The Trade of Marine Turtles in the Toliara Region, South West Madagascar

Ryan. C.J. Walker[1,3], Emily Roberts[2,3] & Eibleis Fanning[3]

[1]*Oak House, Pond Lane, Greetham, Rutland, LE15 7NW, UK. (E-mail: rw@coralcay.org)*

[2]*The Tropical Health and Education Trust, 24 Eversholt Street, London, NW1 1AD, UK. (E-mail: Erthet1@aol.com)*

[3]*Frontier: The Society for Environmental Exploration, 50-52 Rivington Street, London, EC2A 3QP, UK*

Five species of marine turtles inhabit Madagascar's coastal waters, green turtles (*Chelonia mydas)*, hawksbill turtles (*Eretmochelys inbricata)*, loggerhead turtles *(Caretta caretta),* olive ridley turtles (*Lepidochelys olivacea)* and leatherback turtles (*Dermochelys coriacea)* (Rakotonirina & Cooke 1994). The Vezo, a semi nomadic seafaring ethnic group indigenous to the southwest coastal region of Madagascar, have exploited marine turtles as a cultural resource for centuries (Asuti 1995; Petite 1930; Rokotonirina & Cooke 1994). This resulted in many traditions and rituals associated with their hunting by occupational marine turtle fishermen. In more recent times, as turtles have become utilised more as a financial resource, their cultural importance has gradually diminished (Rokotonirina & Cooke 1994). Artisanal fishing pressure has caused a reduction in the local populations of marine turtles (Rakotonirina & Cooke 1994) and there is no longer a specialist turtle fishery. Today, fishermen target marine turtles in an opportunistic fashion as part of a multi-species fishery (Walker *et al.* 2003).

The legal protection of marine turtles in the region is ignored by both the authorities and fishermen alike. Laws were passed in Madagascar as early as 1923 specifically targeting the protection of marine turtles. Decree 24, passed in October 1923, declared protected nesting sites on five islands around the country (Rakotonirina & Cooke 1994).

The eight small, subsistence fishing communities (figure 1) located within this arid coastal region of Madagascar (23°351 S, 43°407 E, to 24°044 S, 43°405 E) of Anakao, Andriangy, Maramena, Befasy, Beheloka, Ampasimahaoro, Besambay and Ambola fish marine turtles, in an opportunistic fashion. Population sizes of the villages range from approximately 20 in the case of Andriangy to more than 400 in Anakao. The number of active fishermen harvesting turtles in Ambola and Befasy is unknown, but Anakao is reported to contain 27 fishers harvesting turtles, Ampasimahaoro 6, Besambay 16, Maramena 120, Andriangy 4 and Beheloka 10 (Walker *et al.* 2003). A trade network exists in the region with fishermen selling captured turtles to dealers and then dealers in tern selling turtles or turtle products to traders (figure 2).

This study was undertaken over a period of 19 weeks between February and June 2002. Data were collected through semi-structured interviews and recorded in logbooks. Information was gathered on the economic value of marine turtles by interviewing fishermen from each of the eight communities regarding the fate and selling price of the captured marine turtles. The four dealers of Anakao were given logbooks with instructions to record the species, size, buying price, selling price and the date of each respective transaction over the study period. The dealers were provided with a pen, tape measure and a sand proof box to keep their respective logbooks in. A demonstration was given on the correct procedure for taking measurements, and in return notes on basic turtle biology and ecology were given in written Malagasy within the logbooks. No other incentive was given, but those involved apparently enjoyed the attention of having people take an interest in their livelihoods, in what is the most marginalized region of Madagascar. The above was conducted in addition to a long-term, sensitive, environmental education program undertaken in Anakao by the NGO, The Society for Environmental Exploration, that targeted those involved in the marine turtle trade amongst other resource users in the village.

The authors believe that the trust built up by them and previous researchers over a number of years makes it more likely that the data collected from the Anakao turtle dealers is accurate. For this reason, dealers in Toliara were not provided with logbooks as it was decided that initial trust had not yet been established, and that most only appeared to occasionally deal in marine turtles. Three Toliara dealers were, however, interviewed on the general buying and selling characteristics of their trade. Semi structured interviews with the two traders in Anakao, and seven traders in Toliara, including two involved in the curio trade, were undertaken. All interviewing was undertaken in spoken Malagasy. All fishermen, dealers and traders were responsive with regard to questioning, despite the controversial nature of the trade. There was some degree of appreciation that what they were doing may be illegal, and for this very reason extreme sensitivity was paramount during questioning.

Captured turtles are generally dealt with in two different ways by the fishers. Specimens <CCL 50cm are normally consumed within the respective communities. Larger specimens are either sold on to four specialist marine turtle dealers in Anakao or to the general meat and fish dealers in the Mahavatse region of the larger port town of Toliara, 20km to the north of Anakao (Fig. 1). We were not able to establish how many dealers operate here but estimate it to be in the order of seven.

The fishermen seem to make the main profit, having little costs, expending only time and energy to catch, transport and sell the animal. Fuel and expensive fishing gear are not an issue for the fisherman; almost all employ hand made shark gill nets (jurifa) and sailing pirogues to capture and transport marine turtles. The dealers and subsequently the traders must have enough capital to buy the animal, and then make a profit on the resale. A live adult marine turtle is worth a maximum of 500,000 Malagasy Francs (FMg) (US$ 74) to the fisherman (table 1). The price is normally determined by size rather than weight. The lowest price was quoted by the fishermen from Ambola, who reported that 150,000 FMg (US$ 22) is received for very small specimens. There is no difference in value among greens, hawksbills, olive ridleys or loggerhead turtles. Leatherback turtles, despite their general greater size, command a lower price as the meat is considered less palatable. Fishermen generally recover the turtles live from their nets and transport them to the dealers either in Anakao or the Mahavatse region of Toliara. Turtles are then kept alive, tethered on the beach by the dealers, as no refrigerated storage facilities are available, then slaughtered at an appropriate time, when the animal can be sold on to a trader. The mean (± SD) buying price

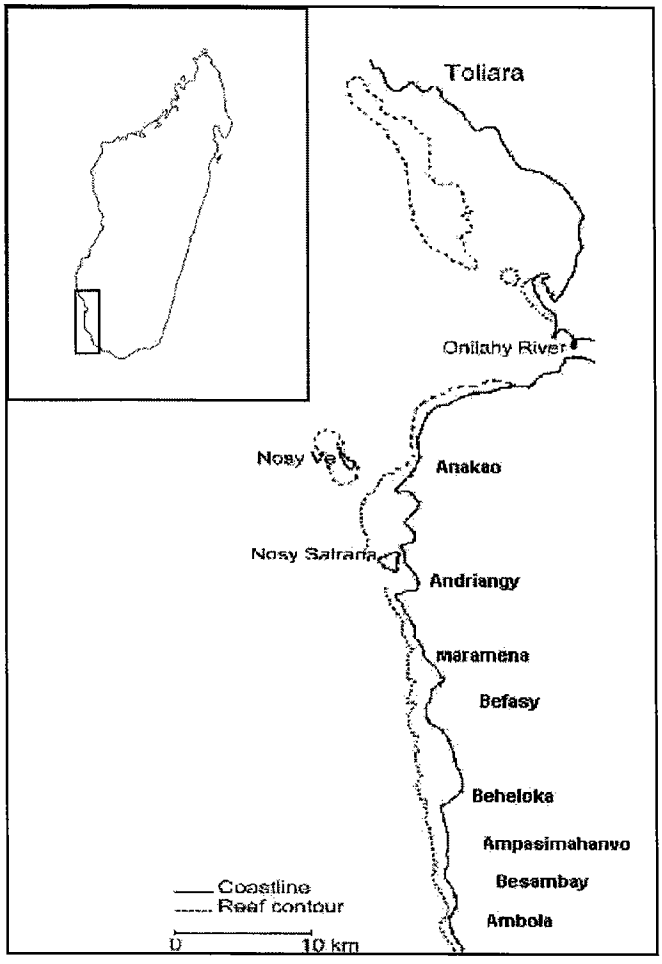

Figure 1. Location of turtle harvesting villages in south west Madagascar.

by the Anakao dealers is 209,000 (± 108,560) FMg or US$ 30 per animal (table 1). Fishermen claimed that marine turtles sold in the Mahavatse area of Toliara generally command a greater price, often in the region of 20-25% higher than in Anakao. Most of these dealers traded in marine turtle products sporadically, with other more reliable sources of income such as Zebu, goat or finfish forming the basis of their occupation.

Marine turtle meat is then sold by the dealers to traders in both Toliara (n = *ca.* 12) and Anakao (n=2) as fresh meat by the kilo, or by the traders as small cooked lumps to street stalls and small eateries. The cost of marine turtle meat in Toliara from meat stalls is approximately twice that of Anakao; 15,000FMg (US$ 2.20) compared to 6,525 FMg (US$ 0.97) on average per kilo. The majority of turtle meat is consumed through the purchase of small cooked lumps. These are priced at 500FMg (US$ 0.07) or 750FMg (US$ 0.11) in Anakao and 500FMg (US$ 0.07) or 2500 FMg (US$ 0.37) at the stalls in Toliara, (priced varied with the size of the portion and location). Occasionally, dealers in Toliara will sell on the carapaces to two curio dealers in town.

Twenty-eight marine turtles (comprised of 21 green, 4 hawksbill, 2 loggerhead and 1 olive ridley turtles; table 1) passed through the four dealers of Anakao during the study period. Dealer A made the greatest mean profit of 51,066 FMg (US$ 7.60) per animal, probably as a result of the general larger size of the animals (mean ± SD carapace length: 82± 28.1cm). Dealer A also purchased by far the greatest number of animals from the fishermen, suggesting that marine turtle dealing is the family's main source of income. Dealers Z and C purchased three and two animals respectively, and rely on other sources of revenue.

Anakao is the village in the study area where marine turtles are economically most important, due to the presence of dealers and traders that do not exist in any of the other villages. During the study, a profit of between 5,000 (US$ 0.74) and 200,000 FMg (US$ 30) per marine turtle was made by the 4 dealers active in Anakao, a profit of between 3% and 67% per animal (mean profit of 22%). The large variation in profit is attributed to the irregular nature of subsistence fishing activities in the region, which are notoriously dependent on environmental condition. The four dealers generated a total profit of 1,171,000FMg (US$ 174) over a period of 19 weeks (table 1).

The cost of marine turtle meat has increased over time, as a result of inflation and a reduction in numbers available. As marine turtles become locally less abundant as a result of harvesting, higher prices can be commanded for their sale. For example, an adult green turtle over 100kg could fetch as much as 200,000 FMg (US$ 33) in 1992 (Rakotonirina & Cooke 1994) - double the price of 1989. Today a similar animal can command prices of up to 500,000 FMg or US$ 74.

Compared to the meat, the carapace of the marine turtle has relatively little value, as dealers rarely sell them. The Anakao dealers are aware that tourists do not tend to buy marine turtle carapaces now. One of two Toliara curio traders stated that he only sold to Malagasy people or to tourists leaving by boat, because it is forbidden to fly out of the country with them, demonstrating a general confusion amongst those involved in this trade and what is perceived to be the law. Even fishermen in Besambay do not attempt to sell carapaces anymore, in recognition of the lack of market for them, a sign that word of the trade drying up has filtered down to the isolated fishing communities.

Of the marine turtles captured and sold to dealers in Anakao during the study, only 7 of the carapaces were sold (5 greens, 1 hawksbill and 1 loggerhead) for between 10,000 and 25,000 FMg (US$ 1.50-3.70; with the exception of a 58cm (CCL) green turtle carapace, sold for only 1,000 FMg (US$ 0.14) table 1). It is probable that the carapaces were sold for local domestic use (carrying receptacles and children's toy sleds are common uses in the area), rather than as curios to tourists because national political instability had put the tourist industry in the country on hold at the time of the study. Only 1 of the 7 carapaces sold was hawksbill, the favoured species of the curio trade. Curio traders in Toliara claimed that 40cm-long hawksbill carapaces are preferred by tourists, and can be sold for 50,000 FMg (US$ 7.40). Other species can command between 15,000 and 25,000 FMg (US$ 2.20 - 3.70), depending on the carapace size.

The sale of marine turtle products as curios has diminished in the area. Rakotonirina & Cooke (1994) stated that in 1992, small green and hawksbill carapaces were sold for about $US 1.00 and sales of stuffed specimens were rare with approximately 2 small green turtles sold per month for US$ 20 each. The general perception by those involved in the trade, from the fishermen to the traders,

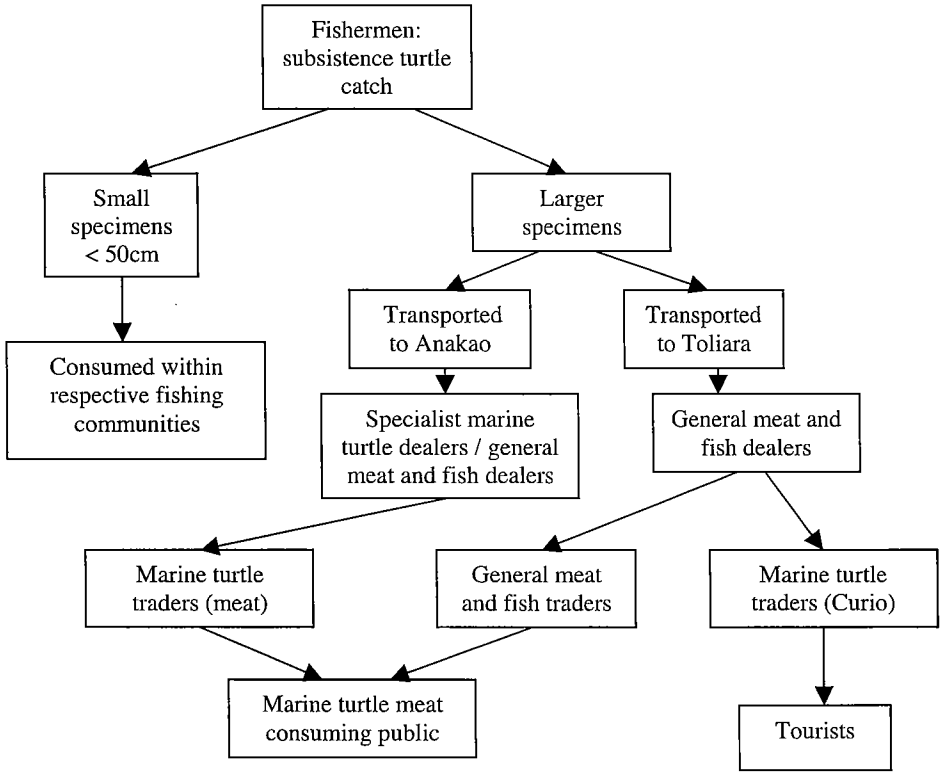

Figure 2. Flow diagram of the fate of fished marine turtles in the region.

is that tourists now refuse in general to buy turtle curio. This maybe a positive indication that campaigns by global conservation organisations have succeeded in educating the travelling public about the conservation implications of supporting such trade, and the exploitation of endangered species. In reality, however, this drop in tourist sales probably has little impact on reducing the number of marine turtles caught each year in this region. There is still a ready market for marine turtle meat in the region, and to a fisherman a 100kg green turtle is far more valuable than the fish he may catch whilst investing the same time and effort. At present there is no incentive to stop.

Rakotonirina & Cooke (1994) do not mention any trade network operating in Anakao during the time of their research. However, from Rakotonirina & Cooke's (1994) work, several shifts are evident in the commerce of turtle products in the region over the last 10 years. The fishing population has increased in the Toliara region by a factor of five over a period of 17 years (DRH/FAO 1992) and is still growing through migration of inland tribal populations moving to coastal regions (Cook *et al.* 2000). Increased pressure has been put on the diminishing, overexploited local marine resources (Cook *et al.* 2000), as more people try to create niches in the local economy. This is probably the case of the marine turtle dealers in Anakao. As marine turtles have become an increasingly scarce resource, commanding higher prices, entrepreneurial individuals have started buying marine turtles from fishermen, with the intention of selling them at a profit. The shift from occupational hunting to incidental or occasional hunting means less importance has been placed on marine turtles by the fishermen who now target multiple marine species, and are unable to generate high enough turtle catches to sustain a consistent supply to traders. This position in the local economy has been taken over by the dealers who tend to deal with the catch from multiple sources (fishermen) thus being able to maintain a relatively consistent supply of marine turtle products, if favourable weather conditions allow for fishing to take place.

Despite legal protection, the relatively lucrative nature of the marine turtle trade in this impoverished region of Madagascar has resulted in little adherence to laws that are seldom enforced. With the average monthly income of fishermen in the region being US$30-40, a large marine turtle can represent over a month's income. Sustainable alternative livelihoods need to be considered to lure fishermen away from marine turtle capture.

Acknowledgements: The authors wish to thank the overseas operations staff of The Society for Environmental Exploration. Support was gratefully received from in-country logistical staff, Jemima Stancombe and Sarah de Mowbray, and our collaborative organisation: The Institute of Marine Sciences, University of Toliara, Madagascar. Thanks must go to the self-funding volunteer research assistances that contributed to this work. Thank you to the two anonymous referees and the editors of MTN for suggestions on the structural improvement of this manuscript. Most importantly thanks to all Malagasy, fishermen, turtle dealers and traders involved in the turtle trade in the Toliara region for their patience and support.

Dealer	Species	CCL (cm)	Catch Location	Buying Price (FMg) from fishermen	Total selling price (meat) (FMg) to traders	Profit (meat) (FMg)	Carapace selling price (FMg)
A	Hks	49	Maromena reef	135,000	150,000	15,000	15,000
	Gre	120	Nosy Satrana	400,000	450,000	50,000	10,000
	Log	118	Befasy	200,000	210,000	10,000	-
	Gre	58	Befasy	70,000	-	-	1,000
	Gre	122	Beheloka reef	175,000	-	-	-
	Gre	104	Unknown	250,000	386,000	136,000	15,000
	Gre	61	Nosy Ve	250,000	350,000	100,000	-
	Gre	52	Nosy Ve	50,000	70,000	20,000	-
	Gre	50	Nosy Ve	50,000	70,000	20,000	-
	Gre	59	Nosy Ve	50,000	70,000	20,000	-
	Gre	51	Nosy Satrana	150,000	200,000	50,000	-
	Gre	112	Nosy Ve	300,000	375,000	75,000	-
	Gre	79	Nosy Satrana	80,000	100,000	20,000	-
	Gre*	100	Nosy Ve	300,000	500,000	200,000	-
	Gre	85	Nosy Ve	300,000	350,000	30,000	-
C	Gre	108	Nost Satrana	325,000	365,000	40,000	-
	Gre	103	Nosy Ve	230,000	260,000	20,000	-
R	Hks	32	Beheloka reef	150,000	175,000	25,000	-
	Log	93	Itampolo (S of Ambola)	185,000	250,000	65,000	25,000
	Gre	112	Befasy reef	250,000	300,000	50,000	10,000
	Gre	105	Nosy Ve	350,000	405,000	56,000	-
	Hks	70	Nosy Ve	170,000	200,000	30,000	-
	Gre	122	Nosy Ve	400,000	410,000	10,000	-
	Gre	85	NosyVe	100,000	105,000	5,000	-
	Gre	98	NosyVe	200,000	220,000	20,000	-
Z	ORid	49	Maramena reef	135,000	150,000	15,000	-
	Gre	60	Nosy Satrana	400,000	450,000	50,000	10,000
	Hks	75	Soalara	200,000	210,000	10,000	-

Table 1. Number, size, species and profit of the marine turtles passing through the 4 dealers of Anakao between February and June 2002. * = Sold on live to the trader. Hks - hawksbill, Log- Loggerhead, Gre- Green, ORid - Olive Ridley turtle.

ASTUTI, R. (1995). People of the sea: decent and identity amongst the Vezo of Madagascar. Cambridge University Press.

COOKE, A, O. RATOMAHENINA & E. RANAIVOSON. (2000). Madagascar. In: Shepard, C. (ed) Seas at the millenium. Elsevier Science Press. pp103-119.

DRH/FAO. (1992). Pêche et aquaculture à Madagascar. Rapport. DRH/ UNDP/FAO.

PETIT, G. (1930). L'Industrie des Peches a Madagascar. Societe des Editions Geographiques, Maritimes et Coloniales, Paris.

RAKOTONIRINA, B.P., & A. COOKE. (1994). Sea turtles of Madagascar – their status, exploitation and conservation. Oryx 28: 51-61.

R.C.J. WALKER, E. FANNING & E. ROBERTS (Eds). (2003). Artisanal and traditional turtle resource utilization in south west Madagascar, with views to management. Frontier Madagascar Environmental Research-Report 3. The Society for Environmental Exploration, London pp38.