

DUGONGS AND DUGOUTS, SHARPTACKS AND SHELLBACKS: MACASSAN CONTACT AND ABORIGINAL MARINE HUNTING ON THE COBOURG PENINSULA, NORTH WESTERN ARNHEM LAND

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ABSTRACT

This paper is concerned with one of the economic consequences of contact between Macassans and Aborigines in northwestern Arnhem Land. It outlines the manner in which items of foreign material culture such as iron and dugout canoes were incorporated into Aboriginal marine hunting technologies. A model is developed regarding the possible impacts of dugouts and iron on indigenous marine hunting strategies, and this model is tested through comparison of pre-contact and post-contact vertebrate faunal assemblages. Archaeological data suggest that the intensity with which large marine animals were hunted in northwestern Arnhem Land increased markedly after the onset of Macassan contact.

INTRODUCTION

For a period of approximately two hundred years the shores of Arnhem Land were visited by Macassans, who were fishermen from what is now the city of Ujung Pandang in southern Sulawesi. The Macassans who travelled to Arnhem Land worked between Cape Don to the west and the Sir Edward Pellew Islands to the east (Figure 1). They sought trepang, which was sold to the Chinese who regarded it as a delicacy and an aphrodisiac. Taking advantage of the monsoon winds, the Macassans arrived in Australia each year in December or January, and departed between April and June (MacKnight 1976). Macassan voyages to Arnhem Land began approximately AD 1720, and ceased in 1907 (MacKnight 1976, 1986; Mitchell 1994).

Aboriginal people from the Cobourg Peninsula, as well as many other parts of Arnhem Land, maintained intensive contacts with the Indonesian visitors. They participated in *trepang* collection, bartered goods such as turtle shell with the Macassans, and occasionally travelled to the port of Macassar. Aboriginal people from this region adopted many items of Macassan material culture, including wooden dugout canoes, nails, axes, bottle glass, tobacco, smoking pipes, beads and cloth (Warner 1932; McCarthy 1957; Thomson 1949). Macassans fathered children in Australia and many Aboriginal people became fluent speakers of the Macassan language (Tindale 1925; Urry and Walsh 1981; Walker and Zorc 1981). Macassan contact was reflected in music, art forms and even ceremonial life (MacKnight and Gray 1970; Rose 1947).

It has long been speculated that Macassan contact also led to major changes in Aboriginal hunting and gathering practices (Rose 1960; Schrire 1972; White *et al.* 1990). This paper discusses the impact of Macassan contact on Aboriginal marine hunting strategies on the Cobourg Peninsula, in northwestern Arnhem Land. Ethnographic evidence from this area indicates that both iron and dugout canoes, which were originally adopted from the Macassans, were readily adopted by Aboriginal people for marine hunting. Vertebrate faunal assemblages from pre-contact and post-contact middens on the Cobourg Peninsula are compared in this paper. The aim is to discover whether the adoption of Macassan technology led to a change in the rate at which large marine animals such as turtle and dugong were captured.

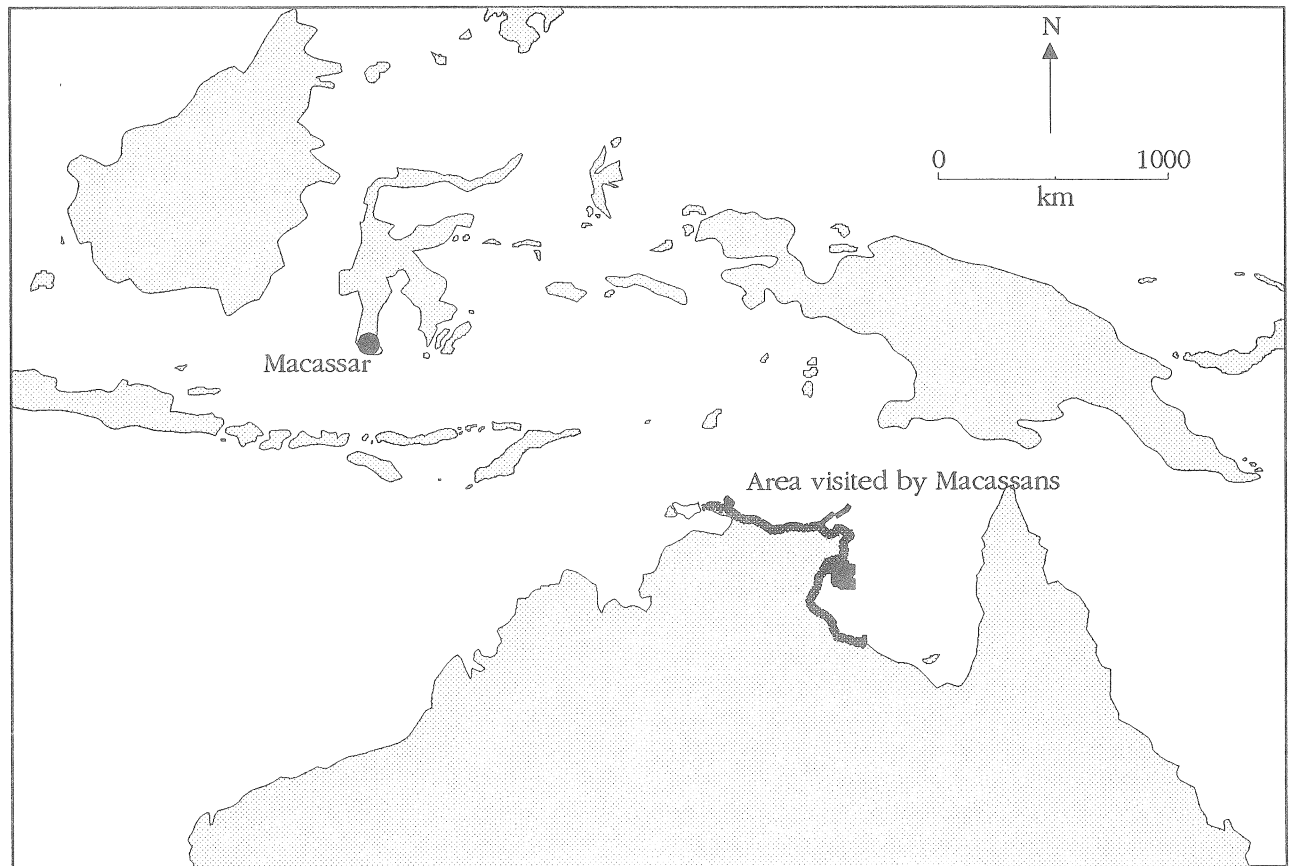


Figure 1: Macassan voyages to Arnhem Land

TURTLE AND DUGONG HUNTING ON THE COBOURG PENINSULA IN THE POST-CONTACT PERIOD

The importance of turtle and dugong within the diet of Aboriginal people on the Cobourg Peninsula was stressed in the strongest terms by observers in the nineteenth and twentieth centuries. European observers were almost florid when describing the popularity of turtle meat. On one occasion, when Aboriginal people visited a British settlement (Fort Wellington) and discovered their hosts had a tethered turtle,

They discovered great emotion...and requested very clamorously to have it. Mimjaloo then showed us their method of killing the turtle, and pointed out, with ecstatic delight, the parts of it that they chiefly prized...(Wilson 1835: 98).

According to Earl (1846b: 82), Aboriginal people from the Cobourg Peninsula "...look upon the turtle as being the greatest delicacy that their country affords...", while Keppel (1853: 178) stated that turtles abound and "...are their favourite article of food."

Given the popularity of this food, it is no surprise that turtles were frequently hunted and captured. For example, Earl (1846b: 82) stated that the Aboriginal people "...wage constant war with them, and are very expert at taking them with the harpoon". In a similar vein Wilson (1835: 164-165) stated "Catching turtle seems to be a favourite occupation with them, and they appear quite adept at that useful art". Numerous other ethnohistoric accounts confirm both the popularity of turtle meat and the fact that turtles were frequently hunted and caught during the post-contact period (Campbell 1834: 170; Mulvaney and Green 1992: 186; Sunter 1937; Webster

1986: 29; *Northern Territory Times* 27/2/1874; *Sydney Herald* 21/6/1840).

Although dugong were more difficult to catch than turtle, their flesh was equally if not more popular among the Aborigines of the Cobourg Peninsula. Earl (1846a: 249) noted that the flesh of the dugong "...is esteemed a great delicacy by the natives..." and that they "...kill it whenever they can, being very fond of its flesh..." (Earl 1863: 105). Keppel (1853: 178) agreed, stating

..the creature for which they will go any distance is the dugong...for a blow out of that dainty they will make more than a day's journey, and talk of it for a week afterwards.

Similarly, Sunter (1937: 54) expressed amazement over the "extent to which people from the Cobourg Peninsula could gorge themselves on dugong flesh."

Macassan objects played a central role in the capture of turtle and dugong during the post-contact period on the Cobourg Peninsula. Ethnohistoric records make it clear that both iron and dugout canoes formed prominent components of the equipment of turtle hunters in the nineteenth and twentieth centuries. The nails and iron hoops which the Aboriginal people obtained from Macassans and other foreigners were manufactured into harpoon heads. These harpoons took the form of a rounded steel rod sharpened at one end, and were usually less than 1 cm in diameter and between 12 cm and 15 cm long (Earl 1863: 103; Sunter 1937: 54-61; Wilson 1835: 111, 164-5, 169). A rope made of twisted hibiscus bark was securely fastened to the shank of the harpoon and the upper end of the shank was fitted into a socket cut into the end of a light pole (Earl 1863: 102-3). While the harpoons could be made of fire hardened wood, ethnohistoric records confirm that iron was the preferred material for making harpoon heads (Earl 1863; Wilson 1835: 164-5; McArthur in Allen 1969: 399).

The second element of Macassan technology, utilised for marine hunting in the post-contact period, was the dugout canoe which was cut or hollowed out of a tree trunk. Dugouts obtained directly from the Macassans measured between 20 and 25 feet long and could carry as many as 15-20 people (Campbell 1834: 167; Pasco 1897: 89). Aboriginal people on the Cobourg Peninsula commenced making dugout canoes in the middle of the nineteenth century, and continued to manufacture them after the Macassan voyages ceased (Mitchell 1994: 119-26). Dugout canoes presented a major contrast to the indigenous bark canoes, which were manufactured from sheets of bark sewn together with vines (d'Urville 1987: 388; Foelsche in Curr 1886: 273; Pasco 1897: 89). Bark canoes were used throughout the nineteenth century, but

there are no written records of Aboriginal people using bark canoes on the Cobourg Peninsula in the twentieth century. The following account of an Aboriginal turtle hunt on the Cobourg Peninsula illustrates the manner in which the harpoons and dugouts were utilised:

The boat used is a long narrow 'dug out' canoe, in which the fishers, always two, take their places, one at each end. As soon as a turtle is seen, the fisher in the bow stands up and fixes the peg [iron harpoon] in the *Oringa* or shaft. If the turtle allows the boat to approach sufficiently near, the harpooner...springs out of the boat, and drives the peg down with the whole weight of his body into the back of the turtle...the turtle re-appears above water, when the harpooner fixes a second peg with the line attached to the shaft and the same process of jumping out is repeated at the first opportunity. When the second peg is fixed, the turtle is considered secure, and is allowed to tire itself out...When sufficiently exhausted the turtle is dragged into the boat and carried on shore in triumph. (Earl 1863: 103).

Other descriptions of turtle and dugong hunting on the Cobourg Peninsula are similar to Earl's account, and emphasise that dugout canoes, rather than bark canoes, were used while harpooning turtle (Sunter 1937: 54-5, 61; Wilson 1835: 120).

TECHNOLOGICAL ADVANTAGES OF DUGOUTS AND IRON HARPOONS

Given the ready adoption of iron and dugout canoes by Aboriginal people following the onset of Macassan contact, it seems likely that the use of this technology offered advantages over other marine hunting techniques. On the evidence currently available, we can only speculate regarding the techniques that may have been used to catch turtle and dugong on the Cobourg Peninsula in the pre-contact period. A range of other techniques for the capture of turtle and dugong have been documented ethnographically across other parts of northern Australia. These techniques include capturing nesting turtles by hand, capturing dugongs in nets, or spearing dugong and turtles from bark canoes with wooden harpoons. It is possible that any or all of them were in use on the Cobourg Peninsula during the pre-contact period. The following discussion draws on ethnographic data from the Cobourg Peninsula and elsewhere across coastal northern Australia to highlight some of the advantages offered by the use of iron harpoons and wooden dugouts.

In many parts of northern Australia, such as Groote Eylandt, the Sir Edward Pellew Islands and north Queensland, Aboriginal people have told anthropologists

that in the past they used wooden harpoons (Bradley 1988, 1991: 94; McCarthy 1955; Roth 1901: 24; Thomson 1934: 246, 1939: 210; Tindale 1925: 93). In each of the cases documented above wooden harpoons had been replaced by harpoons made from iron. Informants from the different areas were unanimous in their reasons for adopting metal; only iron harpoons could penetrate a turtle's shell. In order to capture a turtle with a wooden harpoon, the animal could only be struck in the head, neck and flippers. The adoption of metal harpoons ensured that a lesser degree of accuracy was required, and accordingly the probability of success was increased.

Evidence from the Cobourg Peninsula itself also points to the superior qualities of metal harpoons. Wilson (1835: 111, 115) stated that Aboriginal people from Raffles Bay were eager to obtain iron and nails, because hafting metal on the spears had the affect of "...rendering them more efficient in spearing the turtle". There is also ethnographic evidence that some Aboriginal hunters found it easier to penetrate dugong hides with iron harpoons rather than their wooden counterparts (Smart 1951: 34). Accordingly, it is likely that the adoption of iron harpoons also provided a greater chance of success during both turtle and dugong hunting.

Use of dugout canoes also offered a number of advantages to Aboriginal hunters. For example, Warner (1969) recorded that among the Murngin of north eastern Arnhem Land both bark and dugout canoes were in use. Bark canoes were apparently easier to make, but dugouts made a better platform for harpooning. As such, Warner (1969: 452) stated that:

The dugout finally became a trait in Murngin material culture because a man has a better chance of harpooning a turtle, dugong or shark in the comparatively firm footing supplied by a dugout than he has from the unsubstantial bark canoe. Several informants who were excellent hunters declared this was the reason they used the dugout instead of the older bark canoe.

It is apparent that the adoption of dugout canoes was another strategy through which hunters could increase the probability of success during turtle or dugong hunting. Dugout canoes may also have made it possible to hunt or travel under a wider range of conditions than was possible with bark canoes or other watercraft (e.g. Baker 1988: 181). A visitor to the Cobourg Peninsula commented on the seaworthiness of dugout canoes owned by residents of this area, stating:

...as they possess large wooden canoes obtained from the Malay proas they can visit any of [the] islands at any time of the year, or go onto the mainland as they please (Foelsche 1880).

Indeed, there are records of individuals making journeys of over 500 km in dugout canoes in northern Australia (Baker 1988: 183; Sunter 1937: 35-6). By contrast, d'Urville (1987: 388) stated that the Aboriginal bark canoes he saw in use on the Cobourg Peninsula did "...not permit these savages to venture far from the shore and out to sea, however calm". Similarly, Keppel (1853: 183) observed that bark canoes at Port Essington were "...frail vessels, and easily upset...". Through the use of dugout canoes, Aboriginal people on the Cobourg Peninsula may have been able to hunt marine animals under a wider range of environmental conditions, and in a larger number of locations, than would otherwise have been possible.

As discussed above, ethnohistoric records indicate that turtle and dugong were particularly important animal foods within the Aboriginal diet during the post-contact period. It is possible, however, that large marine animals such as turtle and dugong were captured less frequently before the onset of Macassan voyages, when metal and dugouts became available. This possibility becomes particularly intriguing if the nineteenth century Aboriginal marine economy on the Cobourg Peninsula is compared to that on the directly-adjacent Melville Island. Melville Island was immediately outside the area visited by the Macassans, and accordingly its inhabitants did not have ready access to metal and dugout canoes early in the nineteenth century.

Major Campbell, commander of a short-lived British settlement on Melville Island in the 1820s, described the Aboriginal people from both Melville Island and from Port Essington (which is part of the Cobourg Peninsula). He stated that the subsistence patterns and material culture of the two groups were virtually identical, except that the occupants of Port Essington possessed dugout canoes and iron. The only other significant difference that Campbell identified was that

...from the number of turtle shells I observed scattered about in my excursions round the port [Essington], I imagine they are better supplied with that important article than their insular neighbours of Melville Island (Campbell 1834: 170).

Turtles are now frequently captured in the vicinity of Melville Island, and so this contrast cannot be explained as a result of natural factors (Mitchell 1994: 407). A potential link can therefore be identified between technological change and dietary change in the post-contact period. In order to test whether there was a major shift in the dietary importance of turtle and dugong it is necessary to turn to archaeological evidence.

If turtle and dugong were exploited more frequently on the Cobourg Peninsula after Macassan voyages began, then two propositions can be made about trends which might be expected in the archaeological record.

- 1) The proportion of post-contact sites containing the remains of turtle and/or dugong consumption should be higher than the proportion of pre-contact sites with such remains. This pattern is expected because the adoption of dugout canoes and metal harpoons would have allowed turtle and dugong to be hunted in a wider range of locations and perhaps throughout a wider period of the year.
- 2) In the case of stratified deposits with pre-contact and post-contact strata, the relative abundance of turtle and dugong remains should be far higher in the post-contact assemblage than in the pre-contact assemblage. This should be the case because adoption of dugout canoes and metal harpoons offered hunters a greater chance of success during turtle and dugong hunting.

PROPOSITION ONE: VARIATION IN THE FREQUENCY OF TURTLE AND DUGONG BONE ON PRE-CONTACT AND POST-CONTACT MIDDENS

A total of 43 midden deposits have been recorded and/or excavated on the Cobourg Peninsula to date (Allen 1969; Mitchell 1993, 1994; Tacon 1988) (Figure 2). These middens can be divided into two broad categories based on the time at which they were deposited. Post-contact middens were classified as those sites deposited after the Macassan voyages to Arnhem Land began at approximately AD 1720. Pre-contact sites were identified as those deposited before the onset of Macassan voyages. Criteria used to determine the age of these sites included radiocarbon dating, geomorphological context, the presence or absence of exotic fauna such as pig and cattle, and the presence or absence of foreign artefacts such as glass and pottery. Another criterion was the testimony of Aboriginal informants, some of whom had parents or grandparents who had camped at some of the midden sites in the area (Mitchell 1994).

Vertebrate faunal remains recorded from middens on the Cobourg Peninsula include turtle, dugong and a wide variety of fish, together with terrestrial taxa such as lizard, bandicoot, macropod, pig, buffalo and human skeletal material (Table 1). Turtle and dugong bone occurs relatively frequently on post-contact midden sites (Table 1). Dugong bones were recorded from four, or 23.5% of the 17 post-contact middens. The largest concentration of dugong bone occurs in the post-contact midden at Irgul Point (Site 25), where dugong bone occur with an aver-

age density of one specimen per 30 square metres. By contrast, none of the pre-contact midden deposits recorded in this study contained dugong bone.

Of 17 post-contact midden deposits included in this sample, a total of five, or 29.4%, contain turtle remains (Table 1). By contrast, only one (3.6%) of the pre-contact middens contain turtle remains. The quantities of turtle remains on post-contact middens varies considerably. For example Site 19 contains nine carapace fragments and one pharyngeal bone, while Site 16 contains hundreds of turtle bones and carapace fragments.

Variation in the relative frequency of turtle and dugong remains is summarised in Table 2. While turtle and/or dugong bone are present in 52.9 % of the post-contact middens, they are present in only 3.6% of the pre-contact sample. A chi-square test indicates that this variation is statistically significant at the 0.01 level ($\chi^2=12.20$, $df=1$, $p<0.001$). The chronological variation in the frequency of turtle and dugong remains is therefore consistent with predictions made on the basis of ethnohistoric data.

Variation in the frequency of turtle and dugong does not simply reflect differential preservation of bone in younger and older sites. Many of the pre-contact deposits, such as those at Sites 24 and MM1, consist of dense, stratified deposits of shell. The abundant shell in these types of deposit can be expected to saturate the ground water passing through the midden with alkaline salts, providing an effective buffer against the decay of faunal material (Sullivan 1989). No turtle or dugong bone was found in Sites 24 and MM1, although other types of vertebrate material, such as fish and mammal, were recovered. Stratified pre-contact sites from the Cobourg Peninsula are therefore likely to provide a good medium for bone preservation, and there is no reason to assume that turtle and dugong remains should have completely decayed in these contexts.

Furthermore, if turtle and dugong bone have decayed more frequently within pre-contact deposits, the frequency of other types of vertebrate faunal remains should also be significantly lower in pre-contact midden deposits. As can be seen in Table 1, pre-contact middens contain a variety of vertebrate fauna, including fish bone, mammal bone and lizard bone. If turtle and dugong bone are excluded from the analysis, the frequency of vertebrate fauna on pre-contact and post-contact middens is virtually identical (Table 3). Vertebrate remains other than turtle and dugong were found on 28.6% of the pre-contact sites. The frequency of such vertebrate remains on post-contact sites was slightly lower, at 23.5% (Table 3). This contrast is not statistically significant ($\chi^2=0.001$,

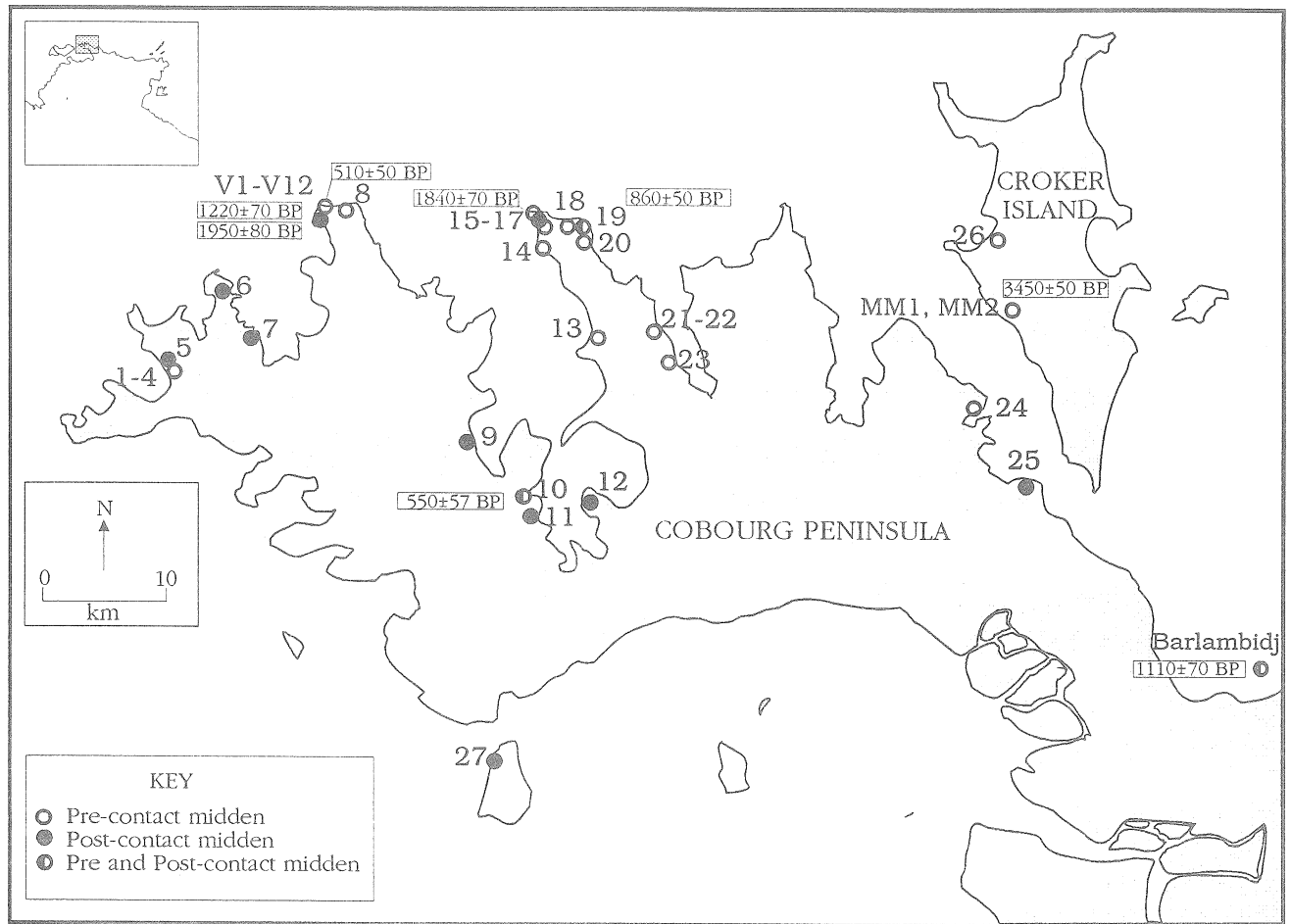


Figure 2: Location of middens on the Cobourg Peninsula

df=1, $p=0.982$). Given that vertebrate fauna other than turtle and dugong are present in equivalent frequencies on post-contact and pre-contact middens, the higher frequencies of turtle and dugong bone cannot simply be explained as the result of differential preservation.

PROPOSITION TWO: A VERTEBRATE FAUNAL SEQUENCE FROM COPELAND ISLAND

It is relevant to look further at the single midden deposit which contains turtle bone in both pre-contact and post-contact midden deposits. Barlambidj is a major Macassan *trepang* processing station on Copeland Island in Mountnorris Bay (Figure 2). Two Aboriginal midden deposits were also identified at this locality. The first is a post-

contact midden deposit on the ground surface, which contains a variety of artefacts such as flaked glass and pottery sherds. A second, subsurface midden was discovered fortuitously during the excavation of a Macassan structure. Seven radiocarbon dates, ranging between cal. AD 779-1000 to 1410-1621 have been obtained from shell and charcoal samples in this midden (Mitchell 1994: 322). Artefacts and faunal material were collected from three square metres of the surface midden, while a 1.25 square metre area of the subsurface midden was excavated.

A wide range of vertebrate taxa were identified within the samples obtained from the two middens, including 15 taxa of bony fish, shark (*Charcharinchus* sp.), stingray (*Dasyatidae*), lizard (*Agamidae*) and turtle

SITE	LOCATION	PRE-CONTACT	POST-CONTACT	FAUNAL REMAINS
5	Popham Bay		y	turtle, pig
6	Trepang Bay		y	dugong
V6	Vashon Head	y		fish
V12	Vashon Head	y		unid. vertebrate
9	Knocker Bay		y	turtle
11 ¹	Minto Head		y	dugong, fish, buffalo, macropod, bandicoot, lizard
14	Black Point	y		human
16	Smith Point		y	turtle, macropod
17	Smith Point	y		human
19	Port Bremer	y	y	fish (pre-contact) turtle (post-contact)
24	Bowen Straits	y		fish
26	Irgul Point		y	dugong
27 ²	Greenhill Island		y	dugong
MM1	Croker Island	y		fish, terrestrial mammal
Barlambidj	Copeland Island	y	y	fish, turtle, lizard

¹ (Allen 1969: 116-32); ² (Tacon 1988: 16-7)

Table 1: Vertebrate faunal remains from midden sites on the Cobourg Peninsula

PERIOD	TURTLE/DUGONG ABSENT	TURTLE/DUGONG PRESENT	TOTAL
Pre-contact	27 (96.4%)	1 (3.6%)	28
Post-contact	8 (47.1%)	9 (52.9%)	17

Table 2. Presence of turtle and/or dugong remains versus age of midden

PERIOD	VERTEBRATE FAUNA ABSENT	VERTEBRATE FAUNA PRESENT	TOTAL
Pre-contact	20 (71.4%)	8 (28.6%)	28
Post-contact	13 (76.4%)	4 (23.5%)	17

Table 3: Presence of vertebrate fauna (excluding turtle and dugong) versus age of midden

PERIOD	TURTLE (NISP)*	OTHER TAXA (NISP)*	TOTAL (NISP)*
Pre-contact	1029 (8.7%)	10,808 (91.3%)	11,837
Post-contact	339 (44.4%)	425 (55.6%)	764

* Number of identified specimens

Table 4: Frequency of turtle bone calculated as number of identified specimens, Barlambidj

PERIOD	TURTLE (g)	FISH (g)	LIZARD (g)	UNIDENT. (g)	TOTAL
Pre-contact	135.6 (22.3%)	332.9 (54.8%)	0.4 (<0.1%)	139.1 (22.9%)	608.0
Post-contact	208.0 (85.9%)	25.4 (10.5%)	0.9 (<0.1%)	7.8 (3.2%)	242.1

Table 5. Frequency of turtle as a proportion of total bone weight, Barlambidj

(*Cheloina mydas*). The range of species within the two middens is virtually identical. Of the 19 vertebrate taxa identified at Barlambidj, 18 occur in the post-contact midden and 18 were identified in the pre-contact midden. Nonetheless, the relative frequency of turtle bone varies dramatically between the two assemblages.

The NISP (number of identified specimens) of turtle bone and carapace in the two middens is compared in Table 4. For the purposes of this analysis, the NISP includes not only those specimens which could be identified to the level of family or higher, but also those specimens which could be identified only as fish. In total, the frequency of turtle specimens increased from 8.7% ($n = 11,837$) of the total pre-contact vertebrate NISP, to 44.4% ($n = 764$) in the post-contact sample (Table 4). A chi-square test reveals that this variation is significant at the 0.01 level ($\chi^2 = 940.3$, $df=1$, $p < 0.001$).

The weights of various components of the faunal assemblage are compiled in Table 5. Again, the category of fish includes all taxa of bony and cartilaginous fish that could be identified to family level or above, together with those specimens that could be identified merely as fish. In total, turtle represents 85.9% by weight of the post-contact vertebrate assemblage, and only 22.3% of the pre-contact material (Table 5). Expressed in terms of weight, turtle bone is therefore substantially more frequent than other vertebrate remains in the post-contact deposit. The faunal sequence from Barlambidj therefore provides further evidence that significant changes took place within the indigenous economy in northwestern Arnhem Land after foreign contact began. Archaeological evidence indicates that the rate at which turtle and dugong were captured increased after the onset of Macassan contact.

FOREIGN CONTACT AND INDIGENOUS MARINE HUNTING: REGIONAL COMPARISONS

It is possible that large marine animals were captured more frequently during the post-contact period over a wide area of northern coastal Australia. Ethnographic evidence suggests that Aboriginal people from the whole of the Arnhem Land coast adopted identical techniques to those used on the Cobourg Peninsula for hunting large marine animals. Descriptions of turtle and dugong hunting in the nineteenth century and early twentieth century are available from the Goulburn Islands, the Millingimbi area, the Gove Peninsula, Groote Eylandt and the Sir Edward Pellew Islands (Figure 3). For example, a painting made in 1856 by Thomas Baines depicts two Aboriginal men from the Goulburn Islands hunting a turtle (Braddon 1986: 121). The men are in a dugout canoe and

are about to spear a turtle with what appears to be a harpoon tipped with metal.

Similarly, Tindale (1925: 93), McCarthy (1955) and McArthur (1960: 96) observed the inhabitants of Groote Eylandt and the adjacent mainland hunting turtle from dugout canoes with iron harpoons. Hunters observed by Tindale (1925: 93) tipped their harpoons with iron nails approximately eight inches (20 cm) long. As was the case on the Cobourg Peninsula, harpoons used on Groote Eylandt were mounted on the end of a long wooden pole, and tied with a length of rope to the front of the canoe (Tindale 1925; McCarthy 1955). Identical techniques were also used until recently on the Sir Edward Pellew Islands (Harney 1956: 161-3). In each of the cases described above, dugout canoes and metal were adopted by Aboriginal people for turtle and dugong hunting. It is possible that this technological change was also associated with an increase in the rate with which large marine animals such as turtles and dugong were captured.

Ethnographic data provide evidence that recent changes in the methods of turtle and dugong capture also took place outside of the Arnhem Land region. For example, Love (1936: 138) noted that the Worora people from the west Kimberley coast hunted turtle and dugong from rafts. At the time he made his observations, metal harpoons had replaced the fire hardened wooden spears which were formerly in use. Metal apparently increased the hunter's chance of success as:

Now, with an iron spear and a length of rope, the bigger game is more often captured, and the meal of solid meat, from turtle or dugong, much more frequent than in the primitive days (Love 1936: 138).

It is not clear in this case whether iron harpoons were originally introduced by Macassans on the Kimberley coast or by Europeans. Nonetheless, if Love is correct a dietary shift similar to that which occurred on the Cobourg Peninsula took place in the recent past on the west Kimberley coastline.

The eastern side of Cape York is another area where techniques of turtle and dugong capture altered throughout the post-contact period. Captain Cook's expedition observed Aboriginal people hunting turtle with outrigger canoes at the mouth of the Endeavour River in AD 1770 (Beaglehole 1962: 126-7, 134; Wharton 1968). A barbed wooden harpoon approximately one foot long was used to strike the turtles and the absence of iron was specifically noted (Wharton 1968: 321). Cook was not impressed by the frequency with which turtle were captured through this technique, stating "...of these I believe they get but few, except at the seasons they come ashore to lay" (Wharton 1968: 320).

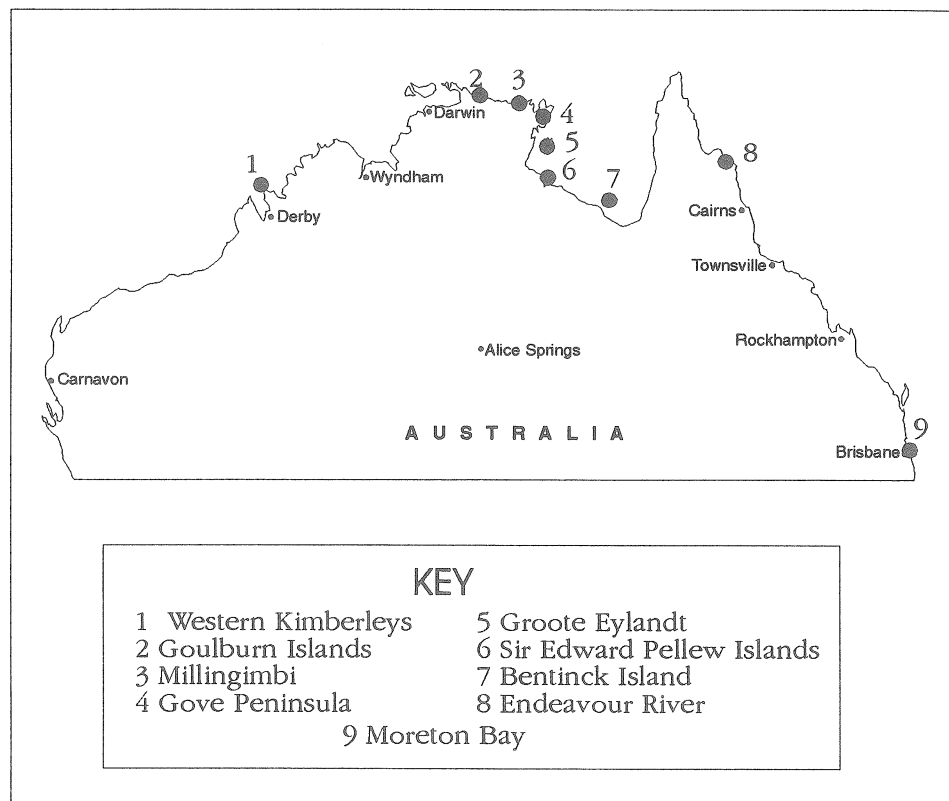


Figure 3: Location of ethnographic observations of turtle and dugong hunting

Early in the twentieth century outrigger canoes were still in use in this area, but the wooden harpoons had been replaced by harpoons made by wire or metal (Thomson 1934). Adoption of metal in this case apparently led to a shift in the importance of large marine animals within the indigenous diet

The natives say that in former times, when only wooden harpoons were used, turtle hunting was much more difficult than it is to-day, when iron and wire harpoons are in general use...turtle flesh was much less plentiful and was more highly valued than it is today. (Thomson 1934: 246)

It is possible that the rate at which turtles and dugong were captured was even lower before outrigger canoes diffused to the area from Torres Straits (cf. Rowland 1987).

Finally, another case of technological innovation in dugong hunting has been recorded from Moreton Bay in southeast Queensland. In the early years of European settlement, Aboriginal people were observed capturing

dugong in shallow waters with nets of indigenous manufacture. This technique was later abandoned, and Aborigines began to use European whaleboats and metal harpoons (Petrie 1980: 67-9). The parallels between the method of dugong capture adopted in Moreton Bay and those developed in northern Australia are intriguing. The similarities suggest that this represents a case of parallel innovation (cf McNiven 1993) and highlights the advantages associated with the use of iron harpoons and wooden watercraft.

CONCLUSIONS

Some ethnographers and archaeologists (e.g. Kenyon *et al.* 1924: 466; Peterson 1976; Spencer 1921: 89; White and O'Connell 1979: 26, 1982: 20) have stressed the conservatism of Arnhem Land societies in the face of foreign contact. For example, although Peterson conceded some economic change had been created by culture contact:

...the nature of their subsistence economy has ensured that where Aborigines are still living in, and off, the

bush there is a strong continuity between past and present in the exploitation of resources ... Iron age ethnography will continue to illuminate Stone Age remains. (Peterson 1976: 271-4).

The results of this study suggest that such an argument is not applicable to the Cobourg Peninsula. Ethnographically-documented Aboriginal marine hunting patterns cannot necessarily serve as a direct historic analogy for prehistoric marine exploitation. Indeed, this is likely to be the case over many parts of northern Australia.

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