CHAPTER 3

AN OVERVIEW OF THE TORRES STRAIT REGION FROM THE PERSPECTIVE OF THIS RESEARCH AND RATIONALE FOR THE SELECTION OF STUDY SITES

This chapter provides an overview of the biophysical environment, demographic profile institutional and governance structures, and history of Islander participation in environmental management in the Torres Strait region where this study was undertaken. I then describe my study sites in Torres Strait and explain the rationale for their selection.
3.1 INTRODUCTION

This chapter describes the biophysical environment, demographic profile, institutional and governance structures and history of Islander participation in environmental management in the Torres Strait region where my study was based. I also describe my study sites and explain the reasons for the selection of my study sites.

3.1 THE TORRES STRAIT REGION

The Torres Strait region is characterised by a complex marine ecosystem listed as one of the 60 unique bioregions in the Interim Marine and Coastal Regionalisation for Australia (IMCRA 1997). It is a shallow shelf which lies between 142°00′E and 144°00′E, and between 9°00′S and 11°00′S. Torres Strait is an area broadly defined to the west by the Arafura Sea, to the north by Papua New Guinea (PNG), to the east by the outer Great Barrier Reef and Coral Sea, and to the south by the Australian mainland (Williams 1994). The area covers over 40 000 km², of which over 90% is ocean (HRSCATSIA, 1997). Extending approximately 150 km north to south, Torres Strait was formed between 8500-6500 years ago as a result of the post-glacial sea level rise and consequent inundation of the Sahul Shelf, the land bridge connecting Australia with PNG (Barham and Harris 1983). The numerous high islands present today are emergent peaks of the submerged Cape York-Oriomo Ridge (Barham and Harris 1983).

Torres Strait is characterised by numerous continental and volcanic islands, coral cays, mangroves, complex coral reef systems as well as some of the most extensive seagrass beds in the world (Williams 1994). Seagrasses extend over an area of 17 000 km² and are distributed in a variety of habitats including the reefs, foreshore areas and the shallow sea bed, particularly in the north-western Torres Strait (Poiner and Peterken 1996). The inter-reefal seagrass communities in Torres Strait are dominated by *Halophila* and *Halodule* species (Long and Poiner 1997), the primary food source of dugongs (Marsh et al. 1982). As a result, Torres Strait is the most important dugong habitat in the world (Marsh et al. 2002).

Hopley (1982) and Harris et al. (1991) identified five physiographic regions in Torres Strait: Warrior Reefs, Eastern Patch Reefs, the Great Barrier Reef and Gulf of Papua/Fly River Delta and Torres Strait Islands. Some 580 coral reefs, including the Warrior Reefs and Eastern Patch Reefs, cover a total area of 2 400 km² in the region (see NSR 1998). The Gulf of Papua/Fly River Delta forms an extensive deltaic system in the western Gulf of Papua (see NSR 1998).

The Torres Strait region includes some 150 islands, 16 of which are permanently inhabited. The inhabited islands are separated into four distinct regional groups (Johannes and MacFarlane 1991). The Western Islands are high continental islands surrounded by fringing reefs; the Top Western group consists of
swampy mud islands adjacent to the PNG mainland; volcanic islands to the east form the Eastern Islands, and low sandy atolls comprise the Central Island group (Figure 3.1). The Inner Islands include Horn Island where the only major airport in Torres Strait is located, as well as Thursday Island, the administrative centre of the region. The region also includes the communities of Siesia and Bamaga, which are dominated by Torres Strait Islanders, who have moved from outer island communities such as Saibai and Boigu Islands to live on Aboriginal (Kaurareg, see below) land situated on the tip of Cape York (Figure 3.1).

Figure 3.1. The Torres Strait region showing the boundary of the Torres Strait Protected Zone, the dugong sanctuary and the main communities in the Inner, Western, Central, Eastern Islands groups and the two Islander communities Bamaga and Siesia in the Northern Peninsula Area (NPA) of Cape York.

The southwest coast of PNG, which borders the Torres Strait region, is a flat narrow coastal plain subject to seasonal flooding during the monsoonal wet season and desiccation during the dry season. Several large, muddy, slow moving rivers including the Oriomo, Binaturi, Pahoturi, Morehead, Bensbach and Fly discharge their waters into the inshore waters of the Torres Strait. The inshore waters along the PNG coast are shallow and muddy and contain numerous old reefs, mudbanks and shifting sandbars (Lawrence and Dight 1991).

Climatic conditions in Torres Strait are dominated by a highly seasonal wind regime comprising two seasonal regimes of fluctuating wind direction and intensity (Williams 1994). The North-West monsoon season or Kuki, dominates from November to April and alternates with the South-East tradewind season or Sager which extends from May to October. The South-East trades are characterised by strong
persistent winds with speeds up to 37 km/hour (20 knots) with rough seas for two thirds of the time (Johannes and MacFarlane 1991; Williams 1994). The North-West monsoon is a period of persistent depressions, sporadic isolated squalls and storms and torrential rain with winds generally less than 31 km/hr (17 knots). Most of the annual rainfall (95%) occurs during the North-West monsoonal wet season in Torres Strait (Mulrennan and Hanssen 1994). Periods of calm weather (doldrums or Naigal) with gradually increasing light winds, calm seas and little rain occur between the two main seasons (Johannes and MacFarlane 1991).

Although tropical cyclones are infrequent in Torres Strait, cyclones and associated low atmospheric pressure storm surges can cause intense rainfall and extremely stormy wave conditions in shallow waters (Mulrennan and Hanssen 1994). The semi-diurnal tidal regime of the Coral Sea to the east and the diurnal regime of the Arafura Sea to the west result in a complex and seasonally variable tidal regime in Torres Strait (Johannes and MacFarlane 1991). Temperatures in the region show little daily or seasonal variation with mean temperatures ranging between 26°C – 31°C (Mulrennan and Hanssen 1994).

3.2 DEMOGRAPHIC PROFILE

The Australian sector of Torres Strait is predominantly inhabited by Melanesian people known as Torres Strait Islanders who have a distinct culture referred to as Ailan Kastom (Island Custom). Torres Strait Islanders possess strong sea-faring and trading traditions, and are bound to the sea by their customs, lifestyle and traditions (Beckett 1987). Another Indigenous Australian people, the Kaurareg, live in the southern border of the region and identify themselves as an Aboriginal tribe (see Southon 1998). The Kaurareg people are also a sea-faring people and their traditional lands and sea territory includes the islands in the Inner Island group (Southon 1998). The main Kaurareg communities in the regions are Kubin on Moa Island and Wasaga on Ngarupai (Horn Island) (Figure 3.1).

The Kiwai people are the traditional inhabitants of the south-western coast of the Western Province of PNG adjacent to Torres Strait. Some 23,000 Kiwai people are distributed amongst ten coastal villages from Daru, the administrative centre in the east to Buji in the west (Lawrence 1994). The Kiwais have a long trading history and share kinship ties with Torres Strait Islanders, particularly in the Top Western communities (Boigu and Saibai Islands) (Lawrence 1994).

The population of Torres Strait at the time of first European contact in 1606 was believed to be approximately 4,000 to 5,000 people. Communities of between 100 to 800 people lived on numerous islands where water was available (Harris 1979; Beckett 1987). The population of Torres Strait Islanders declined dramatically to about 2000 in the 1860s (Table 3.1) mainly as a result of introduced diseases to which Islanders had little natural resistance (Beckett 1987; Williams 1997). The Islander population began
to recover after the 1930s (Table 3.1). Available estimates suggest that the Islander population residing in Torres Strait has remained about 6,000 to 7,000 since 1961 (Table 3.1).

The 1996 Australian Census indicated that 8,572 Australians live in the Torres Strait region. Of this total, 5,667 identified themselves as Torres Strait Islanders and 564 identified themselves as being of mixed Torres Strait Islander and Aboriginal ancestry. This population is distributed across 14 outer island communities in Torres Strait with a combined population of 3,526 people. The remaining 4,089 Torres Strait Islander and Aboriginal people live on the Inner Island communities which include Thursday Island where all government services offices are located and the two communities on the mainland at Cape York (Figure 3.1). The 2001 Australian Census reported a total of 6,089 people live in the Torres Strait region. Of this total, 6,214 identified themselves as Torres Strait Islanders or being of mixed Torres Strait Islander and Aboriginal ancestry. The combined population of the 14 outer island communities in Torres Strait was 3,130 people while 3,084 people lived on the Inner Island communities in 2001.

Prior to World War 2, Islanders were restricted in their distribution to Torres Strait. However since that time, large-scale migration to the Australian mainland has resulted in the redistribution of Torres Strait Islanders now resident in the major cities of eastern Australia (Taylor and Arthur 1992). Much of this migration was initially associated with search for employment and has resulted in up to 84% of the Islander population residing in mainland urban centres, particularly in other parts of Queensland (Taylor and Arthur 1992). Commonwealth census population estimates of Islanders (residing elsewhere in Australia) was 9,663 in 1971, 16,533 in 1976 and 15,324 in 1981 (see Beckett 1987). Information from recent censuses conducted in 1996 and 2001 reflects the historical pattern in the spatial distribution of Torres Strait Islanders. Some 33,000 (1996 Census) to 44,000 (2001 Census) people who identify as Torres Strait Islanders now live on the Australian mainland, mostly on the eastern seaboard.

Table 2. Historical estimates of the population of Islanders residing in the Torres Strait region.

<table>
<thead>
<tr>
<th>Date</th>
<th>Islander population residing in Torres Strait</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>At European contact 1806</td>
<td>4,000-5,000</td>
<td>Beckett 1987</td>
</tr>
<tr>
<td>1913</td>
<td>2,368</td>
<td>Pp. 38, Beckett 1987</td>
</tr>
<tr>
<td>1948</td>
<td>5,000</td>
<td>Pp. 69, Beckett 1987</td>
</tr>
<tr>
<td>1960</td>
<td>7,250</td>
<td>Pp. 69, Beckett 1987</td>
</tr>
<tr>
<td>1986</td>
<td>6,100</td>
<td>1986 Census</td>
</tr>
<tr>
<td>1989</td>
<td>6,245</td>
<td>Arthur 1990</td>
</tr>
<tr>
<td>1996</td>
<td>5,667</td>
<td>1996 Census</td>
</tr>
<tr>
<td>2001</td>
<td>6,214</td>
<td>2001 Census</td>
</tr>
</tbody>
</table>

The 1996 Australian Census showed that the average (adult) personal ($9,500 - $16,400) and household incomes ($28,170 - $34,120) of Torres Strait Islanders, particularly from the outer islands were
substantially lower than those of non-Indigenous people ($44,690, per household) in the region. According to the 1996 Census, high unemployment results from the lack of skilled workers in both the Inner and Outer Islands of Torres Strait. Two-thirds of the household income in Torres Strait was tied to government spending with one third of this associated with Community Development Employment Program (CDEP, a work for social security scheme restricted to Indigenous communities in Australia).

The largest sources of employment in most outer island communities are the local councils who administer the CDEP. Community members usually staff the Island councils. The Commonwealth government departments of the Australian Quarantine and Inspection Service (AQUIS), Australian Customs Service (ACS) and Department of Immigration and Multicultural Affairs (DIMA) and the Queensland state departments of Education and Health also employ local staff in the outer communities. However, with few full time employment opportunities, most families subsidise their CDEP income with subsistence hunting and fishing.

Considerably improved and increased transport between Torres Strait and the Australian mainland has allowed Islanders to reside for longer periods in either Island communities or urban centres on the Australian mainland, particularly in Queensland. Thus some Islanders are able to move relatively freely in search for better employment opportunities (either on the mainland or communities) or for other economic reasons such as the opportunity to participate in lucrative commercial fisheries or the ability to be more reliant on subsistence fisheries in Torres Strait (see Section 6.4.4.).

3.3 INSTITUTIONAL STRUCTURES AND GOVERNANCE IN TORRES STRAIT

Torres Strait presents challenges for all levels of government. These challenges include: maintaining Australia's territorial integrity and northern national boundaries; protecting and managing a sensitive physical marine and island environment; providing equitable living conditions and opportunities to remote communities; managing local infrastructure development; and fulfilling evolving international standards for the survival, cultural autonomy, intellectual property rights and appropriate institutions of a distinct Indigenous people (Mulrennan and Hanssen 1994). The area is thus subject to a complex network of legal and political jurisdictions—international, national, state and regional.

Torres Strait is subject to international law as it is classified as an international strait or 'high sea' under the 1982 'United Nations Convention of the Law of Sea' (see Mulrennan and Scott 2000). Under the Convention, signatory coastal states such as Australia are vested with permanent sovereignty over a 12 nm territorial sea around each island and afforded considerable discretion over management of the natural resources in this territorial sea. Certain duties and obligations are also imposed (Mulrennan and Scott 2000). For example, the region is subject to obligations imposed by several international nature

The Torres Strait Treaty is the overarching jurisdictional and institutional structure for the region. The Australian Commonwealth, along with the PNG (Papua New Guinea) government, administers the Torres Strait Treaty and related matters. The Treaty established the Torres Strait Protected Zone, which includes most islands and reefs outside the Inner Island group in the region (Figure 3.1). Within the Protected Zone, Australia and PNG jointly manage the environment and its resources. By establishing the zone, the Treaty explicitly acknowledges and seeks to protect the traditional way of life and livelihood of the traditional inhabitants. Within the Protected Zone, traditional subsistence activities such as dugong hunting and free movement (across the international border) of traditional inhabitants are recognised.

In Australia, the Torres Strait Fisheries Act (1984) provides the legislation to implement the fisheries provisions of the Treaty. The Torres Strait Fisheries Act (1984) established the Protected Zone Joint Authority (PZJA), which has the mandate to manage the consultative and decision-making mechanisms of fisheries in the region. The PZJA comprises the Commonwealth and State (Queensland) Ministers responsible for fisheries who implement management through their respective fisheries agencies. Since 2001, the PZJA has also included representation from the Chair of the Torres Strait Regional Authority (TSRA), the peak Torres Strait Islander body (see Section 3.3).

There are a number of advisory bodies that report to the PZJA via the Torres Strait Fisheries Management Committee. The Torres Strait Fisheries Scientific Advisory Committee provides expert advice on research and monitoring, while the Torres Strait Fishing Industry and Islander Consultative Committee advises the Fisheries Management Committee on fisheries matters. An Environmental Management Committee provides the mechanism for discussion between PNG and Australia on environmental issues (such as land use along the PNG coast). There is also an annual Traditional Inhabitants meeting between Torres Strait representatives and Papua New Guinea villages, facilitated via officers of the Australian Department of Foreign Affairs and Trade and their Papua New Guinea counterparts. Torres Strait Islanders are represented on most of these institutional arrangements.

In 1939, the Torres Strait Islands were the first Indigenous communities in Australia to be allowed to establish elected councils with some local administrative and judicial authority (Beckett 1987). The Island Coordinating Council (ICC) was established under the Community Services (Torres Strait) Act 1984 and acts as a quasi-regional government (Smyth 1993). The ICC is comprised of 18 elected members who
represent the municipal councils of 14 Outer Island, 2 Inner Island and 2 mainland Islander communities (see Figure 3.1).

In 1994, amendments to the *Aboriginal and Torres Strait Commission Act 1989* established the Torres Strait Regional Authority (TSRA) in recognition of growing aspirations among Torres Strait Islanders to assume greater autonomy in managing their own affairs. The TSRA is a Commonwealth statutory body representing the interests of Torres Strait Islanders. Although it and the ICC comprise essentially the same membership, the two bodies have different administrative functions. Nonetheless, a clear line of distinction is often difficult to ascertain. In 1997, a Commonwealth parliamentary committee presented various options for a new form of regional autonomy including the establishment of a joint statutory agency to replace the existing ICC and TSRA. A Greater Autonomy Task Force has been formed to facilitate the process and to negotiate on behalf of the people with the Commonwealth and state governments.

In October 2001, the TSRA proposed a new regional governance framework for Torres Strait. The proposal seeks to achieve a Territory form of government by building on existing regional governance structures, the key elements of which are the ICC and TSRA (TSRA News, October 2001).

### 3.4 ISLANDER PARTICIPATION IN ENVIRONMENTAL MANAGEMENT

Although Torres Strait Islanders participate in various management mechanisms, which are more inclusive and comprehensive than those available to most other Indigenous peoples in Australia, they consider them inadequate (see Smyth 1993). As summarised by Smyth (1993, 2001), Torres Strait Islanders are formally involved in the management of their island and marine environments through:

- representation on consultative committees such as those related to fisheries established to implement the provisions of the *Torres Strait Treaty*,
- employment in various state and Commonwealth agencies, such as the AFMA, the Queensland Boating and Fisheries Patrol, the Australian Quarantine and Inspection Service, and the Australian Customs Service, Island Community Councils, the ICC and the TSRA, all of which make planning decisions and allocate funding for various projects related to coastal management;
- membership of many Torres Strait Islander organisations which have an interest in the marine environment and its resources, and the Torres Strait Fisheries Task Force and Community Fisheries Associations (see below).
Two major programs were developed by the TSRA and the ICC in the early 1990s to deal with some of the perceived failure to address Islander interests in natural resource management. The Marine Study of the Torres Strait Environment Resource Strategy (MaSTERS), discussed in more detail below, and the Strategy for the Planning of Resource Integration in the Torres Strait (SPRITS) were designed to reflect the socio-economic, cultural and environmental needs of Torres Strait Islanders. The SPRITS was to be a joint Commonwealth and State government initiative to provide a strategic platform aimed at ensuring that decisions on activities in and around the TSPZ supported the ongoing usage of natural resources while also protecting the cultural values of the region. Unfortunately funding for SPRITS was withdrawn in 1999 before the program could be fully implemented.

In 2000, with the support of the TSRA, a Fisheries Task Force representing the interests of all Islander communities was formed to provide information to develop policy on fisheries issues (including dugong issues) for the TSRA and to address the increasing demands of Torres Strait Islanders to develop an integrated planning framework for fisheries that is inclusive of their interests. One of the major objectives of the Fisheries Task Force was to review of the existing fisheries consultative and management structures. In December 2001, the Fisheries Task Force proposed an interim new structure which aimed to strengthen Islander representation by enabling more effective Islander participation through new Islander fisheries bodies, the Regional Fisheries Council (Task Force) and the Community Fisheries Associations. The Torres Strait Fisheries Task Force was replaced with the TSRA Fisheries Committee in June 2002.

These new bodies working in association with the peak Islander political bodies (the ICC and TSRA) and cooperative arrangements with Management Agencies, Queensland Fisheries Service (QFS) and AFMA and Non-Islander fishermen in the region will enable more appropriate and effective Islander participation in consultative and management processes in Torres Strait. The Fisheries Committee and Community Fisheries Association will play a key role in developing collaborative management arrangements with government management agencies such as AFMA and the Queensland Fisheries Service for marine resources. Development of community-based management strategies for dugongs will be a major objective of the Fisheries Committee (Douglas Jacobs, TSRA Fisheries Coordinator, pers. comm. 2001).

3.4.1 Marine Strategy for Torres Strait

The MaSTERS program developed by the ICC and primarily funded under the Marine Protected Areas component of the Ocean Rescue 2000 Program, aimed to provide a comprehensive conservation and sustainable development strategy from which a foundation for future public policy and economic development could be drawn. The program provides a regional strategy for the implementation of broader local and national conservation strategies. The initial outline of the program focused on developing the marine strategy for the region. The evolution of the program saw the need for an implementation phase to run concurrently with local programs to address issues of immediate concern to the community. These
initiatives include Indigenous Protected Areas (IPAs, see Section 10.3.2.2), regional environmental management plans, the collection and storage of data, a service of technical advice, and community-based management.

The public release of the Marine Strategy in 1999 sets the policy framework by which Torres Strait Islanders can engage in development of these initiatives and deal with the potential impacts from infrastructure projects. It also sets a policy framework within which agencies that operate in the Torres Strait can facilitate and support local initiatives such as community-based management programs.

The development of the Marine Strategy was achieved through three years of community consultation combined with field surveys. The policies were aimed at addressing current environmental, cultural and conservation issues facing remote island communities from the viewpoint of the traditional owners of the resources. The Marine Strategy provides a mechanism to raise awareness of environmental issues at the community level that can be coupled with capacity building for communities to actively participate in management.

3.5 TORRES STRAIT AS DUGONG HABITAT

As explained above, the Torres Strait region contains some of the largest areas of seagrass in Australia extending over some 17 500 km² (Poiner and Peterken 1996). The south western region contains unique and extensive open-ocean seagrass communities of *Halophila ovalis* and *H. spinulosa*, preferred food species of dugongs (Lanyon 1991; Preen 1995a, 1995b; Preen and Marsh 1995; Aragones 1996) (Chapter 2.4.1). Aerial surveys discussed below indicate that dugong density is highest in seagrass beds around Badu, extending north to Buru across to Oman Reef and east to Gabba Island (Figure 2.1). Not surprisingly the distribution and density of dugongs is coincident with areas of extensive reef-flat, coastal subtidal and open ocean seagrass habitats, which are broadly distributed throughout central and western Torres Strait (see Figure 2.1 and Section 2.4.2).

Aerial surveys used to estimate the dugong population in Torres Strait have shown that it is probably the largest population in the world (see Marsh et al. 2002). The dugong population in Torres Strait has been estimated using standardised aerial survey methodology (Marsh and Saalfeld 1989; Marsh and Sinclair 1989a, 1989b; Marsh et al. 1997) during in November 1987, February 1988, November-December 1991, November 1996 and November 2001 (see Figure 2.2).

The minimum population estimates for dugongs in the survey area in Torres Strait in 1991 (24 225 ± s.e. 3 276 dugongs) was significantly higher than the estimate for the same region in 1987 (13 319 ± s.e. 2 136 dugongs (Marsh et al. 1997; Marsh 1998; Marsh et al. 2002) (Figure 2.2). The difference in the results of
the two surveys was attributed to the migration of animals into the region from the west. The population estimate obtained from the 1996 survey (27 881 ± s.e. 3 095) was not statistically different from the 1991 estimate suggesting that the population was stable at a regional level between 1991 and 1996) (Marsh et al. 1997; Marsh 1998; Marsh et al. 2002). The results for the 2001 survey were 14 106 ± s.e. 2134, which was significantly lower that for 1996 but not for the 1987 estimate. As discussed in further detail in Sections 2.4.4.4 and 6.4.1.4, these results probably reflect the large-scale spatial and temporal movements of dugongs into and out of the survey region in Torres Strait.

In 1985 a segment of the Torres Strait Protected Zone and adjacent area was designated as a dugong sanctuary in which dugong hunting was banned (Figure 3.1). However, the efficacy of the sanctuary for management is questionable given the limited capacity for surveillance and enforcement, the isolation of much of the sanctuary area and the low density of dugongs in the area (Marsh et al. 2002).

3.6 THE TORRES STRAIT DUGONG FISHERY

The large population of dugongs in the Torres Strait supports important subsistence fisheries for the traditional inhabitants of both the PNG and Australian sectors. Within the Torres Strait Protected Zone, dugong hunting is limited to Torres Strait Islanders and the coastal people of the Western Province of PNG. In PNG, an artisanal fishery for dugongs supplied the local market in Daru (the administrative centre of the Western Province, Figure 3.1) for some ten years until the early 1980s when the fishery collapsed, presumably as a result of over-harvesting (Hudson 1986). The sale of dugong meat was banned in 1984 but the ban is not enforced and there are still reports of the sale of dugong meat in the Daru market (see Marsh et al. 2002). Dugongs continue to be hunted for subsistence by coastal villagers in the Western Province.

In the Australian sector of Torres Strait, dugongs are hunted for subsistence only by Torres Strait Islanders (Marsh et al. 1997, 2002; see Chapter 5). The sale of any dugong products is banned. This fishery is described in detail in Chapter 5. Data from monitoring of dugong catches in the Australian sector of Torres Strait from the early 1970s indicated that most dugongs are caught by hunters from the Western Islands, particularly Boigu, Mabuiag and Badu Islands (Table 3.1) from the areas reported to support the highest dugong densities (Figure 2.1). People from other communities in the Western Islands (such as St Pauls and Kubin on Moa Island and Saibai Island), Yam Island, Inner Island areas and the Northern Peninsula Area of Cape York also hunt when dugongs are locally abundant.
3.7 SELECTION OF STUDY SITES WITHIN TORRES STRAIT

My study was initially focussed on Boigu Island, the most northern community in Torres Strait and one of the major dugong hunting communities (Figure 3.1). Boigu Island was originally selected as the site for my fieldwork because it offered the best prospects in terms of support from the Boigu Island Council and available accommodation. In addition, it also provided an opportunity to build upon a prior initiative to develop a management and conservation program for dugongs in Boigu Island (see Ponte 1996). My project was based on Boigu Island for 11 weeks during the period 10/9/97 to 21/11/97. However, I was forced to leave Boigu Island as a result of water shortages because of an unprecedented drought in late November 1997.

Table 3. The annual catch of dugongs in Torres Strait communities obtained by various methods (adapted from Marsh 1998).

<table>
<thead>
<tr>
<th>Area</th>
<th>Method of estimating catch</th>
<th>Date</th>
<th>Estimated annual dugong catch</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mabuiag Is.</td>
<td>Limited continuous</td>
<td>1973</td>
<td>24</td>
<td>Bertram and Bertram 1973</td>
</tr>
<tr>
<td></td>
<td>Continuous</td>
<td>1977</td>
<td>103</td>
<td>Nietschmann 1984</td>
</tr>
<tr>
<td></td>
<td>Limited continuous</td>
<td>1983-84</td>
<td>12</td>
<td>Johannes and MacFarlane 1991</td>
</tr>
<tr>
<td></td>
<td>Survey</td>
<td>1994</td>
<td>274 (s.e. 175)</td>
<td>Harris et al. 1997</td>
</tr>
<tr>
<td></td>
<td>Continuous</td>
<td>1998</td>
<td>145</td>
<td>this Study</td>
</tr>
<tr>
<td></td>
<td>Continuous</td>
<td>1999</td>
<td>170</td>
<td>this Study</td>
</tr>
<tr>
<td></td>
<td>Survey</td>
<td>1999</td>
<td>183 (s.e. 77)</td>
<td>AFMA, unpublished data</td>
</tr>
<tr>
<td>Badu Is.</td>
<td>Survey</td>
<td>1994</td>
<td>107 (s.e. 80)</td>
<td>Harris et al. 1997</td>
</tr>
<tr>
<td></td>
<td>Survey</td>
<td>1999</td>
<td>200 (s.e. 65)</td>
<td>AFMA, unpublished data</td>
</tr>
<tr>
<td>Boigu Is.</td>
<td>Survey</td>
<td>1994</td>
<td>256 (s.e. 110)</td>
<td>Harris et al. 1997</td>
</tr>
<tr>
<td></td>
<td>Survey</td>
<td>1999</td>
<td>128 (s.e. 59)</td>
<td>AFMA, unpublished data</td>
</tr>
<tr>
<td>TSPZ1</td>
<td>Continuous</td>
<td>1976-77</td>
<td>750</td>
<td>Nietschmann 1984</td>
</tr>
<tr>
<td></td>
<td>Limited continuous</td>
<td>mid 1980s</td>
<td>110</td>
<td>Johannes and MacFarlane 1991</td>
</tr>
<tr>
<td></td>
<td>Continuous</td>
<td>1991-92</td>
<td>954</td>
<td>Harris and Nona 1997</td>
</tr>
<tr>
<td></td>
<td>Survey</td>
<td>1991-92</td>
<td>1095 (s.e. 193)</td>
<td>Harris and Nona 1997</td>
</tr>
<tr>
<td></td>
<td>Survey</td>
<td>1991-93</td>
<td>1226 (s.e. 204)</td>
<td>Harris et al. 1994</td>
</tr>
<tr>
<td></td>
<td>Survey</td>
<td>1994</td>
<td>860 (s.e. 241)</td>
<td>Harris et al. 1997</td>
</tr>
<tr>
<td></td>
<td>Survey</td>
<td>1994-95</td>
<td>623 (s.e. 197)</td>
<td>Harris et al. 1997</td>
</tr>
<tr>
<td></td>
<td>Survey</td>
<td>1999</td>
<td>692 (s.e. 150)</td>
<td>AFMA, unpublished data</td>
</tr>
<tr>
<td>Daru PNG</td>
<td>Continuous</td>
<td>1976-772</td>
<td>74-120</td>
<td>Hudson 1986</td>
</tr>
<tr>
<td></td>
<td>Continuous</td>
<td>1978-832</td>
<td>463</td>
<td>Hudson 1986</td>
</tr>
</tbody>
</table>

1 Includes total catch for the TSPZ including Mabuiag, Badu and Boigu Islands.
2 Catch statistics recorded during period when dugong meat was legally sold in the Daru market.

I relocated to Mabuiag Island at the end of November 1997. The central location of Mabuiag Island relative to the other major hunting communities presented an opportunity to increase and broaden my sample collection to include all three major dugong-hunting communities. Permission to travel by Coastwatch...
fixed-wing aircraft and helicopters (tasked through AFMA) provided me with access to flexible air transport to collect specimens from these key dugong-hunting communities. AFMA's roving monitoring observers were also able to sample dugongs for my project during their visits to communities. Additional funding from AFMA was provided in June 1998 to employ local research assistants to collect samples in Mabuiag, Boigu and Badu Islands. However, as discussed further below a number of confounding factors made it very difficult for me to train community rangers as research assistants in Boigu and Badu Islands.

3.8 DESCRIPTIONS OF STUDY SITES

Mabuiag is a high continental island about 3 x 8 km in area with sparse woodlands and patches of mangroves (Figure 3.1). Many small islands with fringing reefs encircle Mabuiag Island. An extensive reef system, the Oman Reef complex extends to the north-east of Mabuiag Island and is acclaimed by hunters in Torres Strait to be the best dugong hunting area in the world. Mabuiag Island has the reputation of being the traditional centre for dugong hunting (Haddon 1890; Nietschmann 1984, 1989; Johannes and MacFarlane 1991) and dugongs from the area are considered the best flavoured ('sweetest') in Torres Strait. The size of the Mabuiag community has decreased since the 1870s, ranging between 179 in 1996 and approximately 300 people in the 1870s (Table 3.3). The population in 2001 was estimated to be 209 people (Table 3.3). The community has an airstrip, health centre, school, store, power plant and dam. Most supplies are delivered by barge each week.

Boigu Island is a muddy, low lying and swampy island containing complex channel systems of swamps and extensive mangrove forests (Ponte 1996) (Figure 3.1). With an area of 18 x 7 km, the island is surrounded by several fringing reefs and extensive seagrass beds. The population of Boigu Island has ranged between 214 in 1986 and 350 in 1994 people (Table 3.3). The community had 340 residents in 1996 and 241 in 2001. The Boigu community is located in an area known as Koedal Boepur (crocodile's nose) at the northern end of the island. The community has a primary school, a health centre, two stores, a dam, power plant and airstrip. Most supplies are transported to the island by barge each week.

Badu Island is situated 10 km south of Mabuiag Island. Badu Island is a continental island approximately 8 km in diameter. Badu Island contains numerous patches of forest and woodlands with extensive mangroves mostly on the north coast. Kuiku Pad (Jervis Reef) and Orman Reef are part of the traditional 'home reefs' of Mabuiag Islanders but are used by the people from Badu Island to dive for crayfish (Panulirus ornatus) and hunt for dugongs and turtles (Johannes and MacFarlane 1991). The population of Badu has ranged between 325 in 850 in 1996 and 325 in 1986 (Table 3.3). Badu is the largest of the island communities outside of Thursday Island. The community has a new hospital, airstrip, power plant, school, motel and hotel. The Council is known for its progressive enterprise ventures that include seafood processing and a quarry.
Table 3.3. Population estimates of the major dugong hunting communities of Badu, Boigu and Mabuiag Islands where this study was based.

<table>
<thead>
<tr>
<th>Island Community</th>
<th>1870s</th>
<th>1986¹</th>
<th>1989²</th>
<th>1994³</th>
<th>1996⁴</th>
<th>2001⁵</th>
</tr>
</thead>
<tbody>
<tr>
<td>Badu</td>
<td>~600⁶</td>
<td>325</td>
<td>500</td>
<td>550-750</td>
<td>850</td>
<td>523</td>
</tr>
<tr>
<td>Boigu</td>
<td>n.a.</td>
<td>214</td>
<td>340</td>
<td>350</td>
<td>340</td>
<td>241</td>
</tr>
<tr>
<td>Mabuiag</td>
<td>~300⁷</td>
<td>179</td>
<td>180</td>
<td>180</td>
<td>179</td>
<td>209</td>
</tr>
</tbody>
</table>

¹ Murray, cited in Harris 1979, pp. 88
² 1986 Census
³ Arthur 1990
⁴ TSRA
⁵ 1996 Census
⁶ 2001 Census

3.9 SUMMARY

- The administrative, jurisdictional and legislative regimes in Torres Strait are very complex largely as a result of the Torres Strait Treaty between Australia and Papua New Guinea.

- The Torres Strait Treaty provides the overarching framework for management of natural resources in the region, including the traditional dugong fishery. It also explicitly seeks to protect the right of the traditional inhabitants to hunt dugongs.

- Torres Strait Islanders are formally involved in the management of their islands and marine environments through various mechanisms, facilitated by their peak representative bodies, the Torres Strait Regional Authority (TSRA) and the Island Co-ordinating Council (ICC). This includes a Fisheries Committee and Community Fisheries Association who will play a key role in developing collaborative management arrangements with government management agencies for resources such as dugongs.

- The extensive seagrass communities in Torres Strait containing the genera Halophila and Halodule, the primary food source of dugongs, support arguably the most important dugong habitat in the world.

- The Torres Strait dugong population supports an important traditional fishery for both Islanders and coastal villagers from the Western Province of Papua New Guinea in Torres Strait. In the Australian sector of the region, most hunting is undertaken by communities in the Western Islands, especially Badu, Mabuiag and Boigu Islands. The major hunting communities are located close to the large areas of seagrasses and high densities of dugongs, evidenced by results from aerial surveys undertaken in 1987, 1991 and 1996.
Selection of Boigu Island as the original study site was based on the support from the Council and available accommodation. Unfortunately, I had to relocate to Mabuiag Island after a serious water shortage in late November 1997. The project was based on Mabuaig Island for the remainder of my fieldwork from November 1997 to October 1999.
CHAPTER 4

BUILDING RELATIONSHIPS BETWEEN THE SCIENTIST AND COMMUNITY

This chapter describes the general methodology I used to collect data and specimens, including the development of a protocol to ensure that sampling was culturally appropriate. I describe some of the specific challenges in undertaking fieldwork in a remote location in the context of the sensitivities surrounding the traditional hunting of dugongs. These sensitivities are evidenced by both local communities and stakeholders external to Torres Straits. I conclude that my approach to the research enabled me to take advantage of an opportunity to obtain empirical data as well as contribute to the process of community-based management.
4.1 INTRODUCTION

Marine mammals, particularly of threatened status and a wary nature such as dugongs, are notoriously difficult to study. Given the biodiversity, cultural and socio-economic values of dugongs to all stakeholders in Australia, particularly Torres Strait Islanders, obtaining vital information on the reproductive biology of dugongs is crucial. The subsistence harvest of dugongs by Indigenous peoples in both Australia and Papua New Guinea (PNG) has provided opportunities to obtain such biological information from dugong carcasses (see Marsh 1980, 1986, 1995a; Marsh et al. 1984a, 1984b, 1984; Hudson 1986; Boyd et al. 1999).

The value of actively involving Indigenous or local peoples in research is being increasingly recognised (see Chapter 1). The methods required to obtain local knowledge from and to work collaboratively with Indigenous hunters require considerably more flexibility than those of conventional biological research. However, such methods have rarely been formally described.

My fieldwork required me to acknowledge the social context of the consumptive use of dugongs by Torres Strait Islanders. This approach was central to the successful completion of my fieldwork and provided me with important insights into the linkages between the cultural, social, economic and environmental factors that determine how many dugongs are caught.

This chapter describes the general methodology used to collect data and specimens including the development of a protocol to ensure that sampling was culturally appropriate. I describe some of the challenges of undertaking fieldwork in a remote location in the context of the sensitivities associated with the traditional hunting of dugongs in Torres Strait, sensitivities shared by both local communities and stakeholders external to Torres Strait. I conclude that my approach to research provided me with an opportunity to obtain empirical data as well as the opportunity to make a valuable contribution to the process for community-based management (Figure 4.1).
4.2 SAMPLING PROTOCOL: CULTURAL AND COMMUNITY CONSIDERATIONS

The project proposal was developed with the support of the Torres Strait Fisheries Scientific Advisory Committee. Fieldwork was negotiated with Boigu Island Council to be based at Boigu Island. Upon arrival in Torres Strait, my first priority was to introduce myself to and inform Torres Strait Islanders, especially those in major dugong hunting communities about my project. I was invited to introduce the project to Islander leaders of the regional authorities, the ICC and the TSRA. I continued to liaise closely with both organisations and provided them with regular updates about my research activities for the duration of my fieldwork.

I conducted further activities (described below) to inform the communities and hunters at the major hunting communities at Boigu, Mabuiag and Badu Islands about my project. I was introduced to these communities during meetings organised by AFMA staff. This gave me the opportunity to explain the project directly to community members and the hunters themselves. I gave presentations to Years 5 and 6 at the Malu Kiwai State School in Boigu Island and at the Mabuiag Island State School. I also accompanied AFMA staff on liaison visits to schools throughout Torres Strait.
I distributed posters describing the specimens to be collected, the information they provided and how this information would be useful to Torres Strait Islanders. The community rangers in Boigu and my research assistants in Mabuiag and Badu also helped distribute information about the project to the community. In addition, regular media coverage by Torres Strait Radio and the local newspaper, Torres News, disseminated information about the project. I reported regularly to Torres Strait Islander groups and other regional and federal authorities such as the ICC, TSRA and AFMA.

Acknowledgement of the socio-cultural and nutritional significance of dugongs to Torres Strait Islanders was crucial in development of my sampling regime. My fieldwork was successful because I adopted an approach that acknowledged the range and complexity of the social context of the consumptive use of dugongs by Torres Strait Islanders. This required my sampling protocol to be a continuous process of negotiation in which community members, particularly the hunters, actively participated.

During negotiations with community members there were often subtle reminders that I was ‘the one that come to them’, a fact that underpinned the development of my sampling protocol. This served as a useful reminder that the onus was on me to operate within a culturally sensitive protocol. Such an approach guided my research activities and required an adaptive research process.

The relationship established between the hunters and their communities and myself was essential for us to work collaboratively. My living within the Mabuiag Island community for an extended period engendered a sense of ‘belonging’ and facilitated this collaboration, which allowed many opportunities for me to exchange information with hunters, community leaders and other community members. The willingness of hunters and other community members to discuss very sensitive matters such as obligations to share their of dugong catches (see Section 5.3.7) was affirmation of my acceptance within the community. I was very careful not to compromise the trust of my confidants by voicing any criticisms or judgements, especially with regards to the hunting of dugongs.

As dugongs caught by hunters in Mabuiag Island are butchered at specific landing sites belonging to individual families or clans I attended most landings of dugongs to interview hunters. The collection of specimens from dugongs being butchered for food would not have been possible without the voluntary cooperation of local hunters. In return, I made every effort to collect samples with minimum disruption to the traditional butchering or ‘cutting’ method.

When it was not possible or culturally appropriate to interview a hunter (to obtain hunting information) at a butchering event (e.g., the dugong was being butchered for a funeral), information was provided later by the hunter, the crew or community members. I did not attempt to sample an animal if hunters resisted for any reason. Even on the rare occasion when hunters appeared to be unwilling to provide specimens or
Chapter 4 Building Relationships between Scientist and the Local Community

undertake interviews, the information and some specimens would be usually offered later. It was particularly satisfying when community members (including the children) would seek me out to tell me who had caught a dugong and indeed, when I had missed one. The school children were particularly interested in my research and we would often crosscheck information about dugong catches (for the School Catch Monitoring Program, see Section 6.4.2.1). The children also often visited me while I was working in my 'lab' (under the guest-house where I lived) and also helped me while I was sampling an animal on the beach.

Strong support from the Chairman and staff in the Mabuiag Island Council was crucial to the successful completion of my fieldwork. My being aware of and sensitive to occasions when it was not appropriate to sample a dugong ensured that the hunters remained generally co-operative and willingly agreed to provide information on such occasions. My ability to understand 'Broken', the Islander creole language, was a significant advantage to my relationship with and position in the community.

Members of the Mabuiag Island community willingly provided information and advice about how best to obtain samples and information for the project. In addition, Torres Strait Islander staff from AFMA provided valuable advice, particularly about cultural protocols in individual communities. These protocols included knowing the person/s to ask permission to sample dugongs, particularly when dugongs were being cut for special occasions such as a funeral feasting or other significant events. The community members from Mabuiag Island whom I employed as research assistants also provided me with valuable advice on streamlining the sampling procedure.

The success of my fieldwork was attributable in part to good relationships between the Mabuiag Island community and previous researchers, particularly Bernard and Judith Nietschman, who conducted their study of marine resource use by Islanders on Mabuiag Island in 1976-77 (see Nietschmann and Nietschmann 1981; Nietschmann 1984, 1989). Most Torres Strait Islanders have had little first-hand experience with researchers. Thus, the favourable experience that community members at Mabuiag Island had working with other researchers was of significant advantage to my research.

4.3 SAMPLING REGIME

I lived in Torres Strait from September 1997 to October 1999. Most of this time (November 1997 to October 1999), I was based at Mabuiag Island where most of my fieldwork was concentrated. The sampling regime I initially developed was designed to enable community rangers at Boigu Island to be trained to assist in collecting catch statistics and biological specimens. The sampling plan was based on a checklist of specimens from dugongs to be collected and processed and a data sheet to record fisheries
information (see Appendix 7.1). Data sheets using local language names for various organs were also developed to help research assistants identify the specimens required.

The temporal and spatial variability of dugong landings at Boigu Island did not permit a structured sampling regime to be developed, presenting me with significant problems. 'Cutting' of dugongs generally took place at specific sites but was undertaken at very variable times after the dugong was landed in the community.

Given this situation, my sampling regime, particularly at Boigu Island was restricted to regular monitoring of known areas used for dugong 'cuttings'. As a result of good community relations, local community members, including school children and the hunters themselves, often informed me that a dugong was being butchered. The strong community coherence also enabled me to find out who had gone hunting and who had returned with a dugong. Given the prestige associated with dugong hunting, it was quickly widely known which hunters had been successful.

While I was based at Boigu Island, three community rangers were to be trained to assist in data and specimen collection. However this proved to be logistically difficult. Community acceptance of the project and co-operation by hunters was initially slow, but improved over time. This situation resulted in only a small number of dugongs (n = 8) in Boigu Island being sampled before I was forced to cease working at Boigu Island at the end of November 1997 as explained above.

At Boigu Island, hunters mostly landed their dugongs on the boat ramp on the beach in the middle of the community. Occasionally hunters landed dugongs on their private beach in front of their residence or also on sand flats exposed at low tides on the southern side of the island. The location of the guesthouse (where I lived) at Boigu was approximately one kilometre walk to the boat ramp. As there was no effective means of notifying me about a 'cutting', it was very difficult for me to arrive in time to collect a complete data and sample set from each animal as I had no transport. Occasionally, the animals had been butchered by the time I arrived and I would only collect specimens from discarded organs or tissue. In many cases, I could not sample because I had missed landed catches or they had been butchered away from the village. Community members often told me of dugongs caught by hunters a few hours or a day or so after the event.

At Mabuiag Island, 'cutting' tended to be more localised, with the hunters using specific sections of the main beach (in the centre of the village) to land and butcher their dugongs. Except for about a month around October 1998 (see below), most dugongs caught by hunters in Mabuiag were butchered on the main beach in front of the village. During January to November in 1998, crayfish divers from Badu Island were based on Mabuiag Island during the crayfish season. They also opportunistically hunted dugongs
and butchered them on the main beach at Mabuiag Island. Each hunter owned or used a specific ‘landing’ area for ‘cutting’ his catch. Being able to monitor and access butcherings on the main beach enabled me to identify successful hunters and increased my efficiency in collecting catch information and sampling.

In October 1998, following safety and health concerns from the community about discarded offal from butchered animals attracting sharks near popular swimming areas for children, the Council decided to ban any further ‘cutting’ on the main beach. Enforcement of this ban caused me considerable logistical difficulties because butcherings had to be undertaken at a beach that had traditional significance as a ‘cutting’ area, approximately one kilometre away from the main village area. Some hunters also chose to cut their catch on various islands to the north of the Mabuiag community. The Council lifted the ban within a month when hunters applied pressure to the Chairman to allow ‘cutting’ to resume on the main beach, on the condition that all the offal would be towed well offshore for disposal. My fieldwork continued to be mainly based at Mabuiag Island where I lived until November 1999.

### 4.4 COLLECTION OF SPECIMENS

Samples were collected under Scientific Purposes Permit No. F1/000090/01/SAA, Queensland Nature Conservation Act 1992. Whenever possible, I collected only minimal amounts of tissue and specimens from parts of dugongs that are eaten by Torres Strait Islanders. However, most of the specimens such as stomach contents, eye balls, liver (for heavy metal analyses) collected from dugongs were parts that were usually discarded.

As a consequence of the sampling regime described above, there may be several factors that have introduced bias to the study. My evaluation of the potential of any possible biases to affect the results of my study is discussed in detail in Section 7.2.8 and summarised in Table 7.3.

### 4.5 BUTCHERING PROCEDURE

The butchering method used by hunters of the Western Islands was generally as described by Johannes and MacFarlane (1991) however individual communities had their own variations. The following section describes how I adapted my methods of specimen collection to fit in with the butchering method of hunters at Mabuiag Island (see Figure 4.2). The numbering, processing and storage methods of specimens collected are described in Chapter 7 and 8 for female and male dugongs respectively.

Dugongs were laid on the beach on their ventral surface for at least three hours before ‘cutting’ took place, ostensibly to allow distension of the carcass which facilitated efficient butchering. Hunters say that this assists the ‘cutting’ process by providing tension which allows the knife to cut easily into the flesh. If
possible (and with permission from the hunters) I measured each dugong (straight body length to the nearest 0.1 cm) before it was butchered.

When a dugong was ready to be butchered, it was laid out on its ventral surface onto sheets of corrugated iron (kapa) or canvas. The tail portion approximately 10 cm dorsal to the anus was removed first. As noted by Johannes and MacFarlane (1991), a strip of hide approximately 5 cm wide was removed along the backbone. Both flippers were then removed. The carcass was then divided into a series of 5 – 10 cm wide strips cut longitudinally (Figure 4.2). Each strip consisted of hide, fat and meat. I collected approximately 3 cm x 3 cm² wide pieces of hide, fat and meat at each standard site for body condition analysis. These samples were taken from the corresponding longitudinal strips after they were removed from the carcass (see Figure 4.2).

**Figure 4.2. The traditional method of ‘cutting’ a dugong by hunters from Mabuiag Island.**

The dugong’s head was then removed. I collected both eyeballs. If the hunter was willing, the head would be given to me for skinning. I kept the skull to extract the tusks. The dorsal segment of the vertebral column just anterior to the kidney was removed. The muscle between each rib was slashed before each rib was removed from the skeletal frame. I collected a 2 cm x 2 cm² piece of mammary gland (when present) from each female dugong. Great care was taken not to puncture the intestines when the abdomen was slit. The heart and adjacent sternum were then removed. The liver and lungs were removed and discarded. I collected a 10 cm x 10 cm piece of liver for heavy metal analysis. The intestines, stomach and reproductive tract were then removed. I collected a sample of stomach contents from the cardiac region of the main sac of the stomach (Marsh et al. 1982).
In females each uterine cornu was slit at the junction to the ovary and the entire reproductive tract removed. I then collected the whole reproductive tract. Occasionally, each ovary remained attached to the reproductive tract. However, in most instances, the ovary remained attached by muscle to the rib and by mesenteric attachments with the kidney. I collected each ovary. I collected a whole or half of a kidney for heavy metal analysis. In males, the epididymides and testes also remained intact when the vas deferens was slit and removed with the digestive and urogenital tracts. If possible, I collected the testes and epididymides from both the left and right sides.

The collection of tusks from butchered dugongs initially presented a considerable challenge. The head of a dugong contains a large quantity of highly favoured meat and fat. It proved difficult to collect the skull after a head had been taken home by hunters to be skinned. However, following negotiations with hunters, it was agreed that the head would be given to me to skin and that I would return the meat and fat to the hunters or any other designated recipient. This arrangement proved to be highly successful, especially after I employed a community member of reputable ‘cutting’ skills to undertake the skinning.

4.6 CHALLENGES DURING FIELD WORK

4.6.1 Community Perceptions

4.6.1.1 Boigu Island

As mentioned above, because data and specimen collection was totally dependent on the co-operation of the hunters, my first priority was to gain community acceptance for the project (particularly from hunters). Although Boigu was originally chosen as a base primarily because of the support from the Chairman and Council, data and specimen collection were initially very difficult. In addition to the logistical constraints discussed above, community perceptions in Boigu Island also had a significant impact. Negative community perceptions of the project because of concern about potential restrictions or threats to their traditional hunting rights compounded this situation even further.

Several hunters were outspoken about their suspicions as to why I was conducting research on dugongs at Boigu Island. They believed that I was sent to ‘check up on them’ and had a hidden agenda to ban hunting of dugongs in Boigu. I was directly confronted on this issue on two occasions where the Chairman of the Boigu Island Council relayed community concern about my project. I used this opportunity to explain that I would be unable to collect my samples if the hunting of dugongs was restricted or prevented.

Opportunities to address these concerns directly with the general community were very limited. Community meetings proved difficult to arrange and were poorly attended. I found it difficult to speak directly to the Chairman because of his time constraints. Instead I mostly relied on the community rangers
to disseminate information about the project. I was unable to gauge how effective the rangers were in alleviating community concerns. However over nine weeks, my relationships with individual hunters were much improved and I felt confident of a positive long-term outcome for undertaking fieldwork at Boigu Island. Disappointingly, the water shortage increased the tensions. As a (non-essential and controversial) researcher and visitor to the Boigu Island community, my continued presence was not a feasible option during the water crisis.

Following my departure from Boigu and the relocation to Mabuiag Island, I was able to maintain contact with the community rangers, one of the councillors, the manager of the local store and other members of the Boigu community. I also continued to negotiate with the Boigu Island Council to visit Boigu Island whenever I could. On one occasion, I visited accompanied by a reporter and photographer from the Melbourne Age. The warm reception I received from community members during this visit to Boigu Island in January 1998 indicated that very positive reactions to the project had endured despite my absence from Boigu Island since November 1997.

4.6.1.2 Impacts from external perceptions

As the hunting of dugong in Torres Strait is a high profile activity, it requires an effective and appropriate level of liaison and negotiation between local communities as well as those external to Torres Straits. The positive community perceptions in Boigu Island towards the project and myself were seriously jeopardised by an article 'Slaughter of the Innocents' published in a major metropolitan newspaper, the Melbourne Age, on Saturday 7th February 1998. Unaware of the extent of friction towards me in the community caused by this article, I prematurely terminated a visit to Boigu Island in March 1998 to collect samples. Before leaving the Island, I attempted to clarify that I was not supportive of views (on traditional hunting of dugongs and turtles) contained in the article in Melbourne Age. Nonetheless I left Boigu Island prematurely without sampling the five dugongs landed during the time of my visit.

Upon my arrival to Boigu Island in March 1998, the Financial Services Officer in the Council advised me that the Council had considered banning me from Boigu Island but had decided to confront me directly about this article. They believed that I was personally responsible for the contents of the article. One councillor, who had been interviewed by the Melbourne Age reporter and with whom I had enjoyed a good working relationship, was apparently particularly disappointed with me. I immediately drafted a letter to the Boigu Island Council, explaining that my involvement with the Melbourne Age article was purely one of assistance in providing information. I confirmed that I did not support the reporter’s views on traditional hunting of dugongs and turtles. I attached copies of my letter sent directly to reporter and a letter sent by AFMA to the editor of the Melbourne Age.
I then wrote a letter to the editor of the Torres News that was published in the edition of 20-26th March 1998. I hoped that this letter would help alleviate the tension and misunderstandings towards my project caused by the Melbourne Age article. While my personal relationships with the community rangers, individual hunters, councillors and other community members were unaffected, underlying tensions continued intermittently with the Council. This situation was alleviated after the journalist responsible for the above article wrote to the Boigu Island Council (at my instigation) affirming my opposition to the views expressed in his article. In contrast, informal discussions with the Mabuiag Island Council about the above article revealed no such concerns. This situation stimulated the island Co-ordinating Council (ICC) and Torres Strait Regional Authority (TSRA) to develop research protocols. All media attention must now be directed to them.

4.7 TRAINING OF TORRES STRAIT ISLANDERS

High priority is accorded to improving the technology transfer and skills development of Torres Strait Islanders by the Torres Strait Marine Strategy program, MaSTERS, developed by the Island Coordinating Council (see Chapter 3.4.1). However, there have been few studies on natural resources in Torres Strait which have provided mechanisms to facilitate such a process.

A major objective of this study was to provide training to Torres Strait Islanders in the collection of biological specimens and fisheries catch data (see Chapter 1). Such skills will enable Torres Strait Islanders to have continued active participation in the research, monitoring and management programs for dugongs and green turtles in Torres Strait. In addition, the assistance of Torres Strait Islanders in the collection of specimens and data was essential to fostering local support. The technology transfer I facilitated should be beneficial to other long-term monitoring and management programs for dugongs.

I trained roving monitoring observers from AFMA, community rangers and other local people nominated by Island Councils to collect specimens and data from dugongs and turtles being butchered for food. Unfortunately, I found it impossible to maintain training programs for extended periods for research assistants in Boigu or Badu Islands as originally planned, because of my location on Mabuiag Island. However, I worked actively with the Island Co-ordinating Council and Torres Strait Regional Authority with their efforts to explore opportunities to develop an appropriate regional training program for environmental management in Torres Strait.

My attempts at training rangers to assist in data and specimen collection proved to be problematic. Ponte (1996) pointed out that community rangers employed in Aboriginal and Torres Strait Islander communities face a number of challenges. These include lack of training, lack of secure long-term employment opportunities, lack of recognition by the communities and external agencies, lack of direction and
insufficient equipment and inadequate funding. Ponte (1996) found these challenges led to lack of motivation and low self-esteem in the rangers in Boigu Island.

Although the rangers demonstrated initial enthusiasm for my project, it was difficult to maintain their motivation. From a catch monitoring perspective, there are clear advantages to having rangers who are also key dugong hunters. However, training in sampling was seriously compromised by rangers who were also active hunters because they have customary obligations when butchering. Nonetheless, rangers accounted for 65% (n = 13/20) of the dugong catch recorded over 11 weeks sampling in Boigu Island.

Another significant obstacle resulted from constraints imposed by the rangers being employed through the CDEP scheme. This limited working hours to 8 am to 5 pm. In addition, CDEP employees, including the rangers are employed only on alternate weeks. Given that most of dugong hunting is undertaken during the weekends and that most dugongs were butchered in the early morning, rangers were required to work after hours in order to assist in sampling. Other less significant problems were the various personal and community obligations, particularly of the senior members of the community. In addition as CDEP workers, rangers were also required to work in other Council projects. This situation made it difficult for rangers to make my project their main priority.

The withdrawal of the Boigu Island Council supplements to CDEP for rangers provided an opportunity for me to provide the community rangers with a cash incentive to work after hours for the project. As the CDEP wage is low, at least one ranger in Boigu Island supplemented his income by diving for crayfish. Thus, providing a cash incentive to undertake after hours work for my project had significant potential to be effective. Supplementary payments for rangers to assist the project were implemented on a trial basis.

Data and specimen collection on Boigu and (initially) Mabuiag Islands was difficult and resulted in very few complete sets of data and specimens. The AFMA roving monitoring officers undertook a one-week training program with me in Mabuiag Island in September 1998. Two roving monitoring observers routinely collected specimens for the project as part of their work duties on the outer islands during September 1998 and October 1999. I trained the observers to enable them to

- collect accurate fisheries catch data for dugongs and turtles
- collect and process biological specimens from dugongs and turtles caught in Mabuiag, Badu and Boigu Islands
- understand the importance of: (1) knowledge of life history information for management and conservation of dugongs and turtles; (2) the need for sustainable harvests of dugongs (and turtles); and (3) research and monitoring programs for dugong and turtles in Torres Strait.
These skills allowed AFMA monitoring observers to effectively participate in activities which provide information to the community on the need for dugong and turtle management and conservation.

While I was based at Mabuiag Island, a number of local people were employed as research assistants. They included a regular hunter, a highly regarded dugong butcherer and recent school leaver. Their contribution to the fieldwork enabled more comprehensive sets of specimens to be collected and was crucial to the successful completion of my research.

4.8 BENEFITS OF THE RELATIONSHIP BETWEEN HUNTERS AND SCIENTIST

The methods I used for obtaining local knowledge and working collaboratively with hunters required considerably more flexibility than conventional biological research, particularly in terms of sampling regimes, methodology and time frames. Documenting the methodology used in my research has highlighted the potential benefits of recognising the importance of Islander collaboration, particularly at Mabuiag Island, in research on dugongs in Torres Strait.

My capacity to recognise, acknowledge and reconcile my obligations to the communities (by respecting their decisions) while maintaining the scientific integrity of my data and specimens was crucial to the successful completion of my fieldwork. For example, on one occasion on advice from community members, I decided to 'respect' the sudden death of an Elder by not sampling an unusually small pregnant dugong even though I had a strong desire to confirm that the dugong was much smaller (i.e., younger) than pregnant females reported in the literature. After the funeral feast, the head of this animal was given to me and I was subsequently able to confirm my suspicions (see Chapter 7). In subsequent sampling, I did not attempt to sample any animals being butchered for funerals (whether they were regarded as a significant community members or not) or any other culturally sensitive occasions (such as dugongs captured as part of initiation rites). In almost all such instances, the information and/or some samples would be given to me at a later time.

I was confident that my fieldwork had widespread community support when a male relative who had recently returned to the Mabuiag community loudly complained at a butchering that my sampling was harassing people's 'right' to undertake a 'traditional' activity. The hunter concerned promptly admonished his 'uncle' and pointed out that I had lived here longer than he (the uncle) had. Upon hearing the story, the Community Clerk (informally) suggested that the Mabuiag Island Council erect a sign informing people that all dugongs butchered on the beach had to be sampled by me. Although I greatly appreciated this evidence of support for my research, I did not pursue any formal avenues with the Council to erect a sign.
The benefits from accepting these protocols resulted in an exchange of short and long-term benefits to both the community and the scientist. The hunters and community benefited because I obtained critical scientific information required to assist in evaluating the sustainability of their dugong fishery. From my perspective as a scientist, the consultative approach provided me with an invaluable opportunity to collect both important traditional knowledge from the hunters plus data and specimens from a species that is very difficult to work on. My strong relationship with the community will provide a sound basis for any future collaborative research and management of dugongs at Mabuiag Island. Moreover, the consultative approach fostered a relationship of mutual trust and respect that allowed:

- Effective explanation of the research aims to the community.
- Careful consideration of the impacts of the research activity on the hunters and the community.
- Opportunity to negotiate any changes to my sampling regime or research aims (for example to explore the potential impact of high concentrations of heavy metals to the health of Torres Strait Islanders from the consumption of dugong meat and offal, see Haynes and Kwan 2001).
- Traditional information of relevance to the research plan and sampling regime to be obtained.
- Adequate discussions about how the community could access and use the information, which allowed them greater commitment to the research aims.

One additional benefit of establishing this relationship was the opportunity to address local concerns about the potential risks of high heavy metal concentrations both to dugongs and to the health of Torres Strait Islanders from the consumption of dugong meat and offal (see Haynes and Kwan 2001). As explained in Chapter 1, while this research on heavy metal levels in dugong meat is not included in this thesis, it provided an additional opportunity for Torres Strait Islanders to trust me and the other empirical data obtained in my study.

4.9 SUMMARY

- My fieldwork in Torres Strait was mainly based on Mabuiag Island where I lived from September 1997 to November 1999. Successful fieldwork was facilitated by the favourable experiences of members of the Mabuiag Island community with research undertaken by Bernard and Judith Nietschmann during 1976-77.

- I developed a collecting regime within a sampling protocol that was continually renegotiated with community members, in particular the hunters. The successful completion of my fieldwork was largely because of the strong community support and a high level of co-operation of local hunters.
• Marine mammals, particularly those that are considered threatened, such as dugongs, are notoriously difficult to study. The subsistence harvest of dugongs in Torres Strait provided a rare and invaluable opportunity to obtain empirical information from the collection of specimens and data.

• The methods for obtaining local knowledge and working collaboratively with hunters required considerably more flexibility than conventional biological research, particularly in terms of sampling regimes, methodology and time frames.

• Documenting the methodology used in my research has highlighted the potential benefits of recognising the importance of Islander collaboration in research of dugongs in Torres Strait.

• The employment of Islanders as research assistants in future research in Torres Strait is considered obligatory to provide important local information and the opportunity to contribute to capacity building of community members to be more actively involved in research activities.

• Being able to live and work within the Mabuiag community presented me with an opportunity to build mutual trust, co-operation and commitment between the community and myself as a scientist.

• The involvement of Torres Strait Islanders as active participants in the research, and my acknowledgement of the range and complexity of socio-cultural factors were central to the successful completion of this study.
This chapter describes the traditional fishery for dugongs at Mabuiag Island as it operated during 1997-99.
5.1 INTRODUCTION

Torres Strait Islanders are members of one of the oldest remaining Indigenous marine hunting societies in the tropics (Cordell 1989) with rates of seafood consumption amongst the highest in the world (Johannes and MacFarlane 1991). In spite of 200 years of profound external influences since contact with Europeans, access to large numbers of dugongs (and green turtles, *Chelonia mydas*) has enabled Islanders to maintain much of their traditional way of life (Nietschmann and Nietschmann 1981; Nietschmann 1984, 1989). The hunting of both species continues to sustain vital cultural practices, ceremonial feasting and rites of passage (Nietschmann 1984; Muirennan and Scott 2001). This situation has persisted even though most basic necessities are now provided by a cash economy, which is largely based on government funding through employment opportunities and social security (see Section 3.2).

The hunting of dugongs in Torres Strait has received considerable attention in the literature from anthropologists (Haddon 1912; Nietschmann 1984, 1989; Raven 1990), geographers (Eley 1988; Schugg 1995) and marine scientists (Hudson 1986; Johannes and MacFarlane 1991). Since the 1970s much of this attention has been directed at quantifying catch rates of dugongs in the region. The catch rate of the traditional dugong fishery in Torres Strait has been monitored by an Australian government management agency since 1991 (Harris et al. 1997; Marsh et al. 1997) (see Table 3.1 and Section 6.3.6). Concerns remain about the sustainability of these harvests and the need to reconcile management intervention with the socio-political and cultural needs of Torres Strait Islanders, should the harvest prove unsustainable (Marsh 1996; Marsh et al. 1997; Kwan et al. 2001).

Whereas the sustainable use of wildlife resources is an important issue for Indigenous people, as noted by several authors (Altman et al. 1995; Caughley et al. 1996; Davies et al. 1998), there is an absence of comprehensive data on Indigenous peoples’ long-term utilisation of most species. This lack makes it difficult to make definitive statements about both wildlife management and sustainability. In particular, there is very little long-term research that takes into account the seasonal and long-term fluctuations in use as well as catch (Altman et al. 1995).

Although empirical data about catch effort and rates are critical, when a species has great cultural value, the knowledge of the social, economic and cultural context of hunting provides equally important insights about hunting pressure. In this chapter, I describe the traditional fishery as it operated at Mabuiag Island in 1997-99.
5.2 METHODS

5.2.1 Collection of Data

As outlined in Chapter 4, data were obtained during my fieldwork at Mabuiag Island during November 1997 to October 1999 inclusive. As dugongs caught by hunters in Mabuiag Island are butchered at specific landing sites belonging to individual families or clans, I attended most landings of dugongs to interview hunters. The hunter, a member of his crew or community members provided information at a later date when it was not possible or culturally inappropriate for me to interview the hunter at a butchering event (see Chapter 4). Hunters provided information on: the duration of their hunting trips; the location of hunting; the number in the hunting party; the number and sex of dugongs caught and, how the catch was used or distributed.

5.3 RESULTS AND DISCUSSION

5.3.1. Hunters and Hunting Parties

In Torres Strait today, the harpooner is usually the person in a hunting party with the most skill in dugong hunting. He is generally recognised by the community as the 'hunter'. Accordingly, I used the term 'hunter' to refer to the person who led the hunting party. He was usually the harpooner. The hunter was responsible for all the decisions concerning the hunting event, including when and where to hunt. He was accorded the prestige generated by a successful catch and was responsible for apportioning shares from the catch to his hunting crew and to others in the community. The hunter received the best cuts of meat.

During 1998-99, a total of 29 individual men based in the Mabuiag Island community engaged in hunting (Table 5.1) however, the number of hunters active in either year varied (Table 5.2). During 1998 and 1999, a total of 20 and 22 individual hunters respectively, were recorded hunting for dugongs from Mabuiag Island (Table 5.1). Most hunters (n = 20, 69%) were from Mabuiag Island and represent 57% of adult males on the island (35 males > 25 years old, 1996 census). Hunters from nearby island communities also hunted from Mabuiag (Table 5.1). Seven hunters (28%) from Badu Island and one hunter each from St Pauls and Thursday Island were recorded hunting in Mabuiag waters during 1998-99 (see Figure 3.1).

During 1998-99, members of a hunting party or 'crew' from Mabuiag Island were usually younger relatives or friends of the harpooner. Most of the hunters I interviewed were men over thirty years old. The younger men were involved with less skilled activities such as dinghy driving or assisting with the sail.
Table 5.1. Total catch, total number of hunting trips and CPUE (number of dugongs/trip) for individual hunters during March to October in: (a) 1998 and (b) 1999.

<table>
<thead>
<tr>
<th>Hunter Code</th>
<th>Hunter origin</th>
<th>1998 Total trips</th>
<th>1999 Total trips</th>
<th>Total trips with zero catch</th>
<th>Total dugong catch</th>
<th>1998 CPUE</th>
<th>1999 CPUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Mabuiag</td>
<td>59</td>
<td>52</td>
<td>7</td>
<td>16</td>
<td>58</td>
<td>55</td>
</tr>
<tr>
<td>B</td>
<td>Mabuiag</td>
<td>26</td>
<td>36</td>
<td>2</td>
<td>12</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>C</td>
<td>Mabuiag</td>
<td>12</td>
<td>5</td>
<td>1</td>
<td>0</td>
<td>15</td>
<td>5</td>
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<tr>
<td>D</td>
<td>Badu</td>
<td>13</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td>E</td>
<td>Mabuiag</td>
<td>10</td>
<td>13</td>
<td>2</td>
<td>2</td>
<td>11</td>
<td>12</td>
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<tr>
<td>F</td>
<td>Mabuiag</td>
<td>3</td>
<td>11</td>
<td>0</td>
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<td>7</td>
<td>13</td>
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<td>G</td>
<td>Mabuiag</td>
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<td>I</td>
<td>St Pauls</td>
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<td>K</td>
<td>Mabuiag</td>
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<td>P</td>
<td>Mabuiag</td>
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<td>U</td>
<td>Mabuiag</td>
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<td>3</td>
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<td>3</td>
<td>1</td>
<td>0</td>
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<td>V</td>
<td>Mabuiag</td>
<td>nd</td>
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<td>X</td>
<td>Mabuiag</td>
<td>nd</td>
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<td>nd</td>
<td>0</td>
<td>nd</td>
<td>1</td>
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<td>Thursday Is</td>
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<td>nd</td>
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<td>Z</td>
<td>Mabuiag</td>
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<tr>
<td>Cd</td>
<td>Badu</td>
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<td>nd</td>
<td>0</td>
<td>nd</td>
<td>1</td>
<td>nd</td>
</tr>
<tr>
<td>Ef</td>
<td>Badu</td>
<td>1</td>
<td>nd</td>
<td>1</td>
<td>nd</td>
<td>0</td>
<td>nd</td>
</tr>
</tbody>
</table>

n.d. = no data
Chapter 5 The Practice of Hunting Dugongs at Mabuiag Island in 1997-99

Table 5.2. Details of hunters operating from Mabuiag Island in 1998 and 1999.

<table>
<thead>
<tr>
<th>Hunting Party</th>
<th>1998</th>
<th>1999</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of trips</td>
<td>Proportion</td>
</tr>
<tr>
<td>Mabuiag only</td>
<td>105</td>
<td>0.70</td>
</tr>
<tr>
<td>Mabuiag &amp; others</td>
<td>20</td>
<td>0.13</td>
</tr>
<tr>
<td>Others only</td>
<td>25</td>
<td>0.17</td>
</tr>
<tr>
<td>Totals</td>
<td>159</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Good dugong hunters enjoyed very high status within and beyond their community. Two hunters in Mabuiag who caught more than 30 dugongs in any one-year were highly regarded for their hunting skills (Table 5.1). Most other hunters were more opportunistic, often waiting until the more experienced hunters returned with news of local dugong abundance and hunting success (Table 5.1).

Two hunters based at Mabuiag Island caught between 56% (n = 88/156) and 59% (n = 85/144) of the total dugong catch of which the identity of the hunter was known between in 1998 and 1999 respectively (Table 5.1). Hunter A was the most prolific hunter in terms of hunting and caught 37% in 1998 (n = 58/156) and 38% in 1999 (n = 55/144) of the total catch taken when the identity of the hunter was known (Table 5.1). Hunter B caught 19% (n = 30/156) and 21% (n = 30/144) of the total catch during the same periods (Table 5.1). The catch per unit (CPUE) of both hunters A and B was less in 1999 (0.98 and 0.85 dugongs/trip, respectively) than in 1998 (1.15 and 0.83 dugongs/trip, respectively) (Table 5.1).

Only three other hunters in 1998 and only two hunters in 1999, caught more than 10 dugongs each, with hunting efforts ranging from 0.92 to 1.25 dugongs/trip (Table 5.1). The remaining hunters caught between one to seven dugongs each with hunting CPUE ranging between 0 – 2.33 dugongs/trip in 1998 and/or 1999 (Table 5.1). The hunting CPUE of the most active hunters in Mabuiag was lower than that of some less avid hunters because the latter only hunted during periods of likely high returns (Table 5.1) when locations of high dugong abundance were widely known. News of high dugong catches tended to spread very quickly within and beyond the community to other communities such as Badu and Thursday Islands resulting in a rush of hunting activity and high daily catches. For example in April 1999, seven individual hunters caught a total of 10 dugongs in one day.

Hunting parties typically consisted of two to three men. Individual hunting parties consisted of members from one community or of a combined crew from Mabuiag Island and other communities. Hunting parties of Mabuiag Islanders only were predominant in both 1998 and 1999 (Table 5.2). There were fewer hunters from other communities in 1999 than in 1998 (Table 5.2). For example, in 1999 the proportion of hunters who came from Badu was only 15% compared with 30% in 1998. Hunters from Badu Island were more
likely to hunt on their own island in 1999 because of the high numbers of dugongs on nearby Dollar Reef (Figure 5.1).

Figure 5.1. The major hunting areas of dugongs used by hunters from Mabuiag and adjacent communities.

5.3.2 Hunting Methods

There has been relatively little technological change in the traditional hunting equipment used for dugongs in Torres Strait. The traditional harpoon (the wap) with a detachable tip is still the main weapon used. The use of any other weapon to hunt dugongs has been banned since 1995 (Marsh 1998). A wap was used to catch all the dugongs I recorded except on one occasion when a person free diving for crayfish in shallow water opportunistically caught a small dugong by hand. Hardwood from the Wongai tree (Manilkara kauki) largely imported from PNG, is still used for the shaft of the wap but steel harpoon tips are now used in place of the traditional wooden barbs (see Johannes and MacFarlane 1991).

The use of motor-powered dinghies in place of traditional double outrigger canoes has enabled dugong hunting effort to be extended both in range and travel time (Johannes and MacFarlane 1991). Use of motor-powered dinghies may also reduce the influence of wind, tides and currents on the location and
The Practice of Hunting Dugongs at Mabuiag Island in 1997-99

Timing of hunting (Johannes and MacFarlane 1991). However, the high costs of fuel and oil and the limited fuel endurance and carrying capacity of dinghies probably largely offset these advantages.

Maintenance and repair costs of motors and dinghies were extremely high for Mabuiag-based hunters as these services were not available on outer island communities during my sampling period. A maximum of only 15 of the 33 registered dinghies on Mabuiag Island was functional at any one time during 1997-1999. Ponte (1996) reported a similar situation at Boigu Island where some 25 hunters used only 10 functional motorised dinghies. Consequently, it was sometimes necessary for hunters to borrow dinghies and repay such transactions with a share in the dugong catch.

A further disadvantage of motorised dinghies is that they are very noisy. Dugongs are reportedly very wary and have an acute sense of hearing. Consequently, hunters use small wooden boats in the actual hunt (Johannes and MacFarlane 1991; this study). Some hunters also prefer to use fibreglass dinghies because they are reputedly less noisy than steel or aluminium dinghies (see below, F. Mills, pers. comm., 1999).

Johannes and MacFarlane (1991) described the two main techniques used by Islanders for hunting dugongs in Torres Strait based on a stealthy or fast pursuit approach. Hunters based at Mabuiag Island during the sampling period used these techniques. Their choice of hunting method in 1997-99 was dependent on the weather conditions and the time of the hunt.

Reef hunting is a fast pursuit method that required only a dinghy driver and the harpooner. This method, which uses a spotlight, was used most commonly at night to hunt dugongs feeding on seagrass on reef tops. Hunters from Mabuiag and Badu Island told me that this method was adapted from that used in Boigu and Saibai Islands (see Figure 3.1) where the water is 'dirty' because of runoff from rivers on the southern coast of PNG (Johannes and MacFarlane 1991; Ponte 1996).

The second form of hunting, the stealthy approach or 'drift hunting' method was most commonly used by hunters from Mabuiag and Badu Islands where water clarity was high (Johannes and MacFarlane 1991). This method required two dinghies and a crew of three people because of the need for a harpooner, someone to tend to the sails and a third person to manoeuvre the boat. A dinghy with an outboard motor was used for transporting the party to the hunting area. The second, smaller (usually wooden) boat called a 'klinka' dinghy was used under sail in the actual hunt. Three 'klinka' boats were used for drift hunting from Mabuiag during 1997-99. This type of hunting requires considerable skill and was most frequently used during the South-East season particularly in sunny, windy conditions when the water is 'clean' (high water clarity). Drift hunting was also used at night in the South-East season but not during the North-West
season (November to April) when the hunters considered the frequently stormy conditions too rough and dangerous to hunt at night.

5.3.3 Hunting Locations

The duration of hunting trips was variable and depended on the location of hunting as well as weather conditions and the time of favourable tides. As discussed in Section 6.3.2, hunting trips are generally undertaken either during a morning or afternoon (approximately four hours). However, a trip can sometimes take all night or all day. All dugongs caught by hunters during 1998 and 1999 were taken within 35km of the Mabuiag community. In 1998 and 1999, 66% and 71% of the annual catch, respectively, was taken from the Orman Reef complex of seven reefs extending northeast from Mabuiag Island (Figure 5.1). Orman Reef is part of the traditional sea country of Mabuiag Islanders as explained below (Nietschmann 1989). The remainder of the catch (35% in 1998 and 29% in 1999) was taken from 'home reefs', fringing reefs associated with islands adjacent to Mabuiag Island (Figure 5.1). The spatial pattern of hunting was highly variable in areas furthest from Mabuiag Island. In 1998, no dugongs were caught at the farthest reef, Beka Reef (~35 km from Mabuaig Island, Figure 5.1, Table 5.3). In contrast, eighteen dugongs were caught at Beka Reef in 1999. However, very similar numbers of dugongs were taken in 1998 and 1999 at reefs closer to Mabuiag Island (Table 5.3).

Table 5.3. Numbers of hunting trips (n = 173) to reefs shown in Figure 5.1 in 1998 and 1999.

<table>
<thead>
<tr>
<th>Reef</th>
<th>1998</th>
<th>1999</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;30 km from Mabuiag Island</td>
<td>0</td>
<td>18</td>
</tr>
<tr>
<td>Beka Reef</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15–20 km from Mabuiag Island</td>
<td>32</td>
<td>38</td>
</tr>
<tr>
<td>Gururai Reef, No. 5 Reef &amp; Football Sand bank</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;10 km from Mabuiag Island</td>
<td>29</td>
<td>27</td>
</tr>
<tr>
<td>No. 2 Reef, Kuiki Pad and Home Reefs (fringing reefs)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Knowledge of the spatial distribution and abundance of dugongs was an important factor in the choice of hunting locations by hunters. Raven (1990), working in 1986-87, reported that visitors arriving at Boigu by aircraft were often asked where dugongs were seen. As information about the locations of areas of high dugong abundance was quickly disseminated within the community, the spatial and temporal pattern of hunting was generally consistent for all hunting parties at any given time. In this way, hunting effort was redirected from one area to another depending on information about the local abundance of dugongs. Information on locations of high dugong abundance continues to be keenly sought from people travelling by aircraft or boat in Torres Strait. Mobile phones coverage throughout Torres Strait expected in the latter
part of 2002, presents Islanders with the potential to use improved technology that may more efficiently disseminate information about areas of high dugong abundance.

The sea territory traditionally used by Mabuiag Islanders is reputedly the most important hunting ground for dugongs in Torres Strait (Nietschmann 1989; Johannes and MacFarlane 1991). This area comprises approximately 650 km² of which 190 km² are reef. This extensive sea territory includes the home reef Kuiki Pad to the south, the Oman Reef complex to the northeast as well as numerous fringing reefs around adjacent islands (Nietschmann 1984) (Figure 5.1). The hunting area used by hunters in Mabuiag (and Badu) Island was coincident with areas of highest dugong density revealed by aerial surveys (see Marsh et al. 1997, 2002; see Section 3.5). These areas extend from around Badu Island, north to Buru Island around Oman Reef and east to Gabba Island (Figure 2.1).

Islanders state that dugongs from the Mabuiag area are far superior in taste to those of other locations such as Boigu Island. They attribute this to the higher quality seagrass food for dugongs in the region. During my sampling period, people from Badu Island in particular and from St Paul, Kubin and Thursday Island visited Mabuiag Island specifically to hunt for dugong. According to Johannes and MacFarlane (1991) in the late 1970s dugongs became much less abundant on Dollar reef (see Figure 3.1), once an important dugong hunting ground to the south of Badu Island. Since this time, hunters from Badu Island frequent Oman Reef regularly to catch dugongs. However in 1999, hunters from Badu reported hunting more intensively again on Dollar Reef (Figure 5.1) because of the high numbers of dugongs.

Anecdotal information from hunters suggests that dugongs regularly move large distances from one area to another, presumably in search of food (see Harris and Nona 1997; Johannes and MacFarlane 1991; see Section 6.4.1.4). Hunters in Mabuiag consistently stated that dugongs stayed close to Mabuiag during the North-West monsoon and moved to Oman Reef during the South-East season where they fed on 'new shoots' until they moved on when they had 'finished the food'. Hunters told me that the high catch of dugongs in April 1999 at Mabuiag (see Figure 6.6 and Table 6.4) and anecdotal reports of high dugong catches at Friday and Hammond Islands (see Figure 3.1) resulted from the abundance of dugongs feeding on seagrass 'flowers' and 'fresh shoots'.

5.3.4 Seasonality of Hunting

The period May to September was reportedly the 'best' time for hunting because of the local abundance of dugongs, particularly at Oman Reef. Hunters also reported that dugongs move to the northeastern side of Oman Reef between Gariar and Beka Reefs (Figure 5.1) during September and October to mate. Hunters said that dugongs 'move away' from the area after October. Although this pattern is consistent with the monthly catch rate in 1998 and 1999 (see Section 6.3.5), sampling in this study was limited during November to February in 1998 and ceased in November 1999. However, I received anecdotal reports...
from hunters of little hunting activity at this time in spite of favourable weather for hunting in Mabuiag. This pattern was surprising given that this is the Christmas period when demand for dugong meat might be expected to be high. Nonetheless this pattern is generally consistent with that reported by Harris et al. (1997) who reported that hunters from the Western Islands believe that the wind pushes dugongs in a north-south movement between Cape York and the south coast of PNG. During the North-West season, dugongs apparently move south but their movements are reversed in the South-East season when dugongs move north (Harris et al. 1997).

5.3.5 Maintenance of the dugong hunting tradition

Prior to European contact, the hunting of dugongs was the most important male subsistence task and required considerable training and knowledge to acquire proficiency (Raven 1990). Today, proficiency at hunting dugong continues to provide unparalleled high status within and beyond the community. It takes skill, experience and knowledge to be a good dugong hunter (Nietschmann 1984; Raven 1990; Johannes and MacFarlane 1991). As such, even though the first successful capture of a dugong is an important event for a young man in Torres Strait (Raven 1990), this still does not immediately qualify him as a ‘hunter’. Instead the capture of his first dugong qualifies a young man as a ‘crew’ to hunting parties rather than as a ‘hunter’ per se.

Nietschmann (1989) described the detailed knowledge of Islanders of the seasonal and daily fluctuations in environmental factors such as tide, currents, wind and weather conditions which affect the temporal and spatial distribution and hence access to dugong resources. Islanders use this environmental knowledge to recognise and predict tidal and sea conditions (Nietschmann 1989). This knowledge is considered crucial to being a good dugong hunter.

However contemporary studies (Raven 1990; Johannes and MacFarlane 1991) suggest that young hunters seldom receive intensive training and are described by older community members as lacking the requisite skills and knowledge to successfully hunt or distinguish different types of dugongs. Older hunters often told me that, without the appropriate training, younger men were not learning how to hunt using traditional knowledge (see also Raven 1990; Johannes and MacFarlane 1991). The perceived continual loss and degradation of the traditional skills and knowledge required for dugong hunting coupled with the possibility that increasing numbers of younger men are losing interest in dugong hunting as a traditional practice cause much debate amongst Islanders in terms of the maintenance of Ailan Kasfon. Older hunters claimed that this lack of knowledge apparently made the younger men ‘lazy’ and inclined to hunt dugongs only when they are in abundance and catch rates are high (see Section 5.3.1). The hunting pattern of the less avid hunters provides support for such a claim (Section 5.3.1 and Table 5.1).
Working in Boigu Island in 1987, Raven (1990) suggests some of the knowledge (such as the capacity to interpret grazing patterns, once important for positioning hunting platforms (see Figure 5.2), has probably become redundant as a result of the adoption of new technologies, strategies and practices. Hunting success is thus dependent on knowledge of which combination of environmental factors is most favourable for hunting an elusive and wary prey, the local distribution and abundance of dugongs and the skill of the hunter.

Figure 5.2. Hunting platforms once used to hunt dugongs were built in dugong feeding areas from which dugongs were harpooned.

5.3.6 Consumption of Dugong Meat

In 1998-99, dugong meat was the main source of fresh meat of most families in Mabuiag Island. I estimated the maximum consumption of dugong meat based on the total catch in 1998 \( (n = 161, \text{Table 6.4}) \) and 1999 \( (n = 170, \text{Table 6.4}) \) using Nietschmann's (1984) calculation of 115 kg per dugong of useable meat and the census estimate population of Mabuiag in 1996 \( (n = 179) \). This equated to 283 g person^{-1}day^{-1} and 299 g person^{-1}day^{-1} of dugong meat in 1998 and 1999, respectively. During my sampling period, 92% and 91% of dugongs recorded in 1998 and 1999 respectively were used for home consumption while 8% and 9% of the dugong catch was used for other purposes, in particular funeral feasts. I recorded only 2% and 1% of the total catch in 1998 and 1999 respectively to be exported to relatives or friends outside Mabuiag Island. This is surprising, given that large quantities of dugong meat are apparently exported outside of Torres Strait to the mainland (Henry Garnier, ICC pers comm. 1998.). Marsh et al. (1997) reported similarly high per capita consumption of dugong meat for the Mabuiag Island
community in 1991-93 (315.7 g person⁻¹day⁻¹). Marsh et al. (1997) suggested that such high consumption rates may reflect: (1) over-estimates of dugong catches, (2) export of excess meat to other communities or (3) wastage of meat.

During the butchering, the hunter was responsible for deciding how the catch was to be shared. Based on Nietschmann’s (1984) calculation of 115 kg of useable meat, I estimate that a crew of three members would each receive approximately 38 kg. However, other family or friends or persons who provided fuel or the boat were usually given some of the catch. I observed up to 20 shares from one animal (average ~6 kg each). Most households in Torres Strait consist of extended families and there are often many related families in one community. Thus demand for dugong meat was often very high.

5.3.7 Issues of Consumption

The equitable sharing of dugong meat has been a potential source of social division from the inception of dugong hunting (Raven 1990). Thus, while the sharing ethic associated with kinship among Islanders remains strong, tensions arise because meat sharing is an obligation, while only the hunters meet the costs of hunting such as petrol, boat and maintenance (Fitzpatrick-Nietschmann 1980; Fitzpatrick 1991; Raven 1990).

Tensions over sharing dugong meat were evident on Mabuiag Island in 1998-99. Community members pressured an active dugong hunter to observe the social obligations to share meat amongst the community, even though this hunter had no obvious kinship relationships within the community. He had no male relatives or friends to act as crew for his hunts and often relied on Papua New Guineans who were staying with relatives in the community to hunt with him. As a result of this situation, none of his catch was distributed widely within the community.

Over a period of several months, community members became more and more vocal of their criticism of this hunter’s perceived ‘greedy nature’. The matter was raised indirectly at an occasional community meeting but no formal action was taken. The hunter was aware of the community’s disapproval and discussed the matter with me on several occasions. His view was that he had to pay for expensive fuel and oil and worked hard to keep his dinghy and motor in good condition. He considered that some of those who had been critical of him did not consider hunting as much of a priority as he did. He was non-committal about my suggestion that he provide a share of his dugong catch to those who volunteered in-kind contributions to the costs of a hunt.

When I returned to Mabuiag in March 1999 after a month away, this hunter was enjoying notably increased popularity in the community. He was distributing up to ten shares of his dugong catch to members of the community who were elderly or who had no boat to go hunting. He was now hunting with
another avid dugong hunter in order to share costs and avoid the problems associated with unreliable hunting crews. When I asked if the Council had spoken to him, he told me that it was his decision in order to 'stop people talking behind my back'. It was apparent that even without obvious kinship ties within Mabuiag Island, the community clearly considered that this hunter had social and ethical obligations. Social sanctions such as widespread uncharacteristically overt expressions of disapproval by community members were very effectively applied and achieved a satisfactory outcome.

**Interactions with Other Communities**

Dugong meat is consumed regularly in the Western Islands. However, I observed little evidence of wasteful practices. Mabuiag people were particularly scathing of any suggestion of wasteful practices or 'greedy' behaviour of dugong hunters. Many Torres Strait Islanders often stated their concern that current catch rates may be too high because of the actions of 'irresponsible' hunters. For example, on one occasion in 1999, 16 dugongs were caught in one night on Orman Reef for a church feast on Badu Island. Although the occasion was a highly significant ceremony attended by a large number of people from all over Torres Strait, many community members in Mabuiag expressed concerns that an unnecessarily large number of dugongs were caught.

A concern that catches of dugongs from the Mabuiag sea country by people from other communities were excessive resulted in a decision by the Council and Goemalgaw Corporation (the Mabuiag Island Native Title prescribed body corporate) in 2001, that outsiders wishing to hunt in the Mabuiag area, especially at Orman Reef, must first ask the Council for permission.

**5.3.8 Implications for Monitoring and Management**

There has been little information on the cultural, social, economic and environmental variables that determine hunting pressure and the dugong catch in Torres Strait. As discussed in more detail in Chapter 10, such information is crucial to the development of effective co-management strategies.

Only a very small number of hunters were responsible for most of the dugong catch in Mabuiag Island in 1997-99. Two experienced hunters dominated the fishery, only three to four other hunters hunted with any regularity. Hunting effort in Mabuiag Island appears to be driven by the hunting activity of the more experienced hunters; the other hunters wait until they learn of the locations of high dugong abundance from more experienced hunters. The historically relatively small and stable human population on Mabuiag Island (see Section 3.7) suggests that hunting pressure and effort has not increased substantially in contemporary times. However, while any significant increases in the size of the Mabuiag community is unlikely in the near future, the potential for increased population growth in major communities closer to
Chapter 5 The Practice of Hunting Dugongs at Mabuiag Island in 1997-99

Thursday Island, the administrative centre, may result in higher local hunting pressure on dugongs (see also Section 6.4.5).

Most of the catch was taken from the Orman Reef complex. Because of the nature of hunting effort in Mabuiag Island, this can often lead to very intensive hunting effort directed to specific areas. The implications of this practice could be serious if dugongs use specific habitats according to their sex and/or reproductive stage. Anecdotal information from some hunters suggests that some areas of Orman Reef are breeding habitat for dugongs. The high proportion of females (59 – 66% of the annual catch, see Section 6.3.4.5), the high proportion of catches taken from Orman Reef (66 – 71%, Section 5.3.3) together with the lack of evidence for selectivity for sex by experienced hunters (see Sections 6.3.4.4 and 6.3.4.5) support anecdotal reports of differential habitat use by dugongs. If this is the case, hunting effort may often be directed at their most vulnerable life stages.

The population dynamics of dugongs is most sensitive to female adult survivorship (see Section 7.3.13). The occurrence of key breeding habitats in the traditional hunting areas of Mabuiag Island requires a sensitive and appropriate management response.

There is also anecdotal evidence that the recent hunting effort has extended into areas that have not previously been used by hunters for dugongs. Improved technologies, which have enabled more efficient communication (e.g., future access to mobile phones in Torres Strait) as well as more regular travel (by fixed-wing aircraft, helicopters and boats) has allowed rapid identification of areas of high dugong abundance. Areas that have not previously been hunted, such as those in open-ocean deep-water seagrass habitats where hunting cannot easily occur (see Chapter 2) may be important 'source' or refuge areas for dugongs that supply 'sink' or hunted areas (see Novora et al. 2000). Given the nature of hunting activity described in Section 5.3.1, extension of sustained and intensive hunting effort into these potential refuge areas may have important implications for the sustainability of the dugong fishery in Torres Strait.

The maintenance of subsistence economies such as that based on dugong hunting continues to play an integral part in the social and ceremonial life of Torres Strait Islanders in spite of the profound impacts of European contact on almost every aspect of their lives (Beckett 1987). The very large populations of dugongs (and green turtles) combined with relatively low hunting pressure at least prior to European contact in the late 1870s have enabled Islanders to maintain much of their traditional way of life which includes marine hunting (Nietschmann 1984, 1989). Hunting of dugongs has persisted in 'Ailan Kastom' because it has preserved a way of life and a body of knowledge that gives meaning to the livelihood and existence of Islanders (Nietschmann 1984, 1989).
If management strategies are to be effective, they will not only need to actively involve Islanders but will also need to recognise and incorporate the immense socio-cultural significance of dugong hunting to Torres Strait Islanders. In many indigenous societies, local fisheries are regulated according to ‘how’ people fish because it is relatively easy to monitor in closed communities (see Acheson et al. 2001). Many fishers in traditional societies have considerable knowledge about the biology and ecology of their marine resources, knowledge that is crucial for hunting success. Fishing and hunting regulations controlling technology, fishing locations and fishing times are based on their ‘biological reality’ of critical processes (i.e., feeding patterns, migration routes, spawning patterns, nursery areas and seasonal rhythms) (Johannes 1981; Acheson et al. 2001; Johannes et al. 2000). Such rules are more likely to be considered by fishers to be effective and sensible (especially compared with empirical abstractions such as maximum sustainable yields) because they reflect local contexts and perspectives. As Johannes (1981) points out, ‘When fishermen do not understand the purposes of fishing regulations or perceive them to be imposed arbitrarily by outsiders, they are not liable to look on them with favour or obey them arbitrarily’.

5.4 SUMMARY

- The traditional subsistence fishery for dugongs is an important source of fresh meat and has great cultural significance to Mabuiag Islanders, being integral to their customary way of life or Ailan Kasfom.

- Only a few hunters hunt regularly and are responsible for most of the catch; the others are opportunistic and tended to hunt only when the more regular hunters experienced hunting success.

- Dugongs are harpooned with a wap from motorised dinghies. Hunters used either ‘reef-hunting’ (fast pursuit) or ‘drift-hunting (stealthy approach).

- The traditional sea territory of Mabuiag Islander is reputedly the ‘best dugong hunting grounds’ in Torres Strait. In 1998 and 1999, 66% and 71% of the annual catch at Mabuiag Island respectively, was taken from the Orman Reef complex, which is part of the traditional sea country of Mabuiag Islanders. The remainder of the catch was taken from ‘home reefs’, fringing reefs associated with islands adjacent to Mabuiag Island.

- The period May to September was reportedly the ‘best’ time for hunting, a pattern which is generally consistent with the monthly catch rate in 1998 and 1999.

- There is very high demand for dugong meat, a situation which can cause considerable tension about sharing dugong catches within Mabuiag Island community.
Effective management will need to acknowledge the cultural, social and economic significance of dugongs to Torres Strait Islanders.