

ECONOMICS, ECOLOGY AND THE ENVIRONMENT

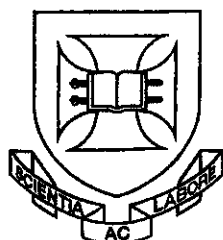
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SEA TURTLES AS A NON-CONSUMPTIVE TOURISM RESOURCE IN AUSTRALIA

ABSTRACT

As many studies have demonstrated, the economic potential for exploiting wildlife resources for non-consumptive wildlife-oriented recreation (NCWOR) tourism is large. Such tourism offers a realistic chance for the conservation of wildlife resources in the long-term, especially important when wildlife resources are dwindling mainly due to habitat destruction, poaching and other man-made threats. In this paper, we show that in Australia, the potential for exploiting the non-consumptive uses of sea turtles in a specialised niche market is large and provides an attractive alternative to current consumptive uses which in the long-term are deemed to be unsustainable. Such uses also afford the best form of preserving the endangered turtles and their rookeries.

Key words: Sea turtles, ecotourism, non-consumptive uses, economic potential, conservation and educational values, Australia.

SEA TURTLES AS A NON-CONSUMPTIVE TOURISM RESOURCE IN AUSTRALIA

1. INTRODUCTION

For the last few decades, non-consumptive wildlife-oriented recreation (NCWOR) tourism has recorded phenomenal growth popularized by ecotourism¹. The economic potential for exploiting non-consumptive wildlife resources is therefore undoubtedly large as many studies have demonstrated. Such tourism offers a realistic chance for the conservation² of wildlife resources in the long-term, especially important when wildlife resources are dwindling mainly due to habitat destruction, poaching and other man-made threats. This is because by showing a sustainable³ economic value for wildlife resources, habitat destruction, poaching and other threats can be slowed down. Such tourism activities are also educational⁴. Non-consumptive economic values show the opportunity costs of current consumptive practices which are unsustainable. The application of economic instruments, too, becomes possible and practical. Such uses also have legal implications. Non-consumptive economic values provide a strong argument for inter-governmental efforts to curb the large-scale harvesting of eggs and turtles for their meat and tortoiseshells in neighbouring countries. The large non-consumptive economic

¹ Orams (1995, p. 3) points out that ecotourism is a new phenomenon and can be traced only as far back as the late 1980s. After his review of the variety of ecotourism definitions, he shows that, at a minimum, ecotourism is tourism which is based on the natural environment and which seeks to minimize its negative impact on that environment

² The argument for the integration of tourism with conservation was first made widespread by Budowski (1976) in his article on 'Tourism and conservation: conflict, coexistence or symbiosis'.

³ It is now an accepted fact that economic development, especially for tourist purposes, should be sustainable and this requires the conservation of biological resources (Barbier, 1987; Tisdell, 1988).

values of turtles can be used to convince native communities and neighbouring countries that there exists more sustainable and attractive alternatives to present unsustainable consumptive practices that are threatening sea turtles that cross international boundaries. In this paper, we show that in Australia, the potential for exploiting the non-consumptive uses of sea turtles in a specialised niche market is large and provides an attractive alternative to current consumptive uses which in the long-term are deemed to be unsustainable. We also show that such uses afford the best form of preserving the endangered turtles and their rookeries.

The plan of this paper is as follows. The first section deals with the non-consumptive recreational values of wildlife, taking examples from all over the world where wildlife viewing by ecotourists is popular. A conceptual framework for wildlife tourism showing growth of visitors and their composition is also presented. In section two of the paper, we discuss the hitherto untapped tourist potential of sea turtles as a non-consumptive wildlife resource in Australia taking advantage of the well established tourism industry and infrastructural facilities. Section three discusses the threats to sea turtles and how NCWOR tourism can help in the conservation of these endangered marine reptiles. Section four looks at the potential problems that are associated with the exploitation of non-consumptive uses of wildlife resources. The last section summarises the conclusions of this paper.

⁴ As pointed out by Tisdell (1998, p. 109) tourism includes an educational element which has been termed edu-tourism.

2. NON CONSUMPTIVE RECREATIONAL VALUES OF WILDLIFE

During the last few decades, non-consumptive recreational use of wildlife resources has attracted large numbers of visitors popularized by ecotourism and generating large direct and indirect economic benefits with local and regional multiplier effects. Today, non-consumptive recreational wildlife viewing is a multi-million dollar business which plays a vital role in the tourism industry. The growth has stemmed from the development of the tourism industry and promotion, and the desire for tourists to see wildlife in their natural state. Rapidly dwindling wildlife species and their natural habitats, too, no doubt would have contributed to the rapid growth of this trade⁵. NCWOR tourism marks a clear shift from the traditional consumptive uses of wildlife resources.

Wagar (1969), as stated in Duffus and Dearden (1990) defines NCWOR tourism as a human recreational engagement with wildlife where the focal organism is not purposefully removed or permanently affected by the engagement. According to Wagar such use provides an experience rather than a tangible product and that it does not preclude any other person or person using such a resource in the future. Non-consumptive uses of wildlife resources can involve many activities with a wide range of levels of organization which will influence the level and types of impact (Boyle and Samson, 1985). As pointed out by Vaske et al. (1982), non-consumptive uses have a distinct difference in most respects between an activity that purposely seeks to remove or destroy an organism and one that does not. It must be pointed out here that non-

consumptive uses of wildlife does not involve non use values (existence and bequest values) and future use values or option values (for e.g. see Pearce, 1993; Bergstrom et al. 1990).

In this paper, we group the activities of NCWOR tourism into two main categories. This distinction is important for our discussion in this paper. In category one (NCWOR I tourism), tourists visit a national park or a protected area to watch wildlife in their natural environment without a focal species in mind. This involves an excursion in the park, viewing whatever wildlife that can be watched. Most visitors fall into this category. The second category (NCWOR II tourism) involves visiting a designated area with a view to watch a focal species in its natural habitat. This involves visiting an area (most often a protected area) and waiting for the species to be viewed when it appears. Usually this involves small groups of individuals viewing from a designated place such as a platform or/and hide. The individuals may be the wildlife enthusiasts and/or the average tourist as will be shown later. Some good examples that can be cited are: the viewing of fairy penguins on Phillip Island, Victoria, humpback whale watching in Hervey Bay and Tangalooma, Queensland or watching the Northern Royal albatross colony at Taiaroa Head in New Zealand. However, whilst engaging in one species, incidental contact with other species may also be involved. For example, seeing short-tailed shearwaters (Tasmanian mutton-birds) during the breeding season on Phillip Island, the incidental sightings of dolphins, dugongs, turtles and other species of whales whilst on a humpback

⁵ See Tisdell (1998, p. 97) for some of the factors that have contributed to the development of the tourism industry.

whale watching cruise or the presence of cormorants with the Royal albatross colony. The first category (NCWOR I) tourism described above is not a new phenomenon. Even during the last century, safaris to wild places in Africa to view wildlife were popular among explorers and adventurers from Western Europe (Orams, 1995, p. 4). However, the second category (NCWOR II) described above is rather a new phenomenon, perhaps dating back to the late 1960s (for e.g Northern Royal albatross colony established in 1967⁶, Mon Repos for turtles in 1968⁷ and Hervey Bay for humpback whales in 1987⁸). In this paper we focus our attention on the second category of non-consumptive wildlife-oriented recreation.

Duffus and Dearden (1990) propose a conceptual framework for wildlife tourism where they identify the dynamic nature of tourism that involves the non-consumptive uses of wildlife for recreation. They point out that such resources evolve and change overtime both in terms of users and the sites where activities take place. As Duffus and Dearden (1990, p. 222) state:

⁶ Phillip Island parade is an exception where organised viewings of fairy penguins have taken place as early as the 1920s (Glover, 1992). However, the present day viewing stands and other facilities began to appear in the 1960s when the Shire of Phillip Island and the National Parks and Wildlife Service took control of the management of the present reserve. Since then the facilities and visitors have systematically increased. The reserve has also been extended since the 1960s.

⁷ It must be mentioned here that viewing of turtles have been in existence long before the dates mentioned in the paper but since the commencement of work by Queensland Turtle Research Program at Mon Repos in 1968, research staff have taken the opportunity to explain turtle behaviour to visitors. The present day turtle-watching program was started in 1985 (Kay, 1995, p. 6). A service fee was introduced in the 1994-95 season.

⁸ Whale watching in Hervey Bay by visitors has gone on for many decades but it was in 1987 that the whale watching industry was started (Kleinschmidt, 1996, p. 97).

“ Through time, a site particularly attractive for wildlife viewing may develop a public image through the growth in publicity and facilities designed to service the visitors who arrive at the area to encounter wildlife. As the facilities expand, this in turn influences the types of individuals who visit a site, the expectations, and the satisfaction derived from the attraction ”

The growth of visitors and their composition which has been developed by Duffus and Dearden (1990) employing Butler’s (1980) concept of the tourist area life cycle which is based on a product life cycle roughly following a logistic curve is shown in Figure 1 with a few minor adaptations.

The specialist/enthusiast-ordinary tourist continuum adapted from Bryan’s (1977, 1980) leisure specialization continuum which is shown in Figure 1 suggests that tourists visiting a specific wildlife setting changes overtime. In the initial years the type of visitors that visit a specific wildlife setting is usually the wildlife specialist who as Duffus and Dearden point out ‘require little infrastructure or interpretive facilities, and their presence is usually absorbable by existing social and ecological systems at the site’. However, it must be pointed out here that they need not specifically be wildlife specialists but can be wildlife enthusiasts as witnessed in the case of fairy penguins in Phillip Island or sea turtles in Mon Repos. Duffus and Dearden (1990) point out that they are likely to have pre-knowledge about the site and the wildlife attraction derived from others who have been before and are few in number to require little management intervention. As time passes and the awareness of the site grows, together with infrastructural development and

publicity, the situation changes from the specialist wildlife viewer and/or wildlife enthusiast to the more general (ordinary) viewers as shown in stage C of Figure 1. These developments, however, will apply pressure on the 'social system and the ecosystem of the host area'. This requires increased management intervention (Duffus and Dearden, 1990, p. 222). As Figure 1 shows, there is rapid growth after stage A which continues past B before slowing down.

< FIGURE 1 >

In this paper we employ this conceptual framework to show that turtle-based tourism can be developed and expanded in Australia and in doing so encounter potential problems that need to be addressed if this resource is to be used on a sustainable basis. By developing new areas with a potential for turtle-based tourism, the pressure on the existing sites can be minimized while also benefiting the local community as well as imparting an educational value on the visitors and aiding in the conservation of the species.

As mentioned earlier, NCWOR tourism is an integral and a sustainable resource for the tourist industry. In fact in certain countries, the tourist industry depends largely on NCWOR tourism and is even the main foreign exchange earner. A good example is Kenya. As Moran (1994, p. 663) points out:

“ protected areas and their inhabitants are the principal focus of the tourist industry, the nation's main foreign exchange earner, and a source of wonder and value for a global population of non-users ”

Many studies have been carried out to determine the economic and recreational benefits of NCWOR tourism. Estimates from North America show that the value of non-consumptive wildlife uses are large and have also grown significantly over the years. Filion et al. (1983) estimate that in 1981 alone, 3.6 million Canadians spent a total of Can \$ 2.1 on non-consumptive wildlife-oriented trips. In Canada, income from whale-watching from Vancouver Island generated expenditures estimated at Can\$4.2 million (Duffus and Dearden, 1990). Statistics maintained by the US Fish and Wildlife Service (1987) show that wildlife viewing as a primary recreational activity increased from 83.2 million to 104.7 million user-days between 1980 and 1985. In Australasia, too, NCWOR tourism of both categories is popular and in recent years has recorded phenomenal growth. In Asia, NCWOR I tourism is popular with NCWOR II tourism, also showing rapid growth during the last decade. For example, in India, Nepal and Bangladesh, special wildlife tours, organized to view the Bengal Tiger, are popular. Specialized tours to watch the last remaining Asian Lions in the Gir forest National Park and Rhinoceroses in India and Nepal are well known. Some specialized bird-watching tours are also conducted in the region. In New Zealand, in addition to NCWOR tourism of category I, NCWOR tourism of category II is extremely popular and perhaps one of the countries that make extensive use of this specialised niche market given the limited but unique biological resources it is endowed with. Many bird species such as the penguins (yellow-eyed and little blue), Royal albatross and gannet colonies, petrels, kiwi's and wading birds and white herons and marine mammals such as dolphins, whales and sea lions have been exploited in recent years as a NCWOR resource [see Higham (1998, p. 523) for a complete list of non-consumptive wildlife tourism in New Zealand and their

locations/settings]. The number of visitors, too, have increased in recent times. For example, in Taiaroa Head Northern Royal albatross colony, visitors have increased from less than 1,000 in 1972 to more than 40,000 by the end of 1992 (Higham, 1998, p. 526). Tisdell (1990, p. 88-98) discusses the economic potential of some of these wildlife resources and shows the revenue generated from the Royal albatross colony alone runs into hundreds of thousands of dollars each year. In Australia, NCWOR II tourism, like NCWOR I tourism, has been drawn increasingly into contact with tourists in recent years. Some examples of non-consumptive wildlife viewing include: Fairy penguins and fur seals on Phillip Island in Victoria, humpback whales in Hervey Bay and Tangalooma, Queensland, dolphins at Monkey Mia, Shark Bay, Western Australia and crocodiles in the Northern Territory. The income and employment generated directly from these ventures are substantial and complements and supports other tourist attractions by adding value to tourist spending. Judging from the large numbers of ecotourists visiting these sites, it is no doubt a major revenue earner. For example, desktop estimates for 1994 put the direct value of cetaceans-based tourism (mainly dolphins) at approximately 8.9 million dollars (Anderson et al. 1996, p. 11). The number of international tourists (in addition to local tourists) engaged in NCWOR II has also increased in recent times. For example, international visitor numbers to Phillip Island/Penguin Parade have shown a phenomenal increase from 187.6 thousand in 1989 to 266.4 thousand in 1995 (Bureau of Tourism Research, Various Issues, 1989-1995). Other sites, no doubt have also grown judging from the increases in ecotourists as recorded by Bureau of Tourism Research (Various Issues, 1989-1995). The income generated is significant. In addition to direct income generated from entry fees to these sites, the indirect and multiplier effects, too,

are large. They can be both local and regional. Some of the indirect benefits include the sale of souvenirs, accommodation and catering, transport services, photography, post cards, books and other merchandise.

As pointed out in the above section, wildlife resources are increasingly being utilized for non-consumptive wildlife oriented recreation, both in Australia and elsewhere. However, despite the large earnings and employment generated, some wildlife resources such as sea turtles have remained until recently an untapped resource and offer the opportunity for further expansion of non-consumptive wildlife utilization. Until recently, sea turtles had only a consumptive⁹ appeal. However, the tourism value of sea turtles has now been revealed judging from the large numbers of visitors who visit Mon Repos Environmental Park and Heron Island National Park during the Australian summer to view the egg laying spectacle of these marine reptiles. These two relatively small beaches in the Southern Great Barrier Reef attract as many as 35,000 visitors each year during the summer (Limpus 1994, p. 138). This shows the extent of demand for this wildlife resource in Australia. Therefore, Australia remains in a unique position to break into this specialised niche market as will be shown in the next section. This not only will further generate income and employment opportunities, but will aid in the conservation of sea turtles by funding conservation activities from money generated from turtle-based NCWOR activities and by involving native communities. The educational value of such

⁹ Sea turtles from time immemorial have been of value to humans in providing a rich source of protein in meat and eggs. Shells have also been used as domestic tools and utensils, ornaments and even as a form of currency in ancient times. Ancient mariners and seafarers, too, found sea turtles as a useful source of protein in their long voyages - a food source that could be captured at sea on their voyages and also kept live until such time they were needed for consumption.

an activity, can be considerable. In the next section, we discuss the large potential that exists in exploiting sea turtles as a NCWOR resource in Australia.

3. NON-CONSUMPTIVE WILDLIFE-ORIENTED RECREATIONAL USE OF SEA TURTLES IN AUSTRALIA

As shown in the last section, the NCWOR tourism is one of the most important and sustainable resources on which tourism depends. The avenues of NCWOR tourism have not only expanded in Australia but have also continued to attract large numbers of ecotourists both local and international. Despite the expansion of activities, there still exists untapped wildlife resources that can be exploited for NCWOR tourism. One such resource is the sea turtles that visit Australia's beaches to nest. This valuable sustainable marine resource, although has been used as a tourist attraction as mentioned in the last section is still a largely ignored resource despite the huge potential it offers.

Sea turtles are living fossils that have navigated the world's oceans from the time of dinosaurs. These ancient giant marine reptiles have long fascinated people and figured prominently in mythology and folklore of many cultures including the Aborigines and Torres Strait Islanders. Seri Indians, who still live on the shores of the Gulf of California believe that the world began on the back of a gigantic (leatherback) turtle. In the Miskito Cays of the eastern coast of Nicaragua, the natives still believe in the story of a kind "Turtle Mother" (a benevolent spirit), who acts as an intermediary between the worlds of animals and humans (Ripple, 1996, p. 10). Turtle folklore is also well known in Fiji (see for e.g. Guinea, 1993, p. 11). Besides the mythology that surrounds the sea turtles, they

are mystical, uncommon, a unique sea reptile, a source of living wonder and of curiosity to many. These attributes make sea turtles a valuable NCWOR resource and attraction with a large potential for ecotourism. Six of the seven species¹⁰ of sea turtles visit the Western, North-Western, North-Eastern and Eastern beaches of Australia for nesting mostly during the summer months of October to March, depending on the species (Limpus and Miller, 1993, p. 135)¹¹. Some beaches witness large numbers of nesting turtles each night during the nesting season. During the nesting season, the important rookeries are visited by turtles in their hundreds or even thousands. In fact, Australia has some of the most important major and minor rookeries of turtles in the world (see Figure 2 for distribution of the six species of turtles in Australia). As Limpus (1994, p. 100) states:

“Australia is one of the few countries that still has large breeding aggregations of marine turtles comparable to what they would have been like 200 years ago”

In addition, the flatback sea turtle is endemic to the Australian continental shelf (Limpus, 1988, p. 63) which is an added attraction to ecotourists, including wildlife specialists from overseas. Four species (green, flatback loggerhead and hawksbill) of turtle occur in globally significant numbers on Australian rookeries (Limpus, 1994), p. 100) as shown in

¹⁰ Kemp's ridley turtle is the only turtle that does not occur in Australian waters. All of the seven species are endangered, the most critically being the kemp's ridley. The leatherback is the largest and the olive ridley is the Smallest of the sea turtles.

¹¹ In the Northern Territory, egg laying takes place all year round with a dry season peak in activity (Limpus and Miller, 1993, p. 135).

Figure 2 while two species (leatherback and olive ridley) occur in smaller numbers, thus making turtle-based tourism attractive for Australia.

< FIGURE 2 >

Australia, for many reasons is placed in a unique position to exploit this sustainable marine resource. The major nesting season of turtles coincide with the holiday season in Australia and the winter months in Europe and North America [Bureau of Tourism Research (1989-1995) statistics show that not only are the largest proportion of international nature-based tourists come from Europe and North America but the numbers have also increased in recent years]. Hence, like for many other wildlife resources, the huge potential to attract both local and international visitors. Furthermore, the Australian tourism infrastructure is well developed for the exploitation of this resource with considerable amount of experience in ecotourism. For example, as discussed in the last section, Australia has successfully exploited the attractions of the Phillip Island fairy penguins and whales (many species including dolphins) for the last few decades and fur seals and crocodiles on a smaller scale in recent times. The direct, indirect and multiplier benefits that can be generated from turtle-based tourism is substantial. Sea turtle viewing can be a bigger attraction. This is because not only do visitors get an opportunity to view these massive reptiles dragging their heavy bodies ashore, but also witness the egg-laying spectacle. A female turtle burrowing its nest with their massive flippers on the sandy beaches accompanied by the long labour of egg laying and later concealing the eggs is an awesome experience never to be forgotten. The attractions of turtles do not end there. Baby turtles emerging from their nests and then dashing straight out to sea (guided by instinct), to meet the crashing waves of the mighty oceans is one of the natural wonders

of the world. Hence, turtle viewing offers not only an opportunity to view turtles in their natural habitat, but offers an opportunity to study them while also enjoying the experience of a life-time. In this manner, turtle viewing not only can generate income and provide employment but also complement the conservation efforts of sea turtles as is done on Phillip Island from revenue generated from viewing fairy penguins. Part of the money generated can be used to further turtle research and to protect and secure nesting beaches. The experience imparted from viewing is also educational which can assist in preserving and conserving this natural wonder for future generations. Turtle viewing can be used to increase the public awareness on the threats facing turtles and their habitats as is done in Sri Lanka (Gampell, 1999, p. 54). For example, edu-tourism (see Tisdell, 1998, p. 109) can go a long way in educating the public on the dangers of disposing plastics on beaches and seas, fishing gear (e.g. nets, tackle, hooks) in the sea, artificial lights near turtle nesting sites, over-exploitation of beaches, use of turtle products (for e.g. tortoiseshells) and consumption of turtle meat and eggs. Edu-tourism can also help to raise money for conservation. Sea turtle viewing can be further complimented by setting up visitor centres/museums dedicated entirely to turtles, depicting all aspects of turtles ranging from their biology, life at sea, current turtle research, main threats to sea turtles, history of commercial turtle harvesting (both Australia and world-wide) and what tourists can do to help the species as is done at Mon Repos since 1993/4. The success of Phillip Island is a good example of how public awareness can be increased through ecotourism and the education imparted. Visitor centres/museums can enhance the visitors knowledge of turtles and the need to protect them. Information gathered from satellite tracking can

be shown as is done with fairy penguins on TV screens on Phillip Island or even display live tracking taking place in the oceans.

Most turtles and their rookeries are located in traditional territories of Aborigines and Torres Strait Islanders. Sea turtles play an important role in the traditions and culture of these native people. These people have traditionally hunted them for thousands of years although some groups exclude hunting because of spiritual beliefs. Making use of the knowledge of these people in turtle-based tourism not only provides new employment and income generating avenues but also helps in the conservation of turtles. This is because these people who have traditionally hunted sea turtles for thousands of years can be shown the sustainable benefits of non-consumptive use of this valuable resource thus opening an important area discouraging the consumptive uses of sea turtles. In addition, turtle-based tourism can be complimented by making use of what Aborigines and Torres Strait Islanders have to offer. For example, conducted tours to learn more about their culture, life styles, art works, etc. Museums can be step up for this purpose. The sale of aboriginal art-works etc can be an added source of revenue. Cultural activities such as dance can also be organized to accompany turtle viewing and study. Turtle breeding can also be encouraged as is now being done with the hawksbill turtle in the Northern Territory. These farms can be on display to tourists as well as releasing some of the stock to the wild if this is possible. This can be complimented with aquariums designed mainly for turtles. They can also be used for research purposes.

Sea turtles that come ashore mostly at night to nest can be easily disturbed by noise, artificial lights and other human activities. This can result in sea turtles going back to sea without nesting. Hence, turtle viewing has to take into consideration the sensitivity of these creatures if turtle viewing is to be made a success. At Mon Repos and Heron Island, park wardens guide visitors in batches to watch the egg laying spectacle as well as hatchlings leaving the nests under supervision. In areas where this form of activity is considered sensitive other methods can be employed. One option would be in the form of building innovative hides that are noise and light proof to the turtles while also at the same time making the visitors comfortable. Night vision equipment can also be used for this purpose. In some instances live footage of egg laying and other aspects of turtle nesting and hatchlings scuttling out to sea can also be shown inside the hides as is done for other species in some RSPB nature reserves in Britain, especially with large birds such as the ospreys, golden eagles or with the Royal albatrosses at Taiaroa Head, New Zealand. Such an exercise can enrich a visitors experience of watching turtles. The number of visitors for each site may also be controlled as is done at Mon Repos and Heron Island.

Most sea turtles come ashore at night for nesting. This can be throughout the night. This may be considered as a potential drawback for tourist viewing. However, this may not be the case since ecotourists are known to go on safaris or bird-watching in the very early hours of morning and resting during the day. In fact the warm summer makes it all the more attractive to enjoy this type of activity during the night. The nights are also shorter.

Visitor numbers at Mon Repos and Heron Island show that night time viewing is not a major drawback.

As mentioned earlier, some of the money generated from tourism can be used for conservation purposes, not only to carry out further research, but also to bring more beaches under full protection and to address the threats that are facing sea turtles. For example, the money can be used to eradicate introduced predators such as foxes and feral pigs that are a major threat to turtle eggs and hatchlings as will be shown in the next section. On Phillip Island, for example, the money generated from fairy penguin-based tourism is not only used for research, but also used to purchase land in the surrounding areas, as well as to control predators such as foxes. The money is also used to fund other conservation activities such as habitat improvement.

Revealing non-consumptive economic potential of turtles also opens up many other avenues to reduce the threats faced by turtles. Non-consumptive economic values show the opportunity costs of current consumptive practices which are unsustainable. The economic values can also be used as an argument to provide alternative sources of fresh meat and eggs to those communities who are dependent on turtles for fresh meat and eggs. Alternative supplies of foods may not only be cheap but can also be made more easily accessible throughout the year. The application of economic instruments, becomes possible and practical. It has legal implications too. The non-consumptive economic potential creates opportunities to make turtle excluder devices mandatory by law on fishing trawls and to limit boat speeds which have been identified as some of the major

causes of turtle deaths in Australia as will be shown in the next section. Fines and perhaps compensation schemes can also be enforced. The argument here is similar to the polluter pays principal (PPP)¹² where the polluter pays/compensates for any damage caused. Non-consumptive economic values also provide a strong argument for inter-governmental efforts to curb the large-scale harvesting of eggs and turtles for their meat and tortoiseshells in neighbouring countries. The large non-consumptive economic values of turtles can be used to convince neighbouring countries that there exists more sustainable and attractive alternatives to present unsustainable consumptive practices that are threatening sea turtles that cross international boundaries.

As pointed out by Duffus and Dearden (1990), in the formative years 'specialists' and/or wildlife enthusiasts tend to visit the wildlife setting. However, with increasing awareness of the attraction and with facility development, a less ambitious or a 'generalist' visitor profile will emerge as shown at point C in Figure 1. For the Tairaroa Head Royal albatross colony, Higham (1998) tests the dynamics of wildlife tourism as illustrated by Duffus and Dearden's conceptual framework and shows that the tourist development of the albatross colony site upholds the conceptual framework presented by Duffus and Dearden. For turtle-based tourism in Australia, too, this could well be the case. At Mon Repos the initial stages of turtle enthusiasts coming down to the beach to see turtles is over and is well beyond stage A or even B with awareness of the site growing due to word of mouth and publicity given and with the infrastructural development since 1974

¹² The basic tenet of PPP is that the price of a good or service should fully reflect its total cost of production, including the cost of all resources used (see for e.g. Turner et al. 1994, p. 145)

(the establishment of the first turtle-sands caravan park at Mon Repos) and the purchase of adjacent land and declaring Mon Repos an environmental park in the 1980s. Further development and expansion have taken place in Mon Repos after the establishment of the visitor centre including an extensive display area and an outdoor amphitheatre in 1993/4 (Kay, 1995, pp. 2, 6).

Therefore, NCWOR tourism of turtles not only offer a huge potential for ecotourism but also the money generated can be used to aid in the conservation of sea turtles. NCWOR activities like turtle-based tourism can be used to educate the public on the need to conserve and to argue for the protection of this sustainable resource. Sustainable use of sea turtles like for NCWOR can also further strengthen the argument to discourage the harvesting of sea turtles and their eggs for food at current unsustainable levels because of the direct, indirect and multiplier benefits that can be generated. Sustainable turtle-based tourism becomes all the more valuable and important considering the increasing threats to sea turtles during the last few decades which has contributed to a sharp decline in populations world-wide. The world-wide decline of sea turtles is due to many reasons depending on the species and region to region. In the next section, we discuss briefly the threats to sea turtles world-wide as well as in Australia.

4. THREATS TO SEA TURTLES AND THEIR CONSERVATION

Although sea turtles are still found in large numbers in Australian waters and beaches they are being severely threatened (Limpus, 1994, p. 100). The threats facing turtles in

Australia and world-wide vary from species to species. In this section, we briefly outline the threats facing sea turtles with special reference to turtles in Australia.

Sea turtles are harvested for their meat¹³, tortoiseshells and many other by products. Turtle meat and eggs form an important part of the diet¹⁴ of many island and coastal native communities¹⁵ including the Aborigines and Torres Strait Islanders. The green turtle is favoured for eating and is actively hunted by indigenous Australians in the tropics (Limpus, 1994, p. 100) where considerable harvesting of turtles take place each year in Torres Strait, Northern Territory and Eastern Queensland. It is a traditional food item for the region (Limpus and Parmenter, 1986, p. 98)¹⁶. A very large number is also harvested in neighbouring countries such as Eastern Indonesia, Irian Jaya, Southern Papua New Guinea, Solomon Islands, Vanuatu and New Caledonia posing a significant threat to the long-term survival of the species in Australia (Limpus, 1994, p. 100). As many as 100,000 green turtles are slaughtered each year in these countries (Limpus, 1988, p. 64). Loggerheads are also sometimes harvested for food (Limpus and Parmenter, 1986, p. 98; Limpus and Reimer, 1990, p. 43).

¹³ Hawksbill turtles are rarely hunted because they can be poisonous or unpleasant to eat.

¹⁴ Turtle meat is also on offer in menu's of some resort hotels in developing countries.

¹⁵ Marine turtles have important cultural and social values for Aboriginal and Torres Strait Islander people living in coastal areas of Northern Australia. They are an essential food item for some of the island communities in the Torres Strait, where there are few other sources of fresh red meat. In Costa Rica, Nicaragua, Panama, Mexico and other countries in the region, turtle meat is an important source of fresh meat. In the Pacific and some regions of South, South-East Asia, too, turtle meat is not only an important source of food but is also considered as a delicacy.

¹⁶ Limpus and Parameter (1986, p. 98) state that around 10,000 green turtles were harvested in the late 1970s. Harris et al. (1995) state that 9,000 are harvested for meat in the Torres Straits each year.

Turtle eggs are harvested for food by many native communities. Turtle eggs are believed by some cultures to be an aphrodisiac and that they promote healthy skin. The sale of turtle eggs in certain countries is a common practice and is a valuable source of income. Hawksbill turtle eggs are regularly gathered for eating by Torres Strait Islanders (Limpus, 1994, p. 103; Limpus and Parmenter, 1986). Aborigines and Torres Strait Islanders also harvest green turtle eggs on a regular basis. Excessive harvesting of leatherback turtle eggs by native communities in Southeast Asia is another major threat (Limpus, 1994, p. 103). Some eggs of flatbacks are also taken (Limpus, 1988, p. 63).

Some native communities such as the Aborigines and Torres Strait Islanders, are by law permitted to harvest/hunt sea turtles for non-commercial purposes (GBRMPA, 1994, p. 3). However, the illegal slaughter of sea turtles and poaching of eggs, mainly in developing countries is a major problem endangering the survival of these ancient sea reptiles.

Apart from these threats, there are numerous other threats, affecting sea turtles. Sea turtles are highly migratory reptiles (moving between feeding and nesting grounds) which spend most of their time at sea and among coral reefs (see Carr, 1980; Limpus, 1991). Hence, they are vulnerable to many dangers, which range from predation in the oceans by larger fish and sharks to marine pollution¹⁷, accidents by speed boats (boat strikes),

¹⁷ Marine pollution can range from oil slicks (petroleum products), polychlorinated biphenyls (PCBs), sewage, fertilizers, pesticides plastics, and other wastes (e.g. heavy metals) can all impact on turtles and their breeding cycles (for a discussion and relevant literature, see Miller and Limpus, 1991).

accidental entanglement and eventual drowning in fishing, crab, shark and gill nets¹⁸ (see for e.g. Limpus and Reimer, 1990). The commercial fishing industry, in particular the prawn trawling industry has been the most frequently identified cause of mortality of loggerhead turtles (Pointer and Harris 1990). The harvesting of the Sargassum sea weed which provides essential shelter and food for the turtle hatchlings and post-hatchlings (see Musick and Limpus, 1997) as a cheap additive to livestock feed is now a major threat to the survival of sea turtles in the oceans. The ingestion of plastics by turtles in the oceans mistaking for jelly fish (especially the leatherbacks) also results in many deaths among turtles (Limpus and Reimer, 1990)¹⁹. Apart from the demand for turtle meat, leatherback turtles (the only turtle without a hard shell) are killed for their body oil which is used for fuel and medicinal purposes. The olive ridley is harvested for its leather (Limpus and Miller, 1993, p. 137). Hawksbill turtles are harvested for their beautiful shells (bekko in Japanese) which are used to make expensive jewellery and ornamental products, especially in Japan. Cosmetics are also known to be produced from Hawksbill turtles. No tortoiseshells are exported from Australia, but hawksbills that breed in Australia which migrate to neighbouring countries such as the Solomon Islands and Eastern Indonesia are harvested for the bekko trade. Many thousand hawksbills are harvested each year for this purpose (Limpus, 1988, p. 65).

¹⁸ Limpus and Reimer (1990, p. 39) state that the most likely cause for the decline of Eastern Australian Loggerhead turtle during the last 10-15 years is due to mortality resulting from the fishing industry in Northern and Eastern Australia, particularly the prawn industry. Other factors such as harvesting for food in neighbouring countries, boat strikes and ingestion of discarded debris are also contributing to their decline (ibid). Thousands of other species of turtles are also caught each year in the prawn trawls (Limpus, 1988, p. 63-64).

The destruction of coastal beaches due to natural erosion, human settlement, resort development and recreation deprives turtles of quality nesting grounds (National Research Council, 1990). Human disturbances and strong artificial lights (eg. coastal roadway lighting) affect turtle nesting. Apart from the harvesting of eggs by native communities, predation of eggs by introduced foxes and feral pigs take place on a large scale (for e.g. see Limpus and Reimer, 1990, p. 42; Chaloupka and Limpus, 1997 that discuss fox predation of turtles)²⁰. There is also natural predation by dingos and land reptiles such as goannas. Hatchlings are also vulnerable to a vast array of predators ranging from sea birds, especially large gulls and skua's, raptors (such as sea-eagles, kites) to crabs, and the above mentioned mammals and reptiles. Artificial lights disorientate turtle hatchlings towards land thereby exposing them to further predations and accidents (e.g. motor vehicles) and exhaustion from heat and eventual death from starvation. At sea, turtle hatchlings are highly vulnerable to predation from sea birds, large fish and sharks (Limpus, 1991). Apart from the above mentioned factors affecting turtles all over the globe, turtles also die of diseases. The main disease affecting them is a tumour-causing disease called fibropapillomatosis (Papillomas).

Turtles, as shown in this section are, therefore, vulnerable to many hazards from the time the eggs are laid. As a result of the high mortality among turtle hatchlings, only a few

¹⁹ Leatherback sea turtles are the most vulnerable since they eat floating plastic bags which they apparently mistake for jellyfish. Jellyfish are their favourite food.

²⁰ Limpus and Reimer (1990, p. 42) state that during the 1970s and 1980s, annual fox predation rates of egg clutches laid along the 22 km beaches at Wreck Rock increased to over 90% and it became rare to observe hatchling emergences.

survive to adulthood from each clutch of eggs²¹. The man made problems affecting sea turtles is not only increasing but the problems confronting turtles vary from country to country and from region to region. Because turtles are a shared international resource, laws enacted and enforced in one county is insufficient for their total protection if no or little protection is afforded in neighbouring/other countries. For example, the feeding grounds and migratory pathways of some turtles that breed in Australia span the territorial waters of three nations (Limpus and Parmenter, 1986, p. 100) which make turtles vulnerable to mass slaughter. Tens of thousands of these turtles are harvested annually in neighbouring countries as mentioned earlier in this section. It is estimated that 90% of harvests of green turtles breeding in Australia occur outside Australia because of migration (Limpus, 1988, p. 64). These problems make the protection and conservation of sea turtles even greater than land mammals which have limits on the scale of migration. The complex and secretive life of turtles (they spend most of their lives at sea), make it all the more difficult and expensive to study turtles in the oceans to protect and conserve them²².

The development of ecotourism is not without problems as shown in Duffus and Dearden's (1990) conceptual framework of wildlife tourism as confirmed by Higham's (1998) examination of the Northern Royal albatross colony at Taiaroa Head, New Zealand. As pointed out by Duffus and Dearden and confirmed by Higham (1998),

²¹ It is believed that only 1 in 10,000 hatchlings is believed to survive to maturity.

²² In North America, satellite transmitter tracking of turtles is now under way to study the patterns of turtle migration, their biology, feeding habits and other factors. In Australia, tagging of turtles has been carried out for several decades to study their complex migrations, biology, etc (for e.g. see Limpus, 1991).

exceeding point C in Figure 1 is most serious and likely to cause irreparable damage to the wildlife resources. In the next section we discuss some of the likely problems that will be associated with the exploitation of wildlife resources for non-consumptive recreational purposes. This calls for the careful management of these resources if they are to be exploited on a sustainable basis.

5. PROBLEMS ASSOCIATED WITH EXPLOITATION OF NON-CONSUMPTIVE VALUES OF WILDLIFE RESOURCES

Exploiting the non- consumptive values of wildlife is not without problems. Many studies have shown that NCWOR tourism can affect wildlife due to human disturbances, infrastructural development and pollution caused by humans. Higham (1998) notes that although Royal albatrosses of Taiaroa Head are tolerant of human presence, significant impacts have been observed. Robertson (1992) using nesting records collected since the 1930s confirm that the nesting distribution of Royal albatrosses at Taiaroa Head has gradually shifted from optimal to sub-optimal nesting areas in terms of nest availability due to human presence. This has taken place despite these birds being conservative in nature in site selection (for a discussion on some other effects on the Royal albatross colony, see Higham 1998, p. 529-530). In North America, too, the effects of NCWOR activities have been studied on a wide range of wildlife resources. For example, Boyle and Samson (1985) review some of the 536 studies that have been carried out concerning the effects of non-consumptive outdoor recreation on wildlife.

Non-consumptive turtle based ecotourism, too, is not without problems. Noise, artificial lights from tourist resorts, human presence on beaches, speed boats have all been identified as causing disturbances to turtles and affecting nesting. Some studies have been conducted to determine the impact of tourism on breeding turtles. However, these studies are not in relation to turtle-based tourism. No detailed study has been carried out to determine the impacts of tourism on turtles on Mon Repos, Heron Island or South Africa where turtle based-tourism has been encouraged. We however, discuss some studies that have been conducted to determine the impact of tourism (i.e use of beaches by tourists during the day), infrastructure development of coastal areas, etc. on turtle nesting which can be useful in identifying some potential problems and threats that can arise from turtle-based tourism. Arianoutsou (1988, p. 330-332) from a study from Zakynthos Island, Greece point out that bright lights and noise can discourage adult females from coming ashore to lay eggs or interrupt the egg laying procedure. He further points out that tourists using the beaches during the day, vehicles on the beach (close to waters edge), motor boats close to the beach and planting of trees on the beaches can, one way or another affect the nesting of sea turtles. Hatchlings can also be affected by bright lights because such lights cause disorientation (ibid). Hosier et al. (1981) showed that vehicular tracks on a nesting beach increase by 35% the time taken by hatchlings to reach the sea at which time they can be exhausted and hence become more vulnerable to predation. Excessive trampling of beaches by people can affect turtle eggs as well as the emergence of hatchlings (Bustard, 1972). Arianoutsou (1988, p. 332) further points out that night time disturbances may be caused to turtles by people who come to the beach in groups to watch nesting animals. Dean and Talbert (1975) observed that loggerhead

nesting activity in South Carolina was lowest in areas where beach houses were present, even if the beach appeared ideal for nesting. Declines in nesting population of loggerheads in Florida have been attributed to urban development (Worth and Smith, 1976). Bustard (1972) considers coastal development and construction in nesting areas to be the greatest threat to the loggerheads in Queensland, Australia.

Possible disturbances of nesting turtles by high tourist numbers at Mon Repos has been mentioned (Limpus and Reimer, 1990). Limpus (1994, p. 103) states that increasing negative impacts on turtle breeding sites are taking place as a result of increased numbers of tourists wanting to watch nesting turtles.

It is clear from the above mentioned studies that turtle-based tourism can impact on breeding turtles if sufficient safeguards are not adopted. If sustainable use of this valuable resource is to be expanded, then strict guidelines have to be adopted. It has also to be carried out in consultation with marine biologists experienced in this field. In fact the success of turtle-based tourism depends on how well the wild stocks are managed.

6. CONCLUSION

In this paper we show that considerable potential exists to exploit sea turtles as a non-consumptive sustainable resource in turtle-based tourism. Non-consumptive turtle-based tourism was shown to be the best alternative to the current consumptive practices which in the long-term are unsustainable. The economic benefits of turtle-based tourism,

therefore, promise not only to be a strong argument to reduce the current high consumptive uses of turtles but also to take appropriate action to reduce other impacts that are threatening the survival of these unique ancient reptiles in Australia as well as world-wide. Turtle-based tourism not only can compliment conservation work but are also be educational. The application of economic instruments, too, becomes possible and practical. It has legal implications too. The non-consumptive economic potential can strengthen arguments to make turtle excluder devices mandatory by law on fishing trawls and to limit boat speeds which have been identified as some of the major causes of turtle deaths in Australia. Non-consumptive economic values can also provide a strong argument for inter-governmental efforts to curb the large-scale harvesting of eggs and turtles for their meat and tortoiseshells in neighbouring countries. The large non-consumptive economic values of turtles may be used to convince native communities and neighbouring countries that there exists more sustainable and attractive alternatives to present unsustainable consumptive practices that are threatening sea turtles that cross international boundaries. In conclusion, it must be pointed out that if the current high harvesting practices are not curbed, not only will this resource disappear depriving native communities of their present consumptive uses but will also deprive a valuable sustainable resource.

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FIGURE 1

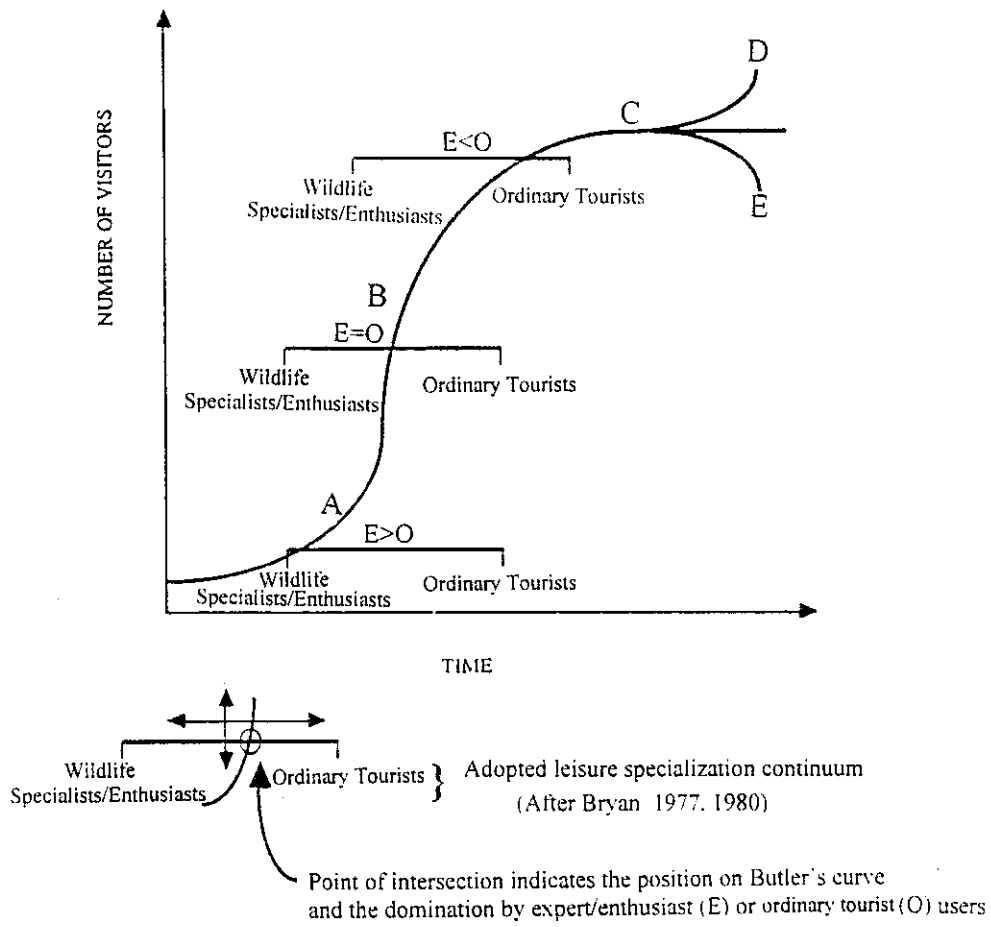


Fig. 1. Duffus and Dearden's (1990) conceptual framework for wildlife tourism with minor adaptations

FIGURE 2

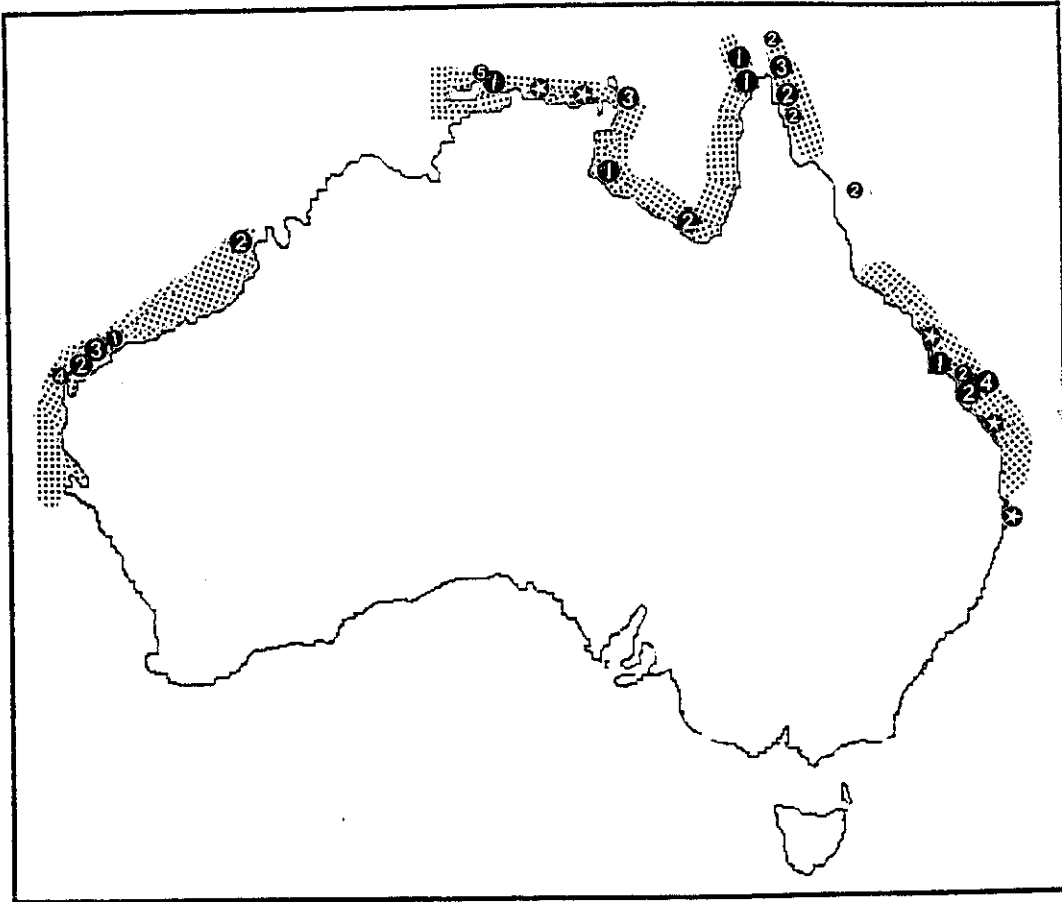


Fig. 2. The primary breeding areas of sea turtles in Australia

Figure 2 is adapted from Limpus and Miller (1993, p. 138). The Figure shows the primary breeding areas of flatback [1], green [2], hawksbill [3], loggerhead [4], olive ridley [5] and leatherback [6] turtles in Australia. Shading areas indicate the primary breeding areas of all turtles recorded in Australia (obviously the breeding areas overlap). Major nesting colonies (>1000 females/year) and minor colonies (hundreds of females/year) are indicated by large and small numerical numbers respectively. Leatherback turtles occur in Australia in very small numbers.

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