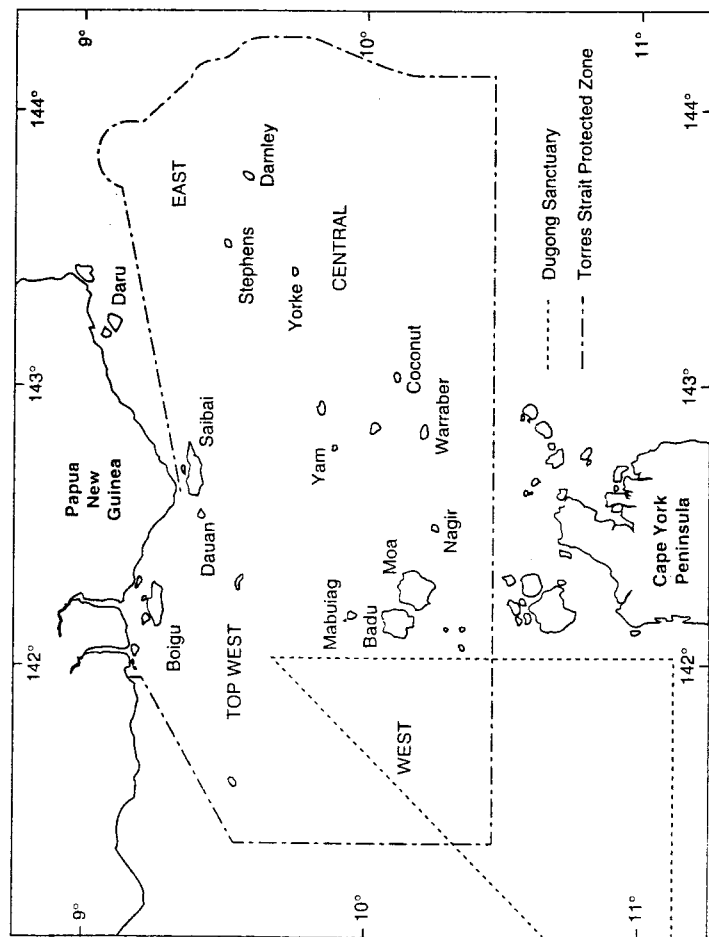


Figure 10.1: Torres Strait showing the main island groups, the Protected Zone, and the sanctuary area established to protect dugongs from hunting.

Aboriginal peoples and Torres Strait Islanders who were not resident at reserves were allowed to hunt only under permits which were rarely issued. In recent years, Aboriginal peoples and Torres Strait Islanders who wish to hunt outside the Great Barrier Reef region have been advised that they can hunt as long as they are accompanied by a reserve resident. Within the Great Barrier Reef Marine Park or in a Queensland Marine Park, indigenous people wishing to hunt require a permit under the regulations incorporated in zoning plans for the various sections of the Park.²⁸

Southern Great Barrier Reef Region

Over the last two and a half years, 70 permits have been issued for dugong hunting between Cape Bedford (near Cooktown) and the southern boundary of the Great Barrier Reef Marine Park (near Bundaberg). Most hunters only applied for a permit once suggesting that hunting is not overly dominated by a few individuals. However, it may be dominated by a few defined groups (F. Ponte, James Cook University, Townsville, pers. comm. 1994).

It is impossible to identify the cause of the decline of dugongs in the southern Great Barrier Reef region given the numerous impacts of people in this area.

In general, dugong density is low throughout the southern Great Barrier Reef region. This is not surprising as the known area of inshore seagrass (about 550 square kilometres) where the dugongs feed is small in comparison with the northern Great Barrier Reef (2407 square kilometres, Lee Long et al. 1993). In 1992, the dugong population of the Great Barrier Reef region south of Cape Bedford was estimated at only $1857 \pm \text{s.e. } 292$ animals (Marsh et al. 1991a). This contrasts with a minimum population estimate of $3479 \pm \text{s.e. } 459$ dugongs for the

same region six years earlier. The survey was repeated in 1995 to investigate whether there is a real decline or were an artefact of conditions. The 1995 population estimate of dugongs confirming the decline is impossible to identify the numerous anthropogenic impacts in this area.

South of the Barrier Reef to Moreton Bay

Moreton Bay (near Brisbane) is an important dugong habitat in Queensland. Moreton Bay supports some 600 dugongs and the population is increasing. Prior to the late 1980s, the dugong population in the Hervey Bay (during a cycle of the Great Barrier Reef Section 10.4.2), the dugong population in the Hervey Bay – Great South Bay was estimated to be $2206 \pm \text{s.e. } 126$ animals (Preen and Marsh 1995).

10.4 Difficulties in identifying a sustainable harvest

10.4.1 Difficulties of

Dugong densities when measured on a spatial scale of aerial surveys (hundreds of square kilometres) are generally low, even in remote areas. Marsh (1991) estimated the number of individuals per square kilometre of management unit such as a section of the Great Barrier Reef to be several hundred or fewer. The status of the dugong population and spatial management, it would be difficult to detect chronic declines in populations before

²⁸ Since the proclamation of the *Nature Conservation Act 1992* (Queensland), urban Aboriginal peoples have had the same indigenous hunting rights as residents of remote communities. The development of a conservation plan for dugongs (see Section 10.5.3).

seriously depleted. Marsh (1995) estimated the minimum detectable rate of decline that would be detected with high statistical power ($\beta=0.05$) in dugong populations of various sizes if surveys were conducted annually for 10 years (the data used for the estimates came from 91 survey blocks from 13 dugong surveys). For small populations, the rate of decline has to be high before it is detectable by statistical measures. For example, as shown in Figure 10.2, the minimum detectable rate of decline over 10 annual surveys of a population of 1000 animals is 8.1% per year ($\alpha=0.05$); that is, for a significant decline to be recorded, the population would have had to decline over the nine years (ten surveys) to 47% of its size at the time of the first survey.

'Present survey techniques will not allow us to detect a chronic low-level decline in dugong numbers at a local scale within an acceptable time.'

Obviously, a low-level chronic decline in a small population of dugongs will take many years to detect even if surveys are conducted

every month. For example, Marsh (1995) calculated that it would take 10.1 years of monthly surveys to detect a 5% per year decline in a population of 100 dugongs within the accepted levels of statistical error.

These figures indicate that present survey techniques will not allow us to detect a chronic low-level decline in dugong numbers at a local scale within an acceptable time without a very high frequency of surveys and intensity of sampling. This result presents an enormous difficulty to managers, some of whom are keen to develop dugong hunting quotas for specific local areas. Even if quotas are introduced, it will be impossible to determine whether or not they are sustainable, especially as the other impacts on dugongs have not been quantified. This is a major impediment to the management of sustainable populations of dugongs.

10.4.2 Measuring indirect impacts

Prior to European settlement, hunting was probably the only anthropogenic impact on dugongs in Queensland waters. This is no longer the case. Accidental entangling in gillnets is a major but largely unquantified

cause of dugong mortality. Inshore fishing has greatly expanded since the introduction of nylon nets and mechanisation, but collation of data on the incidence of dugong by-catch in commercial fisheries has not been attempted. Despite the beliefs of many members of Aboriginal communities, there is little evidence that dugongs drown in commercial prawn trawls.

'Accidental entangling in gillnets is a major but largely unquantified cause of dugong mortality.'

Shark nets were a major cause of dugong mortality. Shark nets set on swimming beaches in Queensland netted 576 dugongs between 1964 and 1989. Most of these animals drowned (Paterson 1990). Shark nets have now largely been replaced by drum lines, and only 25 dugongs drowned in shark nets in Queensland between 1989 and 1993 (Queensland Fisheries and Boating Patrol, pers. comm. 1993), which compares favourably with 84 drownings near Townsville alone in 1964 (Heinsoln 1972).

The seagrass ecosystems on which dugongs depend are very sensitive to human impact. Seagrass beds may be destroyed directly by mining and trawling (Silas and Bastion Fernando 1985), or lost through the effects of disturbances such as inland and coastal clearing, land reclamation and dredging (Gonseca 1987; Shepherd et al. 1989). These activities cause an increase in sedimentation and turbidity which leads to smothering of seagrass or death due to a lack of light. Other threats include herbicide runoff, input of sewage, detergents, heavy metals, the discharge of hypersaline water from desalination plants and other waste products.

Natural events such as cyclones and floods can also cause extensive damage to seagrass communities through severe wave action, shifting sand, adverse salinity changes and light reduction (Heinsoln and Spain 1974; Kenyon and Poiner 1987; Preen et al., in press). After a major flood followed by a cyclone in 1992, more than 1000 square kilometres of seagrass were lost from the

southern half of Hervey Bay. In 1988 was estimated at 1753 \pm s.e. 388 dugongs (1995). An unprecedented 11 carcasses were recovered the second half of 1999 appeared to have died in repeat of the 1988 survey indicated that there were dugongs left in the affected Marsh 1995).

'The loss of seagrass from coastal re-industrial and development is a threat to dugong in eastern Queensland'

Most of the dugong's habitat is remote from human settlement. Seagrass beds are protected marine park or fisheries leg (1991). However, the loss from coastal residential and development is a potential eastern Queensland coast

10.4.3 Asymmetry in distribution of peoples and Torres Islanders

The indigenous population becoming more urbanised last three censuses (see Torres Strait Islander peoples and Torres Strait Islander population density is low. There are no Torres Strait Islander people living between Cooktown and there are in Torres Strait Peninsula. The dugong population Cooktown and Bundaberg (Great Barrier Reef region) to be less than 2000 animals declining (see Section 10.4.1) unlike the situation in Torres Strait region anthropogenic impacts other explained in Section 10.4.1 impossible to evaluate

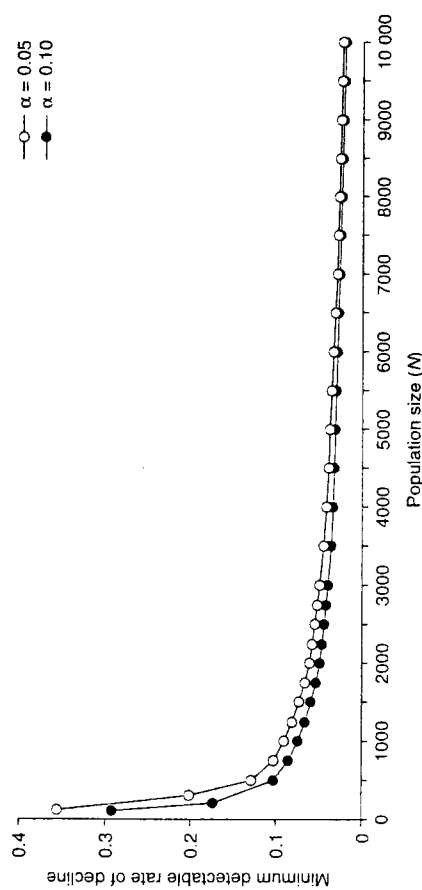


Figure 10.2: The minimum rate of decline detectable with high power analysis (Type-2 error $\beta = 0.05$) of ten annual surveys of hypothetical dugong populations of various sizes assuming Type-1 errors $\alpha = 0.05$ and 0.10. The relationship between the coefficient of variation of the population estimate and population size was calculated empirically using data from 91 survey blocks collected during 13 dugong surveys (Marsh 1995).

asymmetry between the distribution of indigenous hunters and their prey is likely to be problematic because there are no data on the hunting aspirations of urban-dwelling indigenous peoples.

10.5 Progress towards co-management

10.5.1 Torres Strait

In 1978, Australia and Papua New Guinea signed the Torres Strait Treaty. The subsequent Commonwealth *Torres Strait Fisheries Act 1984* established a Protected Zone Joint Authority which is responsible for the management of several fisheries, including the dugong fishery. An Advisory Council with 18 members reviews the Treaty's progress. This Council includes three members from each country who are traditional inhabitants resident in the region.

Other initiatives include the dugong and turtle educational program conducted over several years by the Australian Fisheries Management Authority (AFMA) in schools in the Australian sector of the Protected Zone. The main emphasis of this program has been to educate future hunters about the biology and life cycle of dugongs and turtles (*Chelonia mydas*, *Chelodina rugosa*, *Eretmochelys imbricata*) to create a greater awareness of the need for a continued sensible approach to harvesting these species without wastage or unnecessary mortality, and to explain the reason for the ban on selling meat or other products.

The school program included the collection of catch data. During 1994, AFMA improved the monitoring aspect of this program using data sheets to record the days on which catches are not monitored. In addition, the school program was extended beyond the

Protected Zone to include communities near the northern end of Cape York Peninsula.

Over the last five years, communities on the northern peninsula and the eastern coast of Cape York have appointed a number of part-time community rangers. One of their roles is to record the dugong and turtle catches of local hunters. In addition, community rangers from five communities (Injinoo, Lockhart River, Hopevale, Yarrabah and Palm Island) are participating in a harvest monitoring program being sponsored by the Australian Nature Conservation Agency and the Great Barrier Reef Marine Park Authority (GBRMPA). Three communities (Injinoo, New Mapoon and St Pauls) are involved in a similar program being sponsored by the Australian Research Council and Charles Sturt University (see Roberts et al., Chapter 11).

'Cape York communities have appointed a number of part-time community rangers to record dugong and turtle catches of local hunters.'

Despite this involvement, Torres Strait Islander leaders are claiming that their advisory role in the management of traditional activities such as dugong hunting is not enough. They seek to manage these activities themselves.

10.5.2 Great Barrier Reef

In conjunction with the Queensland Department of Environment and Heritage (QDEH), GBRMPA has been consulting with Aboriginal and Torres Strait Islander communities for over a decade regarding the use of dugongs. Consultation initiatives on the Hopevale and Lockhart River communities in Cape York Peninsula (Marsh 1990) but has recently been extended to urban indigenous peoples. In response to local dissatisfaction about lack of involvement in the management of the Park, the Torres Strait Islander community entered into discussions with the Queensland Government. Traditional hunters from the Mackay region in Queensland (mainly traditionally-affiliated Torres Strait Islander (historically-Aboriginal) peoples. Representatives from the community formed a Council of Elders to address traditional hunting issues (Cook 1994). The Council now handles individual applications for traditional hunting of dugongs and is responsible for issuing Authorities (the process is illustrated in Figure 10.3). Hunters are required to submit data to the Council which hands them to QDEH who in return supply them with relevant information (Cook



Harvesting by indigenous peoples is only one of a number of pressures on the stability of the dugong population. Source: GBRMPA

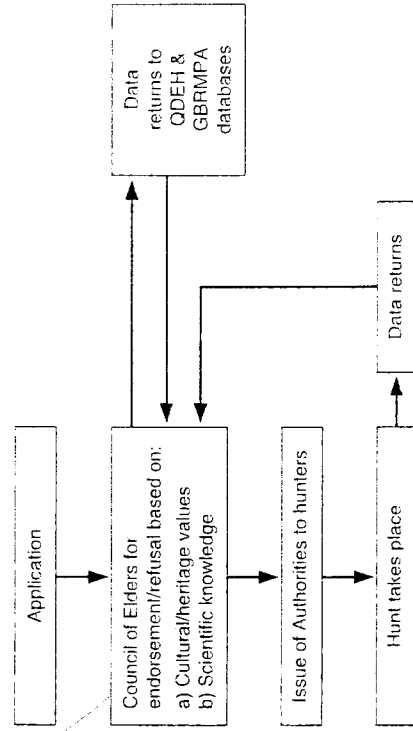


Figure 10.3: The operation of the Mackay Council of Elders with respect to traditional hunting permits (redrawn from *Reef Research* with permission). QDEH: Queensland Department of Environment and Heritage; GBRMPA: Great Barrier Reef Marine Park Authority.

Another Council of Elders was established in Bowen. The Giru Dala Council of Elders in Bowen recently banned dugong hunting believing that numbers in the area are too few to sustain hunting. Another Council is being formed in Townsville.

10.5.3 Other areas of Queensland

The Queensland *Nature Conservation Act*, passed by the Queensland Parliament in 1992, was proclaimed late in 1994. This *Act* gives all Aboriginal peoples and Torres Strait Islanders the right to take, use or keep native wildlife, provided that these activities are conducted in accordance with Aboriginal tradition or Island custom. This right is subject to the provision of conservation plans for protected species such as the dugong.

'The Queensland Nature Conservation Act (1992) gives indigenous Australians the right to take, use or keep native wildlife, in accordance with traditional custom and subject to conservation plans.'

The draft Nature Conservation Regulation 1994 foreshadows the extension of the co-management approach being developed in the Great Barrier Reef region to other parts of Queensland outside the Torres Strait Protected Zone. Under the Regulation, Traditional Use Authorities will be issued only to a corporation:

'whose members represent a community or group of Aboriginal people and/or Torres Strait Islander people particularly concerned with the land and waters in the relevant area. Such corporations may include a Council of Elders, a community council or an Aboriginal or Torres Strait Islander organisation. These corporations will serve as a focus for joint monitoring, transfer of technical information, advice on the nature of Aboriginal traditions and the assumption of group responsibility for the traditional take of dugong.' (Draft Nature Conservation Regulation 1994).

sea country is legalising practices which are opposed by most members of the wider community, at least in north Queensland. Despite this, there has been no attempt to develop an education campaign to inform all Queenslanders about the issues associated with traditional hunting of species such as the dugong.

10.6.2 Conflicts between indigenous peoples

Indigenous migration and hunting rights have also created conflict between 'traditionally-affiliated' people who are descendants of the traditional occupants of an area and 'historically-associated' groups whose ancestors were often forcibly moved to areas to which they have now developed strong commitment. This conflict can be acute in the case of dugong hunting. As discussed in Section 10.2, people from Western Torres Strait regard dugong hunting as integral to their culture. Since the 1960s, many Torres Strait Islanders have migrated to mainland Queensland (Beckett 1987) where they have continued to practise Island customs including dugong hunting. This has created conflict between Aboriginal and Torres Strait Islander groups. This conflict may be exacerbated by the Commonwealth *Nature Title Act 1993* which recognises the hunting and gathering rights of native title holders only. In addition, the Nature Conservation Regulation 1994 (Queensland) gives precedence to the views of traditionally-affiliated peoples over those of people with historical associations with an area. Failure to resolve conflict between traditionally-affiliated and historically-associated indigenous peoples will be a serious impediment to effective co-management in some areas.

10.7 Conclusion

Contemporary Aboriginal peoples and Torres Strait Islanders in Queensland still greatly value the dugong for its cultural significance and its meat. The limited evidence available suggests that the traditional dugong harvest is probably sustainable in the Mornington Island region and the northern Great Barrier Reef region.

The situation in Torres Strait is evaluated without data on the Protected Zone. In the southern region, where dugongs are subjected to impacts from fishing and coastal development, a decline in dugong numbers is evident.

The processes currently in Queensland represent a continuum from almost no management of dugong peoples and Torres Strait Islanders to total self-determination. Certainly has not been a continuum which further progress will be a pre-emptive sustainable use of the dugong by the indigenous peoples of Queensland.

- the impossibility of monitoring dugong numbers at ten scales which will allow management response to decline
- the impracticality of effort in the vast and often remote areas of Queensland; and
- the changing expectations of the right to hunt dugongs by Torres Strait peoples and Torres Strait Islanders.

The challenge will be to convince the wider community for indigenous protection of the dugong and traditional hunting sustainably.

Acknowledgement:

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