ISSN 1327-8231

ECONOMICS, ECOLOGY AND THE ENVIRONMENT

Working Paper No. 90

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THE UNIVERSITY OF QUEENSLAND

ISSN 1327-8231
WORKING PAPERS ON
ECONOMICS, ECOLOGY AND THE ENVIRONMENT

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[1] First draft of a contribution for proposal by J. Frazier (ed) *Man and Sea Turtles* to be published possibly by the Amsterdam University Press.

WORKING PAPERS IN THE SERIES, *Economics, Ecology and the Environment* are published by the School of Economics, University of Queensland, 4072, Australia, as follow up to the Australian Centre for International Agricultural Research Project 40 of which Professor Clem Tisdell was the Project Leader. Views expressed in these working papers are those of their authors and not necessarily of any of the organisations associated with the Project. They should not be reproduced in whole or in part without the written permission of the Project Leader. It is planned to publish contributions to this series over the next few years.

Research for ACIAR project 40, *Economic impact and rural adjustments to nature conservation (biodiversity) programmes: A case study of Xishuangbanna Dai Autonomous Prefecture, Yunnan, China* was sponsored by the Australian Centre for International Agricultural Research (ACIAR), GPO Box 1571, Canberra, ACT, 2601, Australia.

The research for ACIAR project 40 has led in part, to the research being carried out in this current series.

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Abstract

There is little doubt that marine turtles are a flagship species for wildlife tourism. In some cases, this has turned out to be liability for sea turtle conservation, but in other cases, where for example turtle-based ecotourism has been developed, it has made a positive contribution to turtle conservation. Examples of both cases are given. Particular attention is given to the development of turtle-based ecotourism at Mon Repos Beach near Bundaberg, Australia. This development is set in its historical context and its contribution to conservation is discussed. Headstart projects for sea turtles in Sri Lanka are a tourist attraction. While they are promoted as having positive conservation consequences and a survey indicates that visitors are on the whole convinced of this, their effects on turtle conservation is uncertain. The farming of sea turtles provides a basis for tourism and can contribute to turtle conservation in ways outlined. It is argued that insufficient attention has been given to legends, culture and history associated with sea turtles in the promotion of turtle-based tourism. This is supported by Australian evidence. Insufficient use has been made of the connections of indigenous Australians with sea turtles in turtle-based tourism. Beneficial scope exist for developing connections between man and turtles further than at present in promoting turtle-based tourism. This could add further to the role of turtle-based tourism in promoting turtle conservation.

Does Ecotourism Contribute to Sea Turtle Conservation?
Is the Flagship Status of Turtles Advantageous?

1. Introduction

There is little doubt that most humans are fascinated by marine turtles and that they are, therefore, flagship species for wildlife tourism. This is highlighted by the inclusion in Barron's Nature Travel Guides of a book on sea turtles by Devaux and De Wetter (2000) which originally appeared in French. It provides information for tourists about the main sites for viewing marine turtles globally (which are mostly in tropical and sub-tropical areas), a little on the ecology and biology of sea turtles, and some information about relationships between man and sea turtles (Devaux and De Wetter, 2000, pp. 28-29 and various boxes in that book).

While not all tourism based on marine turtles contributes to the conservation of sea turtles (and sometimes such tourism has proven harmful to the conservation of marine turtles) in theory, at least, ecotourism should be favourable to such conservation. While there are several definitions of ecotourism, it can be regarded as tourism that is careful of the environment, relies mostly on natural environments but may also incorporate a cultural element (Boo, 1990; Duff, 1993). Some authors (for example, Wight, 1993) believe that such tourism should also incorporate an educational component if it is be classified as ecotourism. Certainly, as discussed later, an educational component in ecotourism is desirable in order to develop positive attitudes in tourists (and others) towards wildlife conservation and to ensure supportive action for such conservation.

Here we discuss first cases in which the flagship status of sea turtles has turned out to be an environmental liability, and then concentrate on a case (namely Mon Repos Beach near Bundaberg in Australia) where the development of turtle-based ecotourism has positive consequences for turtle conservation. In a developing country context, we give attention next to headstart programmes for sea turtles in Sri Lanka. These programmes are conducted by private operators and a non-governmental organisation (NGO) partly assists a hatchery. These hatcheries rely mainly on tourists for their economic viability. Depending upon the circumstances, their operation can be favourable or unfavourable to the conservation of sea turtles.

The closed-cycle farming of sea turtles continues to develop and associated tourism often adds to the economic viability of such operations. Some conservationists are, however, critical of farming as a means for conserving wildlife whereas others favour it. Farming of green turtles in the Cayman Islands and the development of farming of hawksbill turtles at the 'Crocodylus Park' near Darwin in the Northern Territory of Australia provide interesting cases. Subsequently, we argue that insufficient attention is given (particularly in Australia) in turtle-based tourism, to cultural historical associations between man and turtles. The Mon Repos attraction, for example, provides educational material and experiences but concentrates on the biology and ecology of sea turtles and current or very recent interactions between man and sea turtles. The scope for including more material about Aboriginal Australians and marine turtles at relevant tourist sites is explored.

2. Possible Negative Effects of Turtle-based Tourism on Turtle Populations

Tourists watching turtles date back to more than hundred years in some countries. For instance, turtle watching has been documented in Mon Repos, Queensland, Australia, since the late 1800s (Kay, 1995). In Malaysia it has been popular for several decades. For example, Leong and Siow (1980) state that there were as many as 800 tourists visiting Rantau Abang, Malaysia, each month during the peak season to watch leatherback turtles. By 1982, the figure had increased to 50,000 tourists per year. The number of tourists at this site has been increasing and Heng and Chark (1989) note that around 300 tourists per night came to watch leatherback turtles.

Although sea turtles attract many tourists to destinations and fascinate adults and children, tourist visits to sea turtle beaches or encounters with them have not always been positive. Many negative effects can result from turtle-based tourism mainly due to ignorance and lack of guidelines and supervision.

Tourists waiting to watch turtles on the beach can be noisy, build campfires and shine torches which frighten away turtles that come to nest (Heng and Clark, 1989). When turtles come to the beach, tourists have been known to disturb the turtles by getting too close to them, touching them or even climbing on them for photographs. Some tourists are even known to prod the flippers of turtles and obstruct turtles from returning to the sea (Heng and Clark, 1989). Such disturbances can prevent sea turtles from nesting on a preferred beach. As a

result, they may go elsewhere and lay their eggs on unsuitable beaches or release eggs in the sea (Heng and Clark, 1989). Hatchlings could also be disturbed by handling and be disoriented due to bonfires and flashing of torch lights. Any delays in baby sea turtles entering the sea increase the risks of predator attacks. Arianoutsou (1988) and Jacobson and Lopez (1994) discuss the impacts of tourism on sea turtle behaviour and biology.

Tourists other than those directly watching turtles can also affect turtle populations adversely. Nests are known to be affected by trampling and the use of beach umbrellas (Arianoutsou, 1988). Use of vehicles on beaches are known to destroy nests, harden beaches and create ruts which make it difficult for hatchlings to enter the sea (Hosier et al., 1981; Arianoutsou, 1988). In many countries (e.g. USA, Malaysia, Indonesia, Greece, Sri Lanka) hotels, guest houses and restaurants have been built alongside beaches where sea turtles nest. Pollution, noise and lights may prevent sea turtles from nesting and lights are known to disorient baby turtles (Arianoutsou, 1988). Speedboats used by tourists can also injure turtles.

Tourists visiting areas where sea turtles nest may increase the demand for their products, including meat and eggs. Sea turtle meat and eggs are offered in restaurants in some countries as part of the local cuisine and experience, although it is prohibited by law. Sometimes local tourists are served with turtle eggs because of their perceived aphrodisiac properties. There is scope for this in some countries such as Sri Lanka because, as Amarasooriya (2001) has pointed out that, only 33% of the sea turtle eggs collected in Sri Lanka are used in hatcheries, as discussed in Section 4.

Surveys conducted in Sri Lanka by Wilson, Amarasooriya and Mackensen (a survey of 256 foreign respondents) and Wilson and Amarasooriya (a survey of 207 local visitors) in early 2002 on sea turtle tourism, hatcheries and conservation have found that 1% of foreign tourists and 5% of local tourists respectively were offered either sea turtle meat or eggs while holidaying in the southwestern coast of Sri Lanka. This is the main tourist holiday destination in Sri Lanka and one of the main nesting areas for sea turtles. In Sri Lanka, local pubs are known to serve sea turtle eggs for their patrons. However, it should be pointed out that even in the absence of tourists, sea turtle meat and eggs would have been consumed locally. Furthermore, tourists including those who view sea turtles sometimes purchase curios and souvenirs made out of sea turtles such as whole shells (especially of hawksbills), jewellery, combs and even sunglasses (CITES, UK, 2003). Although such items are banned by CITES

(Convention on International Trade in Endangered Species), turtle-based products continue to be sold in many countries, although it is increasingly becoming difficult to carry them into countries through airports. This may not mainly be because of the enforcement of CITES bans, but because of increased detection due to strict quarantine checks in some countries, such as Australia, and rigorous security checks implemented at airports after the events of September 11, 2002.

However, not all tourism associated with marine turtles has negative consequences for their conservation and some positive trends are apparent. In recent years, there has been a gradual, but discernable shift in sea turtle watching in many countries (e.g. Costa Rica, Indonesia, Malaysia, Australia, Sri Lanka) from destructive forms of tourism to those that are more in line with the basic tenets of ecotourism. As this form of ecotourism becomes more popular and successful, turtle-watching practices that are destructive will become less popular and be replaced by those that are more beneficial to sea turtle conservation. Such tourism can contribute positively to the conservation of sea turtles rather than cause their destruction. One successful sea turtle-based ecotourism venture that is consistent with the basic goals of ecotourism is located at Mon Repos Beach in Australia. It is discussed next.

3. Ecotourism at Mon Repos Beach near Bundaberg

Mon Repos Conservation Park, located approximately 14 kilometres north east of Bundaberg in Queensland (See Figure 1), is the main destination for marine turtle-watching in Australia (in terms of number of annual visitors arriving during the turtle season). This park includes Mon Repos Beach which according to Kay (1995, p.3) supports "the largest concentration of nesting marine sea turtles on the eastern Australian mainland and is one of the two largest loggerhead rookeries in the South Pacific region". Apart from loggerhead turtles, *Caretta caretta,* some green turtles, *Chelonian mydas,* and some flatbacks, *Natator depressus,* also nest here but their numbers are very small (Tisdell and Wilson, 2002, p.5).

The evolution of Mon Repos Beach as an ecotourism site is interesting. This can be considered in two ways. First, in the context of the history of changes in the general attitude of Queenslanders towards the conservation of sea turtles, and secondly the historical process involved in the establishment of Mon Repos Conservation Park itself.

European settlers in Queensland and marine turtles

Indigenous Queenslanders (Australian Aborigines and Torres Strait Islanders), as well as all other indigenous Australians located in tropical and sub-tropical areas have had a long association with sea turtles. They have been (and in some cases still are) an important food source and part of their cultural fabric, as discussed later. Prior to European settlement in Australia, indigenous people were not a threat to the survival of sea turtles. Passing European sailors did however capture sea turtles for fresh meat but this was not a serious threat in Australia. Sea turtles were often held aboard ship alive until needed for fresh meat.

In fact, Captain Cook during his forced stopover at Cooktown to repair his ship "Endeavour" which struck a reef offshore took on board sea turtles. Before leaving Cooktown, he invited local Aboriginals on board to inspect his ship. They were alarmed to find six turtles on the deck (which they believed were their turtles taken without permission). When the Aborigines wanted a few back and when the Endeavour crew refused a skirmish followed. This story was told to us by Eric Deeral, a local Aboriginal tribal elder and former member of the Queensland Parliament during our visit to Cooktown in July, 2003.

Following European settlement in Australia, European technologies provided the means to decimate sea turtle populations, and Europeans proceeded to exploit this stock on a large scale, as soon as it looked to be profitable. Factories for canning turtle soup were established in the 1920s – one on Heron Island and two on Northwest Island off the coast of Gladstone on the Great Barrier Reef (see Figure 1). These operated into the early 1930s until they eventually went broke due to over exploitation of local turtle stocks. But the harvesting of sea turtles continued. Their carcasses were obtained by some mainland meat works from fishermen and sent "overseas direct in the refrigerated holds of ships which transported export beef" (Bustard, 1972, p.164).

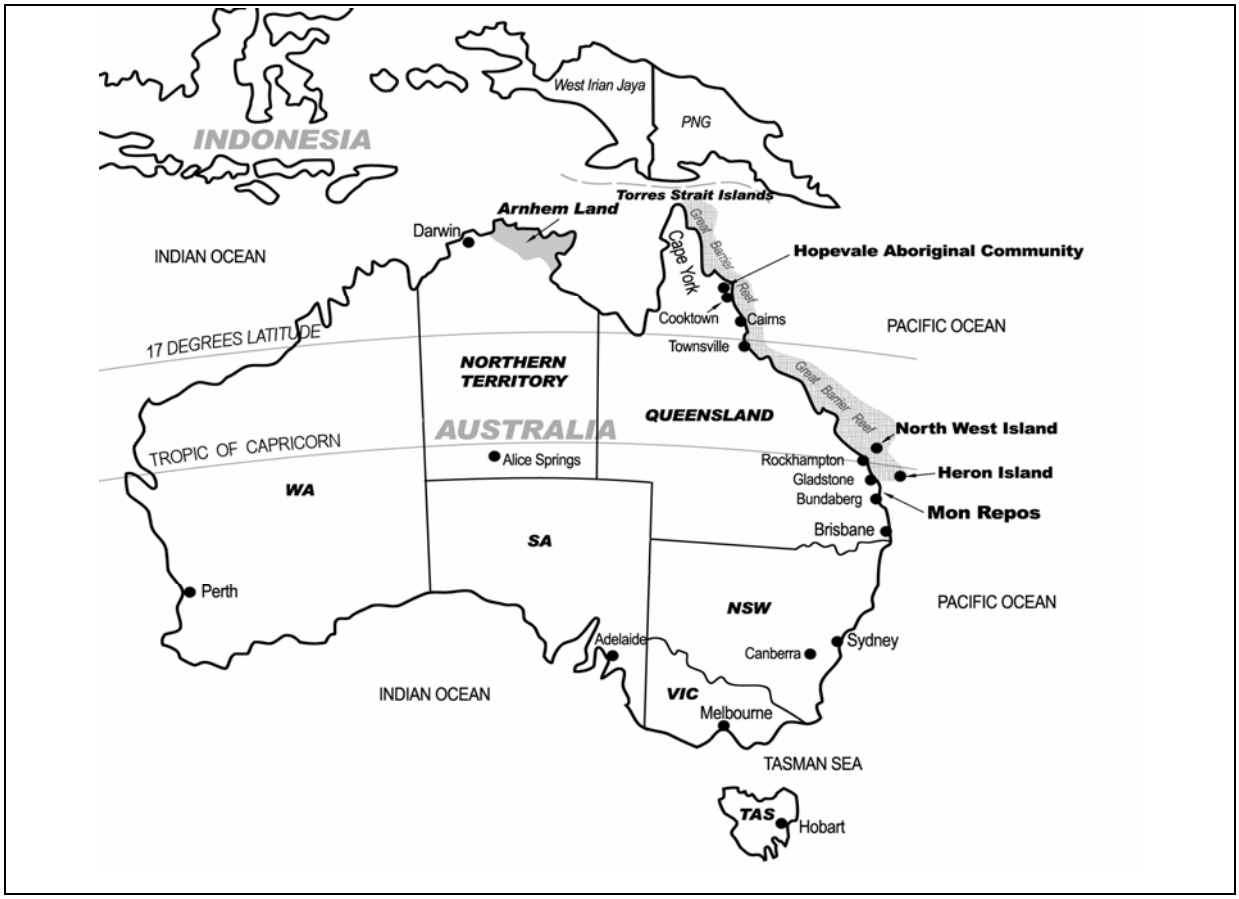

Figure 1: Map of Queensland showing main locations of features mentioned in this article.

In early 1950, a tourist group, consisting of some influential persons, came upon sea turtles destined for this commercial trade. They were so appalled by the cruelty to these animals that they took action through newspapers to bring it to the attention of the public and politicians. The Queensland Government asked the Great Barrier Reef Committee to investigate the matter. As a result of its report, the Queensland Government in September 1950, prohibited the possession of green turtles and their eggs by other than indigenous Australians. However, this regulation only applied south of the 17º latitude (approximately south of Cairns, see Figure 1) and did not cover all species of marine turtle. But 1950 marks the first transition away from exploitative use of sea turtles by non-indigenous Australians. It is interesting to note that it was tourists that played the pivotal role in this change.

It was not until 1968 that the taking of all species of marine turtles in Queensland, by other than indigenous Australians, was banned. Both changing world and local sentiment towards wildlife and growing marine-based tourism in Queensland undoubtedly contributed to this

result. Since this time, proactive policies have been increasingly adopted in Queensland to protect marine turtles.

Such measures include the incorporation of more turtle rookeries in protected areas, measures to reduce accidental (or deliberate) strikes by boats on turtles and regulations to reduce the incidental take of sea turtles in fishing nets by introducing turtle excluder devices (TED's). Some of these protective policies, however, took more than three decades to be achieved and the political battles were far from easy. The establishment of Mon Repos Conservation Park provides an interesting example of lags and political obstacles.

The politics of conservation at Mon Repos Beach

In 1968, (the same year in which the taking of sea turtles by non-indigenous persons was banned throughout Queensland) a group of citizens and organisations tried to have a national park established at Mon Repos Beach for the express purpose of protecting turtles nesting there. Robert Bustard was one of those supporting the idea. He states that Mon Repos beach is "*the site of an important loggerhead rookery, and under proper management the rookery could have been an important tourist attraction like the fairy penguins on Phillip Island in the Bass Strait. We needed only about 100 acres of coastal sand dune, consisting of a strip about one mile long, going far enough back from the beach so that lights could not prevent the orientation of hatchlings towards the sea or frighten adults coming out of the water to nest. However, some of the land was already owned by the Woongarra Shire Council and most of it was owned by a sugar cane grower who was not using it and was prepared to sell to the government at a fair price. However, there was a fly in the ointment. An individual had purchased between five and ten acres in the middle of the proposed National Park for real estate development (beach-side houses). He was not prepared to sell at a reasonable price. Furthermore, it turned out that the local council had plans to build a scenic road right along the top of the unconsolidated sand dunes, and greatly favoured obtaining revenue through collecting rates from beach-houses instead of the establishment of a National Park*". (Bustard, 1972, p.172).

The local Woongarra Shire Council was not convinced that it would gain from extra tourists and thought that most of the gains from tourists would go to Bundaberg (a different council) which is much larger than the two villages in close proximity to Mon Repos Beach. The councillors preferred the extra rates (taxes) from the possible housing development at Mon

Repos Beach. Although the Queensland Cabinet agreed in 1968 to create Mon Repos National Park, it was more than a decade before steps were taken to establish a suitable protected area at Mon Repos Beach.

Actually, it was scientists like Dr Colin Limpus and those tourists with special interests in marine turtles who were instrumental in the final process that culminated in the establishment of Mon Repos Conservation Park (a tourism development pattern described by Wilson and Tisdell, 2001). In 1968, the Queensland Turtle Research Programme commenced at Mon Repos with a scientific and conservation agenda. The presence of this research programme helped to maintain public focus on the area. The programme often took advantage of volunteers and also catered incidentally for some casual turtle-watching tourists. However, it was not until 1981 (about 13 years after Cabinet had approved the idea in principle) that steps were taken to establish the Park by means of land purchases by the Queensland Government. With growing crowds of turtle-watching visitors, research staff at Mon Repos decided in 1985 to establish a formal turtle-watching programme. It was felt that this would be the most efficient way of catering for the growing number of visitors to the site and would help with crowd control.

During the 1993-94 sea turtle watching season there was a significant step forward in catering for turtle-watching tourists at Mon Repos when the Queensland Government completed the building of an Information Centre and Amphitheatre. These were intended to educate visitors about sea turtles, especially their biology and ecology and threats to their survival.

By this time, the Queensland Parks and Wildlife Services (QPWS) had assumed the major responsibility for catering for turtle-watching visitors and had relieved researchers of this extra activity. However, scientific researchers' involvement (including volunteers) with tourists did not cease because at the Park, scientific information gathering is combined with showing nesting turtles and emerging hatchlings to tourists and providing explanations at the same time.

For the 1994-95 turtle season at Mon Repos (November to March), a seasonal service fee was introduced by QPWS for turtle-watching. This marked the commencement of commercialised ecotourism at this site. The charging of a fee for entry to the Park in the evening or night, during the turtle season continues. Its main purpose seems to raise finance to help cover

costs associated with visitors at the site. A subsidiary purpose maybe to limit the number of visitors to 'carrying capacity'.

4. The Features of Turtle-based Tourism at Mon Repos Beach and Its Contribution to Conservation

Currently the type of tourism that occurs at Mon Repos Beach in connection with turtle-watching satisfies the basic conditions required for ecotourism. It is (1) nature-based; (2) is educational; and (3) is careful of the environment and conservation oriented.

It is educational in many ways. Firstly, while visitors await their turn to go to the beach to view a nesting turtle or the emergence of turtle hatchlings, they are able to view information displays about the turtles and threats to them in the display centre. They are then invited outside to the Amphitheatre where they are given presentations accompanied by film material. On the beach, guides provide further information and explanations to visitors about turtles as visitors see the nesting of a turtle or the emergence of hatchlings. In a survey of visitors to Mon Repos turtle rookery, 99 per cent of respondents reported that their visit was informative and educational (Tisdell and Wilson, 2002, p.49).

The type of tourism practiced is careful of the environment. Tourists are only allowed on the beach at night during turtle-nesting season under the supervision of officers of the QPWS and trained volunteers. The maximum size of each group is 70. Appropriate logistics and behaviour are adopted so as not to interfere with the natural behaviour of the sea turtles.

The ecotouristic venture relies heavily for its viability on help from volunteers from the local community and elsewhere. This helps build political support for the project and assists with crowd control and management.

Furthermore, there is scientific spin-off. At the same time as tourists are viewing turtles, scientists and volunteers gather scientific data about the nesting of turtles or the nesters themselves, and about hatchlings. This is of assistance, for example, for determining whether or not population recovery of turtles is underway. It is also possible that this involvement of scientists makes visitors more appreciative of the importance of saving sea turtles and of the role played by Mon Repos rookery in helping to do that.

In addition, the presence of this tourism has incidental conservation benefits. Predators, such as, introduced foxes, are not likely to predate on turtles when they are accompanied by people. Programmes to control the presence of such predators in the Park have been instituted and these have been partly financed by visitor fees. In addition, extra trees have been planted on the foreshore to reduce light emissions from land which could disorientate turtle hatchlings.

The land in the Park also provides additional conservation benefits for other native species, and preserves rock walls built by Kanakas (South Sea Pacific Islanders) brought to Queensland in the nineteenth century as indentured labourers to work on sugar cane fields. In 1991, a further flow-on conservation benefit was the declaration of the adjoining Woongarra Marine Park for the prime purpose of protecting sea turtles offshore particularly in the breeding season.

It is interesting to note that the Burnett Shire Council, a local government successor to Woongarra Shire Council, keenly supports sea turtle conservation and the form of ecotourism associated with it. This is a complete turn around in attitude to that of 1968 when Woongarra Shire Council opposed the creation of a park of the present type at Mon Repos. In fact, the authors found on a visit to the local area at the end of 1999, that the coat-of-arms of the local council had incorporated four main symbols: sugar cane, a beef bull, a loggerhead turtle, and a whale, all indicative of economic activities deemed to be important in the region. Apart from turtle-watching, whale watching is today also important locally as a tourist activity.

Furthermore, in 1999 the local council had promoted a painting competition amongst local school children to depict environmental concerns. Paintings involving threats to and actions to conserve sea turtles were prominent. These paintings were part of an exhibition at the Council offices at Bargara not far from Mon Repos.

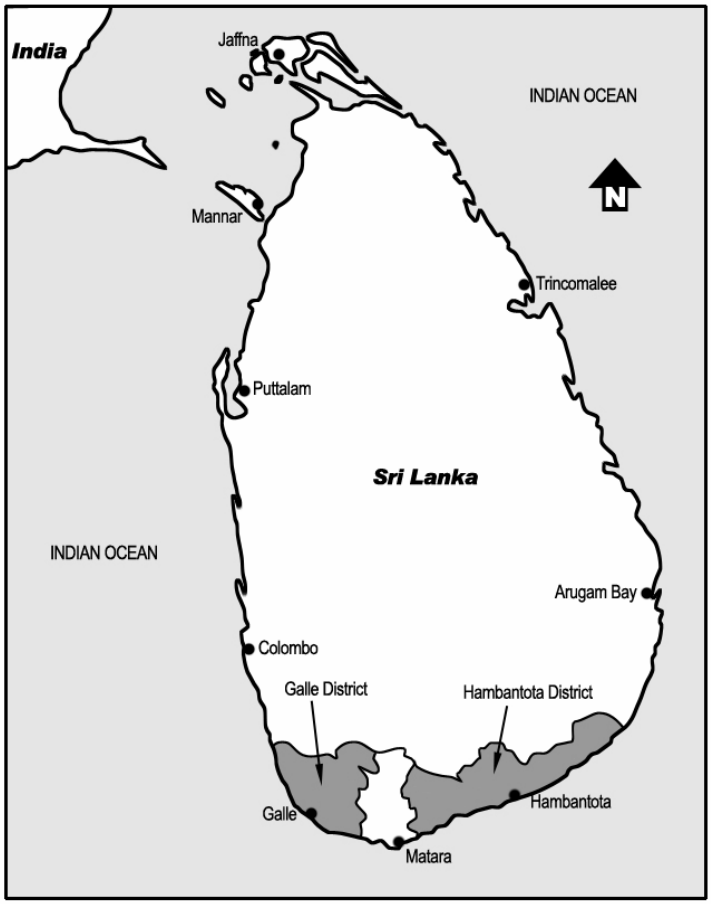

Figure 2: Map of Sri Lanka showing location of turtle hatcheries associated with tourism.

Similarly, the Bundaberg District and Tourism and Development Board has adopted a loggerhead turtle as its logo. An annual turtle festival is now also held in Bundaberg. Thus, it appears that local community support for the conservation of sea turtles is now well established.

Our survey (Tisdell and Wilson, 2002) of visitors to Mon Repos rookery in the 1999-2000 season indicated that their experiences had several positive consequences for sea turtle conservation.

- Most believed after their experience that more should be done to conserve sea turtles;
- A large proportion said that after the event they were prepared to donate more for programmes to conserve sea turtles than if they had not visited Mon Repos; and

- Many respondents said that they would alter their behaviour so as to be more considerate of sea turtles. For example, 62 per cent of respondents said they would be more careful in disposing of plastics, 68 per cent said they would switch off lights near beaches, 47 per cent would take greater care with fishing gear, and 73 per cent said they would refrain from consuming turtle eggs, meat or soup while overseas. Changed behaviour in relation to several other factors affecting turtle conservation were also mentioned.

Therefore, the evidence is quite strong that the development of sea turtle ecotourism at Mon Repos Beach has contributed positively to the conservation of sea turtles. The flagship status of turtles has been an advantage. However, initially it was extremely difficult to have sea turtles accepted as a flagship in Queensland. But now in the Burnett-Bundaberg region, sea turtles have become an icon. This has the advantage that it will be impossible to return to the exploitative and sometimes thoughtless treatment of sea turtles by European settlers that prevailed in Queensland during most of the twentieth century.

5. Tourism and Headstart Programmes in Sri Lanka

At Mon Repos Beach, man interferes as little as possible with the natural life-cycle of sea turtles. The interference in their life-cycle is more marked in Sri Lanka. In Sri Lanka, a number of private operators maintain sea turtle hatcheries in conjunction with tourism and support headstart programmes. Operators claim that their activities involve ecotourism and contribute to the conservation of wild sea turtles.

Headstart programmes for sea turtles are quite common (Wyneken, 2001) and it is widely accepted that well-managed sea turtle hatcheries can play a positive role in turtle conservation when in *situ* conservation is not possible or practical (IUCN/SSC Marine Turtle Specialist Group, 1999). Hatcheries have been established to save eggs from human consumption. In some countries, such as in Sri Lanka, the consumption of turtle eggs would be almost 100% in the absence of eggs being saved by hatcheries. In some countries, headstarting of turtles was initially undertaken by government agencies, but has increasingly shifted to private initiatives because of the tourist potential of such hatcheries. Tourism-based hatchery operators claim that they serve a dual purpose by purchasing eggs from collectors from money raised from tourism and raising hatchlings and releasing them to the sea.

Hatcheries claim that they ensure more eggs hatch than otherwise, and that they increase the chances of hatchlings entering the ocean.

Sri Lanka uses turtle hatcheries to generate revenue from tourism and conserve turtles. In Sri Lanka, five species of sea turtles nest in significant numbers throughout the year with two main seasons, namely from November to May, covering the southwestern coast and from May to August, covering the southern coast (Amarasooriya, 1999). Hatcheries have been in existence in Sri Lanka since the 1970s (Fernando, 1977). The first was started by an NGO with the cooperation of a villager who was concerned by the high volume of extraction of sea turtle eggs for consumption. It initially involved purchasing eggs from collectors who otherwise would have sold these in the local village market or elsewhere for human consumption. Although conservation was the prime reason for the establishment of the first hatchery it soon attracted visitors, both local and foreign. Subsequently, a charge was levied on visitors and most of the money was used to purchase more eggs from collectors.

Because of the high demand from tourists to view turtle hatchlings and the income generated, many hatcheries now operate. All sea turtle hatcheries in Sri Lanka receive fee-paying visitors. Visitors can view hatchlings. This form of viewing is promoted as a form of 'ecotourism' and the hatchery operators claim that the main objective is the conservation of sea turtles. However, Amarasooriya (2001) claims that only two hatcheries in operation today have conservation in mind as their main objective and the rest are primarily operated for commercial gain.

The number of sea turtle hatcheries and their size has fluctuated a great deal in Sri Lanka. For example, Richardson (1994) recorded 16 hatcheries in the southwestern and the southeastern coasts in the early part of the 1990s, but Amarasooriya and Dayaratne (1997) recorded only 7 in 1996. In recent years, the number of hatcheries have remained at around 9 (Amarasooriya, 2001). Over a million eggs have been used in hatcheries during the last two decades and the use of eggs has accelerated rapidly. The three hatcheries in existence in 1981/1982 used 48,934 eggs at the time (Wickramasinghe, (1982) and in 2000, the nine existing hatcheries used around 300,000 eggs (Amarasooriya, 2001), a 513% increase.

Sea turtle hatcheries in Sri Lanka attract a large number of tourists, both domestic and foreign, and are part of the itinerary of many tour operators in Sri Lanka (cf. Responsible Travel, 2003). Hatcheries are also cited in travel guides and tourist brochures as part of the

natural attractions of Sri Lanka (cf. Bradnock and Bradnock, 1998). A study conducted among foreign tourists holidaying in southwestern Sri Lanka by Wilson, Amarasooriya and Mackensen in early 2002 found that 80% of the tourists were aware of sea turtle hatcheries in Sri Lanka. Only 19% did not know about their existence and 1% did not answer this question. Of those who said 'yes' 40% said they knew about the presence of sea turtle hatcheries before their arrival in Sri Lanka. The study also found that 66% of those tourists who were aware of the hatcheries had either visited or intended visiting them during their stay in Sri Lanka. The reasons cited by those 69 (34%) who said that they were not visiting the hatcheries are shown in Table 1.

Table 1

Reasons given by foreign tourists in Sri Lanka for not wanting to visit sea turtle hatcheries used for tourism in Sri Lanka

Reasons for not wanting to visit	Number of respondents	Percentage of respondents
No interest in turtles/have other preferences	29	42
No time	17	25
Animals should be free/heard they were not good/only a business	08	11
Already seen in other countries	06	09
Did not know how to find hatcheries	03	04
Saw turtles on the beach/while surfing	02	03
Avoid tourist areas	02	03
No response	02	03
Total	69	100

Source: Wilson, Amarasooriya and Mackensen. The survey was conducted in southwestern Sri Lanka in early 2002.

Furthermore, those who did not know about the presence of sea turtle hatcheries, 50% said that they would consider visiting a hatchery. Of those tourists who said that they had already visited or intend visiting, 31% were of the view that visiting a hatchery was an important part of the stay in southwestern coast of Sri Lanka. However, 22% of the respondents did not answer this question.

Hatcheries are dependent on tourist revenues (entrance fees, donations and sale of souvenirs) for their operations and some hatcheries operate only during the main tourist season(s) (Hewavisenthi, 1993). Amarasooriya (2001) suggests that this is an indication that some hatchery operators may be driven by profit rather than conservation because the revenue generated during the main tourist season would be sufficient to finance the hatcheries'

conservation activities during the tourist off season. Data collected by Amarasooriya (2001) provides some evidence that sea turtle hatcheries operate mainly for profit because the largest collection of reburied eggs by the hatcheries coincides with the peak tourist season, which is approximately from November/December to April/May. The purchase of eggs by hatcheries declines during the low tourist season. About 98% of the turtle eggs utilized by hatcheries in Sri Lanka are utilized by hatcheries in southwestern Sri Lanka and the remaining two percent are utilized in the southern part of the island (Amarasooriya, 2001). Thus, most eggs utilized by hatcheries are acquired by hatcheries on the southwestern coast of Sri Lanka where the majority of foreign tourists also holiday (See Figure 2).

Sea turtle hatcheries are in fact a lucrative cottage industry financially supporting many families in areas where they operate. Amarasooriya (2001) estimates that the annual gross income from hatcheries in Sri Lanka is more than 27 million Sri Lankan rupees or approximately US $340,562 per year. With tourism rapidly growing in Sri Lanka, the number of hatcheries and the number of eggs used in hatcheries may increase.

Wilson, Amarasooriya and Mackensen found from their survey that the majority of responding foreign tourists were supportive of sea turtle-based tourism hatcheries and thought they involved a better form of sea turtle use than consumptive use. Of those who answered this question, 77% said it is a better form of sea turtle use than their consumptive use while 18% said they did not think that hatchery-based tourism is a better form of sea turtle use. 5% of the respondents failed to answer ‘yes’ or ‘no’ to this question. However, if the tourists were given more information such as the motives of hatchery operators and conservation outcomes, the number of visitors saying ‘yes’ might have decreased. The frequency of reasons for saying ‘yes’ and ‘no’ are summarised in Table 2.

Table 2

Reasons given by respondents for supporting or opposing sea turtle hatchery-based tourism as a better form of sea turtle use than their consumptive use

Reasons for supporting sea turtle hatchery-based tourism	**Number of respondents**	**Percentage of respondents**
Support conservation/ensures some survival	77	39
Better than consumption/prevent killing	48	24
Turtles are endangered	15	08
They are educational	11	05
Provides employment/income	08	04
There is enough other food	04	02
Ecotourism is good	01	0.5
Poaching is good	01	0.5
No reply	33	17
Total	**198**	**100**
Reasons for not supporting sea turtle hatchery-based tourism		
It is a business	02	04
Turtles should be left alone	01	02
No reply	42	94
Total	**45**	**100**

Source: Wilson, Amarasooriya and Mackensen. The survey was conducted in southwestern Sri Lanka in early 2002.

Note: 13(5%) of the respondents failed to answer the question *"Do you think that sea turtle hatchery-based tourism is a better form of sea turtle use than their consumptive use."*

It is apparent that most tourists are supportive of hatcheries although some have reservations about it as shown in Table 2. Better managed sea turtle hatcheries could capitalize on this support. Some are not so well managed currently. In situations where sea turtles hatcheries are the only practical solution to protecting sea turtles, as in the southwestern coast of Sri Lanka, tourism based on hatcheries can make a valuable contribution to the conservation of sea turtles provided the hatcheries are well managed.

Despite sea turtle tourism-based hatcheries being on the itinerary of many tour operators and cited in tourist guides, such hatcheries are strictly speaking illegal in Sri Lanka. However, because the hatcheries have convinced the public and tourists that they make a positive contribution to the conservation of sea turtles, their presence is 'unofficially' sanctioned and the collection of eggs for hatcheries is 'justified'. Surprisingly, there are few, if any, prosecutions for illegally collecting turtle eggs, although the Sri Lankan fauna and flora protection regulations prohibit such collection.

It is uncertain how effective 'headstarting' through sea turtle hatcheries are in the conservation of sea turtles. Some conservationists have negative views about sea turtles raised in hatcheries (especially those involving tourists) rather than in the wild. Some of the negative effects of hatcheries are summarized in Tisdell and Wilson (2003). As pointed out by Amarasooriya (2001), tourism-based sea turtle hatcheries that mainly operate for profits may be inclined to sacrifice conservation objectives. If tourism-based sea turtle hatcheries are to make a greater contribution towards conservation taking advantage of increased tourism and their support, it is important that appropriate management strategies for conserving sea turtles be introduced. Otherwise, tourism-based sea turtle hatcheries could do more harm than good for the conservation of sea turtles.

On the other hand if tourism-based sea turtle hatcheries are able to manage hatcheries according to appropriate guidelines, the flagship status of sea turtles can then be used to enhance their conservation, especially in countries such as Sri Lanka, where almost all eggs laid are at risk of being collected for human consumption. Otherwise, the flagship status could end up as a liability for these species. Apart from the tourism value of sea turtles, the consumptive value of these flagships species has led to the establishment of commercial farms, for both consumptive use and tourism, as discussed next.

6. The Farming of Sea Turtles and Tourism

According to Boo (1990), Hector Ceballos-Lasaurain provided one of the earliest definitions of ecotourism. He is cited in Boo (1990) as defining ecotourism as *"tourism that involves travelling to relatively undisturbed or uncontaminated natural areas with the specific objective of studying, admiring or enjoying the scenery and its wild plants and animals as well as any existing cultural manifestations (both past and present) found in those areas"*. Given this definition, it is clear that any tourism associated with the farming of sea turtles could not constitute ecotourism.

However, it is possible for tourism associated with such farming to be educational and to be presented in such a way that it has relevance to the conservation of wild populations of turtles. This could at least in principle have positive natural conservation outcomes via its impact on visitors.

As for sea-turtle farming itself, opinions amongst conservationists appear sharply divided about its potential to contribute to the conservation of wild turtle stocks. Some of the economic argument about whether such farming favours or is detrimental to the conservation of stocks of wild sea turtles are analysed in Tisdell (1991, Ch. 6) and possible environmental impacts of aquaculture generally are considered in Tisdell (2003).

The long-term economic viability of farming sea turtles is uncertain particularly because the operation of CITES restricts opportunities for exporting products from such farms. Export restrictions seem certain when it is believed that turtle farms pose some danger to wild turtle stocks. In particular, any form of utilisation of wild stocks by farms (for example, reliance, or partial reliance on eggs of wild turtles, or capture of broodstock for use in farming), might be expected to result in banning of farm exports under CITES. In fact, there are today no exports of farmed turtle products, although green turtles are farmed in the Cayman Islands.

In 1968, a turtle farm was established there by Mariculture Ltd by investors from the USA and the UK to farm green turtles *Chelonia mydas* for commercial use. This company, however, became bankrupt in 1975, partly as a consequence of bans on the export of its products to the United States and other countries. It was then taken over by a group of German investors and renamed Cayman Turtle Farms (Ltd). According to the present owner of this farm: *"The new owners intended to operate the farm more as a non-profit organisation, funnelling any products back into sea turtle conservation and protection projects, using the site as an international sea turtle research facility,. However, export restrictions continued,"* resulting in cash flow problems, a scaling back of operations and imminent closure of the farm in 1983 (Cayman Islands Turtle Farm, 2002a, pp.1-2). It was then purchased by the Cayman Islands Government and has since been operated as a private company, Cayman Turtle Farm (1983) Ltd. According to the reports of the Cayman Turtle Farm (2003a, p.2) the reproductive life-cycle of turtles at the farm is a closed one – no broodstock have been taken from the wild since 1975 and no eggs since 1976.

However, exports of meat and other products continue to be banned. Hence, the economic viability of the farm depends on local sales of meat and visits by tourists. In addition, 'head started' turtles are released around the Cayman Islands.

Visits by tourists make an important contribution to the viability of the company. The farm has become one of the largest tourist attractions in the Cayman Islands. It attracted over 340,000 visitors during 2000 (Cayman Islands Turtle Farm, 2002a, p.2). The cost of entry is reported to be US$6 for adults and US$3 for children (aged 6-12), with younger children free. Thus gross revenue from tourism appears to be around US$1.7 million annually. There is said to be a breeding herd of 355 green turtles. Therefore, average tourist revenue per breeding turtle is around US$500 annually.

Following a destructive hurricane in 2001, the Cayman turtle farm has been undergoing redevelopment and has an associated 'marine park'. Thus, the emphasis on tourism seems to be increasing. The nature of the information and education provided to visitors at this turtle farm cannot be assessed by us without a visit. The farm however reports "*Cayman Turtle Farm has been engaged in the education, conservation through utilisation, research and rehabilitation of the marine turtle for over 30 years. As an integral part of this effort, the farm has released over 30,000 green sea turtles to help in replenishing the wild population since 198*0" (Cayman Islands Turtle Farm 2000b).

In Australia, there have also been attempts to farm marine turtles. The first attempt was an initiative of the Australian Government designed to assist indigenous Australians to farm Australian wildlife with a view to creating sustainable livelihoods for those Australians, especially in remote areas having few economic opportunities. Projects included the farming of marine turtles, emus and crocodiles and were managed by Applied Ecology Pty Ltd, a government-backed company.

The farming of marine turtles (green turtles and hawksbills) commenced on several Torres Straits islands in 1972 (not long after the Cayman Islands venture). The intention was "*to combine ecological objectives with job creation. At its height in the mid-1970s the project employed around 170 men and women, however it proved neither ecologically nor economically sound, and caused considerable political embarrassment before it was dissolved in 1980*" (Beckett, 1987, p.182). The Australian Government was estimated to have lost AUS$6 million on the project. Even in the second year of its operation concern was already evident about the economic viability of the project and a report was commissioned by the Australian government into its prospects. This report (Smart, 1973) noted (referring to the experiences of Mariculture Ltd in the Cayman Islands) that acceptance of the project by

world conservation organisations would be difficult to achieve and the market for its products would be severely restricted. Visits by tourists to farms did not figure in the project probably because the farms were small and of a cottage-type, and rather remote. Furthermore, 'farming' was mostly dependent on 'ranching' and collection of resources from the sea (see Smart, 1973; Finch, 1977; p.67) some of which might have been utilised by wild turtles.

A more recent experiment in farming marine turtles is underway at Crocodylus Park in Darwin, the Northern Territory. Experiments are well advanced to breed hawksbill turtles, *Eretmochelys imbricata*, in a closed cycle under 'farming' conditions. Water is being recirculated for this aquaculture.

Crocodylus Park is a zoo-like tourist attraction containing captive wild animals and some breed in captivity. The park, apart from relying on tourists/visitors for revenue, earns extra income by research and consulting activities. Dr Grahame Webb is involved in research at the Park and consulting, for example. He is a pioneer of saltwater crocodile farming (Webb and Manolis, 1989). He believes that marine turtles may have even greater economic potential for farming than saltwater crocodiles (personal communication, July 2003). Those tourists who join the guided tours will undoubtedly obtain some information about the hawksbill turtle, but as yet there are no major displays of information about it, or about other marine turtles.

7. Lack of Attention to Legends, Culture, History Associated with Sea Turtles in Turtle-based Ecotourism

In many countries, turtles including sea turtles specifically, are endowed with legendary, cultural, historical and symbolic significance (Sax, 2001, pp. 255-259). This was true for the Greeks (Atlas is said to have stood on the back of a turtle in holding up the Earth), is so for Hindus (the turtle is the second incarnation of the God Vishnu as described by the Sanatan Society, 2003) and Chinese (Devaux and De Wetter, 2000, p.28) and for indigenous Australians in contact with marine turtles. In Australia, such cultural aspects are, however, not a feature of ecotourism associated with sea turtles.

For example, although it was noted that Mon Repos Conservation Park results in positive outcomes for turtle conservation, and can be classified as satisfying the basic criteria for ecotourism, there is no coverage in its displays and presentations of the connection of

previous Aboriginal tribes in this area with turtles, or more generally of the cultural connections of Aboriginal Australians with sea turtles. Thus, this element in the definition of ecotourism as originally suggested by Ceballos-Lasaurain (and specified above), is missing.

It is possible that Australian Aboriginal legends and beliefs associated with the Mon Repos area have already been lost so there is no scope for taking these aspects into account. There is, however, an Australian Aboriginal legend (according to Ellis, 1994) of the Mooloola people who she says lived a little north of Brisbane. It tells how the turtle came to be and why it has a shell. It is the story of an Aboriginal man, 'Mungi', who lived in the Dreamtime. He was a gifted travelling story-teller and musician. He visited a small tribe on an island that refused to let him leave and threatened to kill him if he tried to escape. But one night with the aid of a floating log he tried to make a getaway. He kept his head down in the water but he raised it eventually to see if he was approaching land. But his captors saw him and one speared him in the neck. He thought he would surely die.

But his ancestor spirits were watching and did not want that to happen. They changed Mungi's human form completely. When finally he reached the shore safely, he found that he was *"a new creature, an amphibious creature which could wear for all time to come, a protective shell on its back"* (Ellis, 1994b, p.73).

"Mungi had become a turtle, the very first one. He quickly realised that he would no longer be able to sing and entertain his people. Though this made him sad, he was pleased to be alive and pleased that even as a turtle he would continue to travel from place to place peacefully, through all the days of his life" (Ellis, 1994b, p.73).

Such legends reinforce the connections of Aboriginal groups with nature and emphasise the unity of mankind and nature. For example, in the Dreamtime, creator spirits could change from human to animal form and even today human spirits can reside in animals, including turtles. For instance, a senior Aboriginal woman in east Arnhem Land, Lanjani Marika, declared "A child's spirit can come from the saltwater. It can reveal itself for the first time by adopting the form of a creature, from the sea like turtle or a fish bringing unexpected good fortune" (Buku-Larrngay Mulka Centre, 1999, p.19).

Turtles obtain a special mention in the myth cycle of the Aborigines in north-east Arnhem Land of the Northern Territory. This myth outlines how Aborigines came into being in Arnhem Land and is summarised by Groger-Wurm (1973, pp.19-20). There are variations on the theme (Isaacs, 1980; Ellis, 1994a) but according to the common theme the "original parents" of today's Aborigines in this area came across the sea from an unknown country in the east in a canoe. These original parents included two sisters who brought with them sacred symbols. The two sisters (the 'mothers' of today's Aborigines) amongst them possessed all the Dreamings and sacred knowledge to be passed down to future Aboriginal offspring.

According to a legend recorded on a plaque at the Darwin airport, as the two sisters paddled in their canoe, they saw the sun. They sang a sacred song that enabled it to rise. Then they saw a dolphin and did likewise presumably launching it on its life-cycle. This also happened when they saw small blue starfish, said to be the food of turtles.

Then they saw the head of a sea turtle pop above the surface. They did the same thing and hence they began the life-cycle of the sea turtle. They gave names to all the different things whatever they found in the saltwater - fish, turtles, octopus, giant clams and all the sea creatures which belong to the Dhurma people.

Aboriginal people believe that by singing and performing various ceremonies they contribute to the continuation of the life-cycle of species and keep in motion the natural world around them. Without such sacred songs and ceremonies, life and the natural world would come to an end.

Eventually the sisters landed in Arnhem Land and after some transformation of the land, began producing offspring to create the predecessors of today's Aborigines.

There are also many Aboriginal sacred paintings and other myths involving sea turtles. One myth is detailed in Groger-Wurm (1973, pp.67-69). It is about a dreamtime Bremer Island sea turtle hunter. A number of sacred Aboriginal bark paintings from this Yirrkala area also portrayed the legendary significance of sea turtles to local Aborigines. For example, in Buku-Larrngay Mulka Centre (1999) there is such a painting from one of the Wessel Islands (see pp. 82 and 83) and one from Lutumba (see pp. 30-31). In both cases, the shell of the sea

turtle is indicated to be a place holding the clan's secret knowledge. It has a sacred nature. In Lutumba, a sea turtle cleansing ceremony is also performed for deceased persons.

The turtle is a totem (Ellis, 1994a, Ch. 2) for some moieties or groups of tribal Australian Aborigines. For example according to a contribution in Isaacs (1980, p.132), the turtle Spirit Ancestor of the Yirritja moiety of central Arnhem Land is called Guwarrtji. He is believed to be responsible for singing up the north monsoon. In the Dreamtime, he left his marks on rocks near a reef known to this tribe and these rocks are now sacred.

The shells of sea turtles are often used by Aboriginal Australians for paintings. A wide array of those motifs are also available on bark and paper. The prominence of sea turtles in the life and culture of some Aboriginal communities is apparent from the subject of wall paintings on the inner courtyard of the community centre of Hopevale Aboriginal township.

Much scope exists for making Aboriginal cultural and historical aspects of sea turtles a part of any new turtle-based ecotourism developments in northern Australia. Similarly any such development in the Torres Strait Islands of Australia can make use of cultural and customary affiliations of the Torres Strait Islanders with marine turtles. These indigenous people of Malenesian origin have a rich cultural and customary association with sea turtles (Fraser, 1978; Haddon et al, 1901-1935) which differs from that of Australian Aborigines. For instance, Torres Strait Islanders make face masks out of turtle shells but not Australian Aborigines. By including these historical and cultural aspects, it should be possible to make ecotourism in Australia an even better flagship for sea turtle conservation and generally, for nature conservation and for cultural conservation also.

The question may also need to be considered whether the emphasis of ecotourism development in some areas should be on a single species or a closely related group of species (for example, marine turtles) or have a wider focus, for example, include dugongs in some areas. Such a question cannot be answered to any great extent in the abstract. For one thing, the answer may vary with location. There is also a danger, given limited human capacities (Simon, 1957), of overloading tourists with too much information about varied species and/or cultural aspects. Consequently, conservation messages may become confusing and ineffective when an attempt is made to convey a large and varied amount of information. In such circumstances, it can be advantageous to concentrate on flagship species, such as sea turtles,

to provide a single focus. However, this need not be the focus in every area where sea turtles are important. In some areas of Australia, for example, the dugong could appropriately be the flagship with turtles introduced as a subsidiary theme. There is a case for variation in themes adopted in different conservation-oriented nature-based tourist attractions. Tourists over their life-time usually visit multiple sites, and what they cannot take in on one occasion, they may very well be able to assimilate on another occasion. Such variety helps to address the problem of individuals being unable to absorb more than a limited amount of information on a single occasion.

8. Concluding Assessment

The flagship status of sea turtles for tourism purposes can be, depending upon the circumstances, an advantage or a disadvantage for the conservation of sea turtles and nature generally. The growth of inadequately controlled tourism to take advantage of the nesting habits of sea turtles can, as outlined above, both directly and indirectly result in the decimation or demise of local turtle populations, as occurred for example in the past in parts of Malaysia. On the other hand, there is strong evidence for example, from our observations at Mon Repos Conservation Park in Australia, that turtle-based tourism conducted according to the basic principles of ecotourism contributes positively to the conservation of sea turtles and to the conservation of nature generally. However, much turtle-based tourism that is claimed to involve ecotourism or to have positive consequences for the conservation of nature may involve a hoax. We considered above the claims of Sri Lankan turtle hatcheries that they help save sea turtles and are engaged in ecotourism. None actually meet the standard basic criteria for ecotourism and the contribution of some (but not all) to saving sea turtle populations may be problematic.

The farming of sea turtles has been the source of much controversy amongst conservationists. Proponents see it as an effective method of conserving sea turtles by commercial utilisation. Opponents see it as an inadequate substitute for wild stocks and a source of increased danger to wild stocks. The political lobbying of the latter group has undermined the commercial viability of sea turtle farming, as is illustrated by economic experience with turtle farming in the Cayman Islands. It might also have contributed to the economic failure of Australian attempts to farm sea turtles in the Torres Straits. Currently, the Cayman Islands turtle farm depends significantly (but not entirely) on tourism for its commercial viability. At Crocodylus Park in Darwin, where a closed-cycle for farming hawksbill turtles is being

developed, tourists/recreational visitors help to contribute to the commercial viability of the whole enterprise at this site. Although tourism of such sites does not meet the usual criteria for ecotourism, it can also be an effective force for the conservation of sea turtles in the wild and under 'domestication', depending on how it is conducted.

At present, most sea turtle-based tourism/ecotourism does not sufficiently capitalise on important cultural, customary and historical associations between man and sea turtles. This is so despite the fact that one of the earliest definitions of ecotourism highlights the importance of including such features in ecotouristic programmes. It should be apparent from the above discussion that much untapped scope exists in Australia for capitalising on the cultural heritage and customs of Aboriginal Australians (and Torres Strait Islanders) in developing turtle-based ecotourism. In fact, there is scope for doing this as well for ecotourism involving other Australian wildlife species. The next evolutionary step in developing ecotourism in Australia could be to take greater account of such cultural connections.

In conclusion, sea-turtle tourism that satisfies the basic requirements for ecotourism does contribute to sea turtle conservation. However, its contribution could be strengthened by giving more attention to the cultural associations (past and present) with sea turtles. At the same time, we need to be wary of nature-based tourism that falsely masquerades as ecotourism. It can be very detrimental to nature conservation including the conservation of marine turtles. On the other hand, it would also be wrong to conclude that all nature-based tourism (including that focused on sea turtles) that fails to satisfy the criteria for ecotourism has negative effects on nature conservation, including the survival of sea turtles in the wild. Tourism based on headstarting or on the farming of turtles, captive turtles, aquariums or museum exhibits could have positive consequences for the conservation of wild sea turtles. Much will depend on the specific cases. In fact, if we want to use tourism as a means to promote nature conservation, including the conservation of sea turtles, there is much to be said for a multi-pronged approach.

Acknowledgements

Preparation of this article has benefited from a research grant of the Australian Research Committee for a project investigating the economics of conserving Australian tropical wildlife. We would like to thank Caroline Martin of the Queensland Museum for responding to our requests for some information about the cultural association of Australian Aborigines

and Torres Strait Islanders with sea turtles and Beryl Rajbhandari and Nick Footner for research assistance. We would also like to thank Kamal Amarasooriya (deceased) from the Natural Aquatic and Resources Agency (NARA) and Annika Mackensen from Germany for conducting the surveys in Sri Lanka.

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