

INDIA'S MARINE TURTLES: SENTINELS FROM ANTEDILUVIAN TO POST-MODERN TIMES

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Marine turtles predated as well as outlived the dinosaurs; and their interactions with humans date back millennia. Since before the Christian era, marine turtle products were of great importance to international trade networks in the Indian Ocean. People in various societies, all round the world, have not only exploited these ancient reptiles, but also venerated and celebrated them in diverse forms. During recent times many populations of marine turtles have declined dramatically, including several in the Indian subcontinent. Many different causes are recognized, including direct exploitation, incidental capture in fisheries, pollution, and habitat destruction. As a result, marine turtles are recognized, nationally and internationally, as requiring special attention for conservation. Their antediluvian roots, ancient and diverse history with society, and endangered status give these animals special importance to humans. Numerous national and international policies have been directly affected because of the concerns that people have for these reptiles. They have served as classic 'flagship species' for centuries, and it is important that future generations protect themselves and their environments by making full use of the motivational attributes of marine turtles.

Key words: marine turtles, conservation, flagship species

Brief description of marine turtles

The oldest fossils of marine turtles are from the Middle Cretaceous, estimated to be some 115 million years old (Zug *et al.* 2001). Although today there are just seven living species, these reptiles not only predated, but also outlived the dinosaurs. Marine turtles are part of an ancient, yet successful, lineage. Their antiquity bestows upon them a distinctive attractiveness to people of many walks of life.

Although there are species-specific differences, all living marine turtles share several life cycle characteristics (see reviews in Miller 1997; Frazier 2001). Reproductive females must crawl out of the sea and lay their eggs in the sand, well above the high tide mark – that is, they all nest in a *terrestrial* environment. Yet, the vast majority of their lives is spent in the sea, and most marine turtles disperse and migrate widely, often crossing oceans. Information from satellite tracking studies that has been accumulating over the past few years (e.g., Plotkin 2003; <http://www.seaturtle.org/links/Satellite_Tracking/>) shows that marine turtles of different species and from different populations commonly make long-distance movements. For example, several leatherback turtles (*Dermochelys coriacea*) fitted with satellite transmitters have been found to traverse the Atlantic Ocean in periods of less than a month, and studies from the Pacific show comparable results (Ferraro *et al.* 2004; Hays *et al.* 2004; Dutton *in litt.*; Eckert, *in litt.*). Thus, these reptiles are often referred to as 'highly migratory.' Added to the immense spatial scale that is involved is an equally daunting time scale: marine turtles may take more than a decade just to reach maturity, and it has been estimated that some populations may need half a century for individuals to become mature. After reaching adulthood, marine turtles may continue breeding for decades, so it is

likely that some individuals live for more than a century. These extraordinary life history characteristics make the animals even more remarkable than they seem at first appearance.

Marine turtles and humans

But, marine turtles have not just existed in 'natural isolation'; there has been an on-going relationship with humans for millennia. Zooarchaeological studies show that these reptiles have been utilized by coastal peoples in many parts of the world, and evidence from southern Africa indicates that humans exploited marine turtles as much as 50,000 years before present (Plug 2004). Information from eastern Arabia (see reviews in Frazier 2003a, 2004) shows that several coastal societies were exploiting marine turtles more than 7 millennia ago, in some cases quite intensely.

These generalities must also hold for the Indian subcontinent, but there is little zooarchaeological information available in a systematic form. For example, Chandraratne (1997) summarised the reptile bones excavated from the Citadel of Anuradhapura, Sri Lanka; he reported a total of five bones of *Lepidochelys* from Phases II and III, dated at 800-250 BC. Given the length of time that the Subcontinent has been inhabited, and the abundance of marine turtles along various sectors of the coast in recent times, one would expect zooarchaeological remains from various localities, dating back thousands of years.

In addition to direct use of marine turtles, humans in diverse societies around the world, over many millennia, have depicted these animals in countless forms and kinds of media. There are also accounts about marine turtles in ancient historic documents, in different languages: even cuneiform tablets more than 5 thousand years old are thought to have accounts

about catching marine turtles (see reviews in Frazier 2003a, 2004). In societies all round the world, humans have fashioned a wide variety of articles out of marine turtle parts, to the point where one could consider these reptiles as the 'ultimate tool kit' for pre-industrial societies (Frazier 2005). Evidence from various sources shows indisputably that marine turtles and humans have been interacting for millennia.

The Indian subcontinent is clearly endowed with numerous cultural artefacts involving turtles. A terracotta representation of a marine turtle is known from Harappa/Mohenjodaro, dating to well before the Christian Era. Moreover, there is abundant evidence of contact and trade between the ancient Indus Valley civilizations and those from Mesopotamia and the Gulf (Kohl 1979), and there are diverse representations of marine turtles in the latter (see reviews in Frazier 2003a, 2004). For contemporary times in the Subcontinent it is well known that there are rich and varied representations, in mythology and religious contexts, in which turtles play central roles, being celebrated and venerated. A Tamil poem describing a nesting turtle dates from about the 4th century AD (Sanjeeva Raj 1958), and surely there must be many more ancient writings about these reptiles in India. However, what is lacking are systematic studies of prehistoric and ancient depictions that clearly show marine turtles. Nonetheless, there is little doubt that human-turtle interactions in the Subcontinent are both diverse and very old.

There are indications that in certain situations – particularly desert oceanic islands and arid coasts – some human groups may have survived because of access to marine turtles, which provided critical food resources. Moreover, products made from marine turtles may have been fundamental in the development of certain human institutions, particularly trade. At least by the time of Christ a well-organized trading network existed around the Indian Ocean, designed especially to provide raw materials and slaves to the urban centres of the Mediterranean, and possibly other areas such as the Middle East and China. An unknown author, evidently an Egyptian Greek, wrote in the middle of the first century AD what is essentially a traders' handbook for the Indian Ocean, particularly for luxury goods. Known to contemporary scholars as the *Periplus Maris Erythraei*, this describes in remarkable detail well-established, highly organized commercial enterprises, involving a great diversity of activities and commodities in trade (Mathew 1975; Casson 1989: 6, 7, 15). One of the most important items for exporting to the Mediterranean was tortoiseshell: it was traded in all the major ports that were described in the *Periplus*, including those in

the Red Sea, the horn and east coast of Africa, and the southern coast of Arabia, as well as India, Sri Lanka, and Malaya or Sumatra (Casson 1989: 17, 101). In fact, 'Tortoise shell' receives more mention in the *Periplus* than any other object of trade'; 'the finest quality was brought to Muziris/Nelkynda all the way from Malay to be made available to Western merchants' (Casson 1989: 17, 101). Other details highlight the importance of commerce in marine turtles, such as explanations that at 'Menuthias Island', dugout canoes and sewn boats were used for catching turtles (Casson 1989: 59).

It is not clear when the tortoiseshell trade began, but wide-ranging commerce in the Indian Ocean had been in existence for at least two millennia before the *Periplus* was written (Casson 1989: 11): that is, more than four thousand years ago. Scholarly studies of ancient historic information on seafaring shows clearly that there were well developed maritime activities between the great centres of ancient civilizations by no later than the 1st millennium BC; Arabic, Indian, Jewish, Persian, Phoenician fleets and enterprises that transported trade items are all well documented from this region; and as early as the 3rd millennium BC Egyptian vessels were sailing extensively in the Red Sea (Hourani 1951). There is ample evidence for well-established Arabic trading networks in the region before the Christian era (Hourani 1951; Whitehouse 2001).

Accounts of Chinese trade as early as the T'ang Dynasty (AD 618-907), and into the Sung Dynasty (12th-13th centuries) also show the importance of tortoiseshell ('*tai-me*') as a desired commodity, sought by Chinese traders from as far away as Africa (Duyvendak 1949: 14, 17, 21; Wheatley 1959: 39, 83; Hirth and Rockhill 1966: 3, 4, 16, 19, 21, 77, 85, 111, 128, 129, 156, 158, 160, 238), with the "Berbera" coast (present-day Somalia) noted as providing the thickest shell (Hirth and Rockhill 1966: 128). There is ample evidence that tortoiseshell trade continued to be substantial into the Ming Dynasty (14th-17th centuries), with repeated mention in state customs and tax records (Chang 1991; Ptak 1991; Wade 2005).

An exhaustive review of diverse sources of historic information on trade in the Indonesian archipelago showed that tortoiseshell was one of the most valuable trade items, and this was evident over a period of many centuries (Meilink-Roelofs 1962). Numerous historic accounts, from Arabic to Chinese, describe trade activities in Çrivijaya, the celebrated Buddhist kingdom that arose around the beginning of the 11th century and could be regarded as the predecessor of the Malacca or (Melaka), Malaysia. For example, a Chinese source from the beginning of the 13th century indicates that the 'products brought by the *Ta-che* (the western Asians) or

¹The term used in the *Periplus* was 'chelone' which commonly refers to the animal, but in the context it is interpreted as referring to the product of the turtle (Casson pers. com.; Margaritoulis in litt., 13 June 2002).

exported by Çrivijaya included not only turtles, camphor, valuable kinds of wood, spices such as cloves and cardamom, pearls, perfumes, ivory and coral, but also woollen and cotton cloth' (Meilink-Roelofs 1962: 14), clearly grouping turtles and their products together with the other prized items of trade and luxury products. The importance of tortoiseshell as a valued trade commodity in this region, with connections east to China and west to Europe, has been pointed out time and again. The fast-expanding Portuguese trading network established a base in Malacca in the early 16th century to have greater access to – and profits from – major trade items; by the second half of the 16th century regular trade between Malacca and Macassar (now Ujung Pandang, Sulawesi, formerly Celebes) had become well established. 'Tortoiseshell, obtained from the turtles which occurred in great numbers off the coast of Celebes, was brought from Macassar to Malacca by the Javanese.' (Meilink-Roelofs 1962: 163). Other Europeans were also attracted to the tortoiseshell from the region: 'Spaniards from the Philippines also traded on Borneo and obtained there in exchange for cloth many small but valuable goods such as diamonds, pearls, gold, bezoar stones, camphor, and tortoiseshell.' (pg. 164). And, of course, Chinese traders remained very active in the region, despite which European nation was in power; for example, when the Dutch began to take control of trade in Indonesia at the beginning of the 17th century, there was regular and large scale trade at Bantam, West Java, with China: '[b]esides pepper, the Chinese also exported sandal wood, fine species such as nutmeg and cloves, tortoiseshell and elephant tusks from Bantam.' (Meilink-Roelofs 1962: 246).

Similarly, other archipelagic territories have been involved in wide-ranging trade for centuries, if not millennia. In the case of the Maldives, the trade in cowries was well established by the 9th century, and among the other commodities that were shipped regularly to ports such as those in Arabia, was tortoiseshell (Vogel 1991: 235). Mainland ports were also involved in the regular export of marine products. For example, between the 14th and 18th centuries the capital of the Thai court, Ayutthaya, was of enormous importance for trade in Asia. Among the items exported to China, tortoiseshell was in high demand, not only for its ornamental value, but also because of medicinal values – it was believed to have properties of warding off evil (Breazeale 1999: 21). For the European trade, however, it was the ornamental value that stimulated the high demand in tortoiseshell. Items such as a silver-gilt tortoiseshell casket are recorded among the possessions acquired by the likes of the viceroy of Goa in the 1630s (Disney 1991: 442). There were other types of use, such as shields made of tortoiseshell reported in Tenasserim in the 16th century by Ludovicio de

Varthema (Hammond 1963: 168; see also Charney 2004: 40), but the demand for these items must have more localised and been less significant.

The quantities and patterns of trade in the Indian Ocean, especially during the late 1800s and 1900s, indicate centuries of intense exploitation, particularly on nesting females and eggs. Because some populations of these reptiles were exploited at extraordinary levels, many populations have been greatly depleted, and some have been exterminated – economically if not biologically (Frazier 1974; King 1982; Ross 1982). Unfortunately, few data from the Indian subcontinent are adequate to interpret trends. A 19-year study at Hawksbay, Karachi, Pakistan, indicates that there has been a decline in the annual numbers of nesting Green Turtles (*Chelonia mydas*) (Firdous 2001). Likewise, an evaluation of massed nesting Olive Riddleys (*Lepidochelys olivacea*) in Orissa, India, over the past 25 years indicates that annual numbers nesting have declined in the wake of heavy mortality, first from intense egg exploitation and more recently from massive fisheries bycatch of reproductive animals (Shanker *et al.* 2003).

Added to the pressures of direct exploitation are other, perhaps more insidious, factors that are tremendous threats to marine turtles total. Increased fishing activities – in relation to depleted fish stocks, expanded export markets, spiralling investments and over-capitalization in the industry, and 'improved' technology – has resulted in ever greater incidental captures of marine turtles (Lewison *et al.* 2004), with subsequent increases in mortality during life history phases that were previously not under such pressures. Massive development activities on tropical coasts around the world have destroyed prime nesting areas. Pollution, not only in marine and coastal environments, but also in terrestrial areas that subsequently drain into the sea, has had substantial impacts, altering critical environments, food webs, and the toxins to which the turtles are exposed (Lutcavage *et al.* 1997). Given the intensity of human population growth and development, especially in coastal areas, it is only to be expected that there has been a general decline in marine turtles throughout India and the rest of the region.

Marine turtles as a symbol for humanity

Marine turtles are categorised as endangered in national laws and international agreements (see Frazier 2002), and this confers upon them a special status for conservation reasons. Yet, this status goes beyond the strictly legal considerations of national and international laws and agreements: when people appreciate that an animal is categorised as endangered, they usually make some effort, no matter how slight, to avoid harming it (Metrick and Weitzman 1996; Gunnthorsdottir 2001).

Despite the fact that humans have exploited, and decimated, marine turtle populations, these reptiles continue to exist and to enjoy a very special relationship with people. This is not just the case with prehistoric, 'traditional' cultures, for in 'post-modern' (*viz.* contemporary) societies these animals play unique roles in education, research, and tourism. As charismatic 'flagship species', they have been used countless times to draw attention to complex issues, with resulting alterations to policies that have promoted biological conservation and environmental protection, not just for marine turtles, but also for the vast habitats on which they depend and thus the environment in the broader sense, with tremendous relevance to society (Frazier, *in press*).

There is no clearer illustration of the relevance of marine turtles to post-modern societies than a case involving as powerful a body as the World Trade Organisation (WTO). Dispute number 58, the 'shrimp-turtle' dispute, was brought before the WTO in 1996 and resulted in a long, complex process. In short, this involved the governments of India, Malaysia, Pakistan, and Thailand contesting a US law that prohibited the import of shrimp not caught in trawls using turtle excluder devices (TEDs). In the end, after extended debate, more than 130 countries that formed the WTO at the time adopted, by consensus, the October 12, 1998 report by the Appellate Body that included several fundamental findings; three of these are of particular relevance. Endangered species can be considered as 'exhaustible resources' and as such a country may adopt unilateral trade measures to promote their conservation. Importing countries may distinguish products by the way that they were produced (e.g., not all fisheries products have to be treated the same, but those that have been caught by environmentally [or socially] damaging means can be regulated differently – namely banned). Dispute Settlement Panels of the WTO have no reason to reject outright third party submissions (the effect of this is to open up the process to more forms of participation) (Frazier and Bache 2002; Bache and Frazier, *in press*). These profound policy changes – which affect societies around the planet – were brought about specifically because of a dispute centred on marine turtle conservation.

In this same light, it is important to point out that there are a number of international agreements that have been created explicitly for the conservation of marine turtles and their habitats. These include a legally binding treaty (Frazier 2000), three regional memoranda of understanding, a trilateral accord, and a bilateral accord (Frazier 2002; Bache and Frazier, *in press*). Considering that there are only seven living species of marine turtle, it is remarkable that there are so many international instruments focused specifically on them. Of these, the most relevant to the Indian subcontinent is the

Memorandum of Understanding on the Conservation and Management of Marine Turtles and Their Habitats of the Indian Ocean and South-East Asia (IOSEA), which has been in effect since September 1, 2001 and now has 21 Signatory States, with the Secretariat based in the UNDP offices in Bangkok. Signatory States from Asia make up more than a third of the present membership, including Bangladesh, Cambodia, Indonesia, Myanmar, Pakistan, Philippines, Sri Lanka, Thailand and Vietnam. The governments of India, Maldives, and Malaysia participated in the negotiations leading up to this instrument, but to date none of them has signed the MoU; neither Brunei nor Singapore have participated in any meetings so far.

At the other extreme of the political spectrum are villages of coastal fishers, routinely marginalized from the political and commercial mainstreams of society: even so, peoples' lives in rural villages have been affected by marine turtles. In some places, such as Orissa and the Gulf of Mannar, directed exploitation had been carried out for generations, providing sources of food for local consumption, as well as commodities for trade and commerce. With declines in numbers of nesting females, loss of nesting habitat, and subsequent concern for the conservation of turtles that has developed during the last few decades, direct exploitation of the animals and their eggs is now prohibited by state and national laws. Moreover, in India, as in most other countries, there are a number of national laws that regulate coastal development, access and use of marine and coastal areas, pollution, and otherwise protection of the marine environment; and although these laws do not specifically mention marine turtles, they do provide protection for the habitats on which the animals depend (Upadhyay and Upadhyay 2002).

More specifically, various kinds of marine protected areas (MPAs) have been created by state and federal governments to provide beach sanctuaries for turtles to nest and coastal marine sanctuaries for them to feed and rest. While the principal motivation for creating a protected area may have been the conservation of marine turtles, the effects go far beyond these reptiles. Other species of plants and animals, and even coastal processes, are safeguarded when these sanctuaries are created. At the same time, the various forms of regulation limit the sorts of activities in which coastal peoples can engage without falling foul of the authorities, or being castigated by other members of their societies. In conservation parlance when the principal motivation for restricting human activities is the conservation of marine turtles, but various other environmental benefits are provided for other species, these animals are said to be 'focal species' (Miller *et al.* 1999; Zacharias and Roff 2001; Frazier, *in press*).

With the diversity and gravity of environmental problems confronting contemporary societies, and the competing forces of expansion of commerce and consumerism, promoted under the socially acceptable guise of modernisation, economic growth (Czech 2000), and sustainable development (Frazier 1997), there is an urgent need to employ tangible and charismatic symbols to motivate people toward more responsible behaviour in regard to their interactions with the environment. In many countries, the first exposure that students have to field projects and/or the complexities of biological conservation is through a turtle project (Frazier 2003b), and this is certainly true in India (Shanker and Kutty, in press). For diverse societies around the world, marine turtles have served to promote a greater interest in biological conservation and environmental protection: they are 'flagship species' for diverse sectors of society and peoples of many different cultures and nationalities (Frazier in press).

Given that marine turtles not only predated the dinosaurs but also out-survived them, they represent antiquity combined with a unique capacity of survival. Ancient values stemming from diverse human-turtle interactions, ranging from direct exploitation to veneration, and dating back countless generations, are combined with contemporary values that are founded on the non-material aspects of humanity. Marine turtles have a variety of values for contemporary societies – with or without the homogenizing effects of globalisation. Hence, there are few

better sentinels available for post-modern societies that have as many diverse cultural, ecological, emotional, social, and spiritual values for so many peoples, from different sectors of society, and from different nationalities.

To a large extent, the conservation movement is founded upon, and directed by, field biologists, dedicated to increasing the quality, profundity, and diversity of research. However, we need to understand that biological conservation exists and functions independent of the quality of information available: what is absolutely essential is motivation, and 'flagship species' provide the key to motivation. Far beyond the increase in scientific knowledge and technological capacity, initiatives to enhance environmental protection and wildlife conservation urgently need to find means to motivate people from all walks of life to behave more responsibly. Marine turtles provide this basic function, and serve as sentinels for today's societies.

ACKNOWLEDGEMENTS

The US Fish and Wildlife Service covered international transportation to the Centenary Seminar of the Bombay Natural History Society, and the organizers of the meeting provided hospitality and other kind support. The deepest thanks go to the BNHS for serving steadfastly as a sentinel for natural history studies and conservation for over a century. Melania Yáñez Quezada made valuable comments on an earlier draft of this paper.

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