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# Marine Turtle Newsletter

## Marine Turtle Conservation in South and Southeast Asia: Hopeless Cause or Cause for Hope?

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All species of marine turtles except the Kemp's ridley (*Lepidochelys kempii*) occur within Asian waters, and of these, all except the Flatback (*Natator depressus*), nest in the Asian region. The Flatback is confined to waters of the Australian continental shelf, but feeding turtles have been recorded in the Indo Pacific area (Limpus et al. 2001). Marine turtle populations in Asia have been depleted through long-term harvests of eggs and adults, and as by-catch in the ever-growing trawl fisheries. Since turtles are indicators of the health of various and diverse marine ecosystems, these losses reflect a void in mankind's ability to sustain the present health of the oceans. Commitments made by many Asian governments at the Rio Convention have, for the most part, failed to curb the declines leading to the loss of what are among the last descendants of the planet's prehistoric age.

Despite the many turtle-related laws in Asian countries, governments have generally had little success with turtle conservation, and sea turtles and their habitats along with many other environmental issues are not high on their list of priorities. Even occasional efforts from governments and other agencies rarely translate into success at the ground level. However, governments are often forced to demonstrate good intentions and some measure of success, often resulting in misleading claims and assertions. An example is the frequent reports of exaggerated numbers of turtles nesting in Orissa, even though the population may really be in decline (see Shanker et al. in press). Similar is the case with the so-called success of green turtle conservation in Sabah, Malaysia (see Chan 2001; UPM et al. 1996), where populations have been steadily increasing, though nearly all eggs are moved to hatcheries, which produce 100 % females due to warm development temperatures (Tiwol & Cabanban 2000) resulting in skewed population sex ratios. Even given today's understanding of the problem, less than 20 % of the hatchery is shaded to counter this error. In another instance, when the USA imposed regulations on the import of shrimp, calling for the use of turtle-friendly fishery gears such as Turtle Excluder Devices (TEDs), the governments of India, Malaysia, Pakistan and Thailand opposed the move and won a case at the World Trade Organisation (Oravetz 2000). Though the Asian governments may have shared the US concern for sea turtles, they opposed the US position to protect their political agendas and since then have mostly failed to require or enforce the use of TEDs in their trawler fleets. The only losers in this case are the sea turtles, many of which continue to be accidentally captured in trawl fisheries.

For many parts of Asia there is still a vacuum with regards to knowledge of marine turtle populations. We present here a brief review of the status of marine turtles in South and Southeast Asia in the areas where most study and management efforts have been undertaken, major threats to populations and habitats, and highlight problems of particular importance. We also evaluate the general outlook for turtles and present

major considerations for their conservation.

## Current Status of sea turtles in South and Southeast Asia

Most populations in Asia have declined in recent years, some to the brink of extinction; though there are a few cases in which protection over the last 30 years has restored turtle populations. Major nesting populations in the region are as follows:

**Leatherback:** The only major nesting sites in the Indian ocean / Southeast Asian region are on Bird's Head peninsula, West Papua, Indonesia, where ~5000 nests are deposited per year (Halim et al. 2001; Putrawidjaja 2000) and Great Nicobar island, with about 2000 nests per year (Andrews & Shanker 2002). Nesting also occurs at a few other sites in the Andaman and Nicobar islands (Andrews et al. 2001) and Godavaya, Sri Lanka with ~ 300 nests per year (Ekanayake et al. 2002).

**Green:** Green turtles are the most widely distributed species, with regionally important populations occurring in Indonesia (10,000-20,000 nests per year; Halim et al. 2001), East Malaysia (Sabah and Sarawak Turtle Islands combined: up to 10,000 nests per year), Peninsular Malaysia (2,000-3,000 nests per year; Chan 2001; Nasir et al. 1999) and the Tawi-Tawi Turtle Islands, Philippines, (10,000-20,000 nests are deposited per year; Trono 1991). Myanmar has a reported 500 nests per year (Thorbjarnarson 2000) while in Thailand 200-300 nests are deposited yearly in the Gulf of Thailand, and possibly a similar number on the Andaman sea coast (Chantrapornsyl 1993). Green turtles also nest in Pakistan (~1000 nests per year; Asrar 1999), Gujarat, India (Sunderraj et al. 2001), Lakshadweep (<1000 nests per year; Tripathy et al. 2002) and the Andaman and Nicobar Islands (>1000 nests per year; Andrews et al. 2001), Sri Lanka (Dattatri & Samarajeeva 1982), and the Maldives (Frazier et al. 2000). All these populations are believed to have declined. In Vietnam, Con Dao has an average of 230 females per year (1995 to 2001) (Nguyen Thi Dao 1999; WWF/Con Dao unpublished data) and the total Viet Nam nesting population(s) is likely to be around 250 females per year (Hamann et al. 2002).

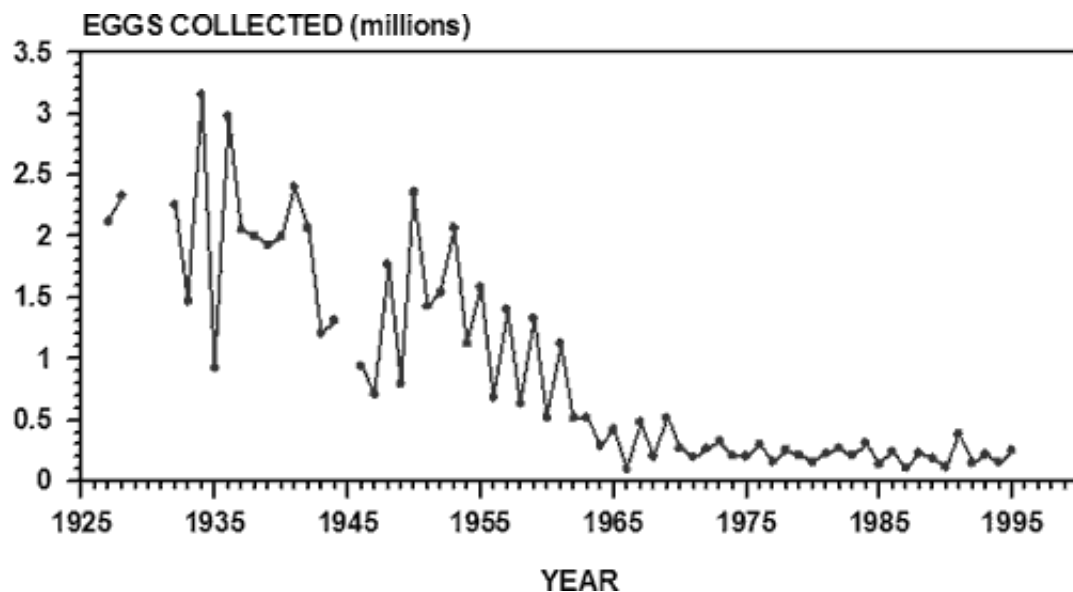
**Hawksbill:** In Malaysia, 400-600 nests are deposited per year in the Sabah Turtle Islands (Pilcher & Lamri 1999), and between 200-300 nests are produced per year in Melaka (Peninsula Malaysia). Nesting in Indonesia is higher, with a total of 1,000-2,000 nests per year (Chan 2001; Nasir et al. 1999). In the Indian subcontinent, hawksbill nesting is restricted to Lakshadweep (Tripathy et al. 2002) and the Andaman and Nicobar islands (Andrews et al. 2001).

**Olive Ridley:** Olive ridleys nest in Pakistan (Asrar 1999) the east and west coasts of mainland India (Kar & Bhaskar 1982) and Sri Lanka (Dattatri & Samarajeeva 1982), Bangladesh (Islam 2002), Myanmar (Thorbjarnarson et al. 2000), and Andaman and Nicobar islands (Andrews et al. 2001) and small populations are found in Vietnam (Hamann et al. 2002), Malaysia and Australia. Important sporadic nesting occurs at Tamil Nadu with ~4000 nests per year (Bhupathy & Saravanan 2002), Andhra Pradesh with up to 10,000 nests year (Tripathy et al. unpublished data) and Andaman and Nicobar islands with ~1000 nests per year (Andrews et al. 2001). The single most important breeding area is Orissa on the east coast of India, which has three mass nesting beaches (Gahirmatha, Devi River mouth and Rushikulya) where >100,000 turtles nest during arribadas at Gahirmatha and tens of thousands nest at the other sites (Shanker et al. in press). This species is mostly absent in Southeast Asia. Myanmar and Brunei record activity exceeding 300 nests per year, and Indonesia, Malaysia and Thailand have less than 50 nests per year (Chan 2001; Nasir et al. 1999). It is currently difficult to estimate the population size in Viet Nam, however it is likely to be 10s of nests per year.

**Loggerhead:** The only significant nesting site is in Myanmar, with about 60 to 100 nests per year (Thorbjarnarson et al. 2000). This is a conservative estimate taking into account the potential mis-identification of loggerhead and olive ridley turtles.

## Population trends

Green turtle population sizes have, for the most part, decreased throughout their range in the region. Turtles have been taken for their meat and have become by-catch in the ever-increasing fisheries. Coupled with this, the thorough and systematic harvest of eggs in many parts of Southeast Asia results in few hatchlings reaching the sea, such as occurs in many parts of Indonesia (Pilcher 1999). This has occurred in Sarawak, Malaysia, where the harvest of green turtle eggs was an industry right up until the 1980s, and this near-complete harvest of eggs over decades caused the collapse of the nesting population (Fig. 1). After more than twenty years of conservation efforts, the population has not shown signs of recovery (see Limpus et al. 2001). It is important to note that with long-term conservation efforts, some populations are starting to stage a comeback (see below).



**Figure 1. Long-term trend of egg collection at the Sarawak rookery in East Malaysia, showing no recovery after sustained egg harvests (Limpus et al. 2001)**

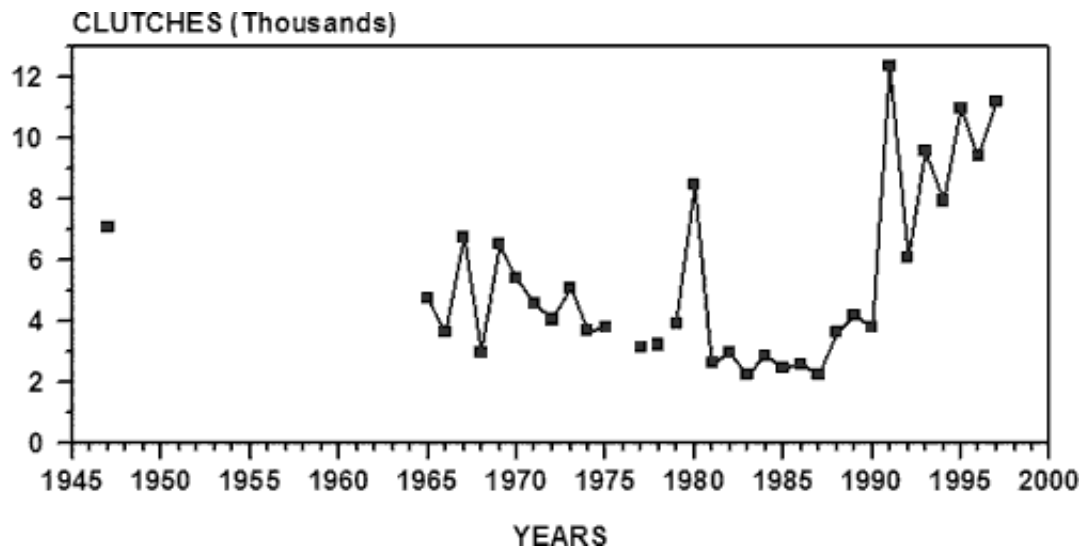
Hawksbill populations have also declined at nearly every rookery in the region, as exemplified by the population at Suka Made, Indonesia (Limpus et al. 2001), for which data from recent years indicate a near-collapse of the nesting population. However, there is evidence that some populations may be stable at present, such as those in Malaysia (Chan & Liew 1999; Pilcher & Lamri 1999).

The leatherback turtle and its eggs have been over-harvested and lost to fisheries as by-catch, with many populations at the brink of extinction, most notably at Terengganu in Malaysia, where nesting declined from 10,000 nests per year in 1950s to less than 20 nests per year in recent years (Chan 2001).

Olive ridleys appear to have declined in Bangladesh (Islam 2002), Myanmar (Thorbjarnarson et al. 2000) and Sri Lanka. At Hawkes Bay (Pakistan), there has been a dramatic decline despite a hatchery program (Asrar 1999). In some areas, declines may have been arrested by local conservation programs such as the one in Madras, India, where eggs have been collected by conservation volunteers and incubated in hatcheries since 1974 (Shanker 2003). In Orissa, the fishery related mortality has resulted in over 90,000 dead turtles since 1994 (Pandav 2000; Biswajit Mohanty pers. comm.), which may have caused a severe decline in the population (Shanker et al. in press). Over 50,000 turtles may have been harvested each year in the 1970s (Biswas 1982; Das 1985), but later implementation of wildlife laws drastically reduced this harvest (Dash & Kar 1990). Numbers of turtles appeared to rise in the 1980s following the ban on commercial trade, but may now be declining due an increase in fisheries-related mortality (Shanker et al. in press). Although most estimates of nesting are unreliable (see "*Poor Data*" below), the failure of mass

nesting events in three of the last five years, and a consistent decrease in the size of breeding adults between 1996-2002, suggests a potential or imminent decline (Shanker et al. in press).

Lastly, there are suggestions that conservation measures can have positive results, as not all populations are currently in decline. For instance, in Sabah, East Malaysia, following long-term complete protection of nesting females and eggs, green turtle populations are on the rise (Fig. 2) even though the population had declined by an estimated 54% before these rises started to occur (see de Silva 1982; Groombridge & Luxmoore 1989). At present it is impossible to say whether the population rise is entirely a result of conservation measures, however, given the available information, they are likely to be a significant factor. This highlights the need for conservation efforts in Southeast Asia, and for the world for that matter, to be long-term (several decades) and ongoing exercises.



**Figure 2.** Green turtle recovery at the Sabah rookery in East Malaysia. These data must, however, be seen in a much longer timeframe context, as the rookery releases millions of female hatchlings and few male ones, bias which is likely to have a profound impact on the population trends in the coming 30 years (Limput et al. 2001).

## Major Threats

Marine turtle populations have long been exploited throughout the Indian Ocean and Southeast Asian region (for a review, see Frazier 1980). Human activities that directly or indirectly threaten marine turtles include the harvesting of eggs and turtles, fishery related mortality, inappropriate management practices, destruction or modification of habitats, pollution, mariculture and tourism. In many cases, it has been the combination of modern fisheries (mechanisation and fishing gear) and traditional practices (turtle harvesting) that has resulted in drastic declines in recent years.

*Adult mortality* - Each year over 5000, and possibly as many as 10,000 green turtles are killed on the Indonesian island of Bali for religious and cultural reasons (Halim et al. 2001). In Bali and surrounding waters the green turtle is almost extinct, and most of the turtles landed at Benoa now come from further afield. Many nesting turtles on Indonesian beaches are also collected, and some boats collect as many as three hundred turtles on a trip, which can extend out to Aru, Southeast Sulawesi, East Kalimantan, Irian Jaya, Madura, Timor and Flores. Recent scientific efforts have determined that some of these turtles may also originate from Australia, the Philippines and Malaysia (see Lindsay & Watson 1995). Additionally, 25 % of the turtles are male, indicating harvesting also occurs at foraging/courtship grounds. Recent efforts by WWF Indonesia appear to be having success in reducing the number of turtles landed in Bali (I.B. Windia Adnyana and K. Sarjana Putra, pers. comm.), the decrease of which may be reflected

regionally, possibly even for the population increases indicated by Chaloupka & Limpus (2001) for Australia.

In Orissa, the incidental mortality in trawl nets has increased from a few hundred each year in the 1980s to ~15,000 each year since 1999 (Pandav 2000; B. Mohanty pers. comm.). Recently, gill nets have also been identified as causing significant mortality in Orissa (Wright & Mohanty 2002) and along the rest of the Indian coast (Rajagopalan et al. 2001). Several thousand green turtles were killed annually in the Gulf of Mannar for trade in Sri Lanka and India, and while this has declined since the implementation of wildlife laws in both countries, many turtles are still caught opportunistically (Bhupathy & Saravanan 2002; Hewavisenthi 1990). The trade in tortoiseshell also continues in Viet Nam (Duc 1995; Pham Thuoc et al. 2002), Sri Lanka (Richardson 1997) and other countries.

*Egg collection* - The collection of eggs in Southeast Asia is widespread, and one of the main threats to turtle survival in the region. In the early 1970s, less than 10% of eggs were retained for incubation in hatcheries in peninsular Malaysia. In 2001, the percentage of eggs protected in Peninsula Malaysia has been increased to approximately 50%. The remainder are marketed by the licensees (Siow & Moll 1982). Over 4,100,000 eggs were harvested in Sarawak between 1967 and 1978, of which only 2 % were transplanted to hatcheries. The population has declined steadily with little chance of recovery (Fig 1). In contrast, in Sabah, from 1965 to 1978, a total of over 6,000,000 eggs were collected, of which slightly over 2,700,000 were transplanted to hatcheries, of which ~66 % hatched (Siow & Moll 1982). Depredation of nests by feral animals is also widespread in many South Asian areas (Bhupathy & Saravanan 2002; Dattatri & Samarajeeva 1982; Islam 2002; Sunderraj et al. 2001; Tripathy et al. in review).

*The tale of the Turtle Excluder Device* - At the center of international dialogue, and viewed as a crucial factor in turtle conservation are Turtle Excluder Devices (TEDs) to minimise incidental capture of turtles in trawl fisheries. The reason this has become an issue stems from a USA decision whereby all countries exporting shrimp to the USA are to use TEDs on their trawlers, a requirement many developing countries in Asia took reservation to, citing illegal implementation of World Trade Organization (WTO) trade restrictions. This issue led to international lawsuits, and while the USA recently won its appeal against claimant nations, and is free to implement restrictions while working in close collaboration with exporter States, it is not clear if this will be an effective mechanism to enforce the use of TEDs (see Bache 2001; Bolton 2001).

*Bekko (tortoiseshell) industry* - Hawksbill shell is used widely in the manufacture of trinkets and jewelry. The meat is generally not eaten, so the animals are killed simply for their shells, and the tortoiseshell industry has been responsible for the massive declines in the wild populations over the past four or five decades simply for the animals' shell. The trade in tortoiseshell continues to this day in many Asian countries including Indonesia, China, Korea, Viet Nam, and others, even though CITES member countries do not trade legally in the product. While CITES does not have any control over domestic trade, it should have some form of control over international trade, which in many cases it does not. As an example, in Viet Nam (a CITES signatory nation) the international movement of tortoiseshell is widespread, with tortoiseshell available at Duty-Free shops at airports to make it easy for tourists to unwittingly become part of the problem. Recently, in April 2002, the Viet Nam government developed local legislation which has outlawed the capture, use and sale of marine turtles and their products. Awareness raising incentives were initiated in late 2002 to help promote the local enforcement of this law.

*Poor management practices* - The last 30 years have witnessed a meteoric increase in scientific knowledge on marine turtles, their environmental needs, reproductive cycles, habitat requirements and the like, but little of this knowledge is yet incorporated into conservation projects in Asia. For example, temperature dependent sex determination and sex ratios have been well studied and documented, even for

this region, but in Sabah, open and unshaded beach hatcheries continue to produce 100 % female hatchlings (Tiwol & Cabanban 2000), and while a 50:50 ratio is not necessarily a requirement for survival, the complete lack of one sex most definitely is. Experimental studies have shown hatchlings in hatchery enclosures tire and utilise valuable energy (Pilcher 2001), but retention of hatchlings for several days, such as those in programmes in Myanmar, Thailand (Chantrapornsyl 2002), and Sri Lanka (Hewavisenthi 1993) for the sake of tourism robs hatchlings of vital offshore migration cues. There is a clear need for management practices to adapt and reflect the biological needs of the turtles themselves, and for the appropriate information sources to be made available in several languages to managers in the region. Indeed, the issue of language is another stumbling block in the region, whereby many managers simply do not have access to the required information in their own languages. It is imperative that pertinent sections and manuscripts of widely available current literature documentation be translated if local communities and managers are to make use of the valuable array of scientific and technical knowledge currently available.

*Lack of basic research* - Research has been relatively advanced in India, Malaysia and Thailand, while the remainder of Asian nations generally lack the funding and other resources to carry out scientific research. Many countries have surveys and monitoring programs, but these are often not standardised over multiple seasons to provide accurate population trends.

*Poor data* - Over the last thirty years, various groups of researchers, government officials and non-government organisations have been involved in the conservation and monitoring of turtle populations in the region. Since standardised methods have not been used to estimate female populations at beaches, the reliability of these estimates must be questioned. For example, when >20 publications on arribadas in Orissa were reviewed, the numbers quoted by different authors and different agencies did not agree even when the data was ostensibly from the same source (Shanker et al. in press). This places grave doubts on the validity of these counts and makes the assessment of population trends very difficult. In Malaysia data sets have been collected over many years, but for many of the older records, reconciliation of the (supposedly) linked data sheets was rarely possible (N. Pilcher pers. obs.). In Viet Nam, nesting data sets can be correlated with the hatching data sets in less than 30% of cases (N. Pilcher pers. obs.). An example of a case where unreliable data has further endangered marine turtles exists in Orissa, India, where credibility of data has meant that conservation efforts have suffered severe setbacks (see below).

*Hype and Hysteria in Orissa* - Since the discovery of the Gahirmatha Olive ridley rookery in the 1970s, it has been hailed as "the worlds largest" or "highly endangered", sometimes even simultaneously (Shanker et al. in press). Clearly however, both statements cannot be true and in Orissa, the hype generated by conservationists and the counterclaims by trawler owners that sea turtles die of migration fatigue, labour pain and pollution (Shanker & Mohanty 1999) have led to a polarization that has hindered conservation and prevented the implementation of the use of TEDs. The absence of reliable estimates and population trends has also hindered conservation action, obscuring the real status of turtles, and leading government agencies and some stakeholders (eg. trawler owners) to downplay concerns and minimise efforts for conservation (Shanker et al. in press). Clearly, there is a need for collaboration between scientists and managers, to determine if the Olive ridleys in Orissa are indeed declining, which can only be achieved by careful and objective monitoring, solid scientific research and information sharing.

## **Policy and Legislation**

A major obstacle in the legislative processes throughout the region prior to 1982, and in several cases till today, has been the improper listing or complete omission of marine turtles from wildlife ordinances and other legislative instruments. In many cases marine turtles were considered under Fisheries regulations, in which the basic premise was exploitation rather than conservation. Only in the last decade have major advances been made toward rectifying these deficiencies, and marine turtles are now, for the most part,

listed by name and often as unique groups of individuals. Today, there are national laws to protect turtles in all but a few countries. Comprehensive reviews of this legislation exist for India (Upadhyay & Upadhyay 2002), and for the Southeast Asian Region (Pilcher 2001). In addition, there are international resolutions, conventions and legal instruments, applicable in particular to the Asian region, which cite marine turtles or even list them as the primary basis for the instruments. Most countries are now signatories to CITES (<<http://www.cites.org/>>), and many are signatories to CMS or one of its agreements (<<http://www.wcmc.org.uk/cms/>>), as well as other international treaties. Among these are the ASEAN Memorandum of Understanding on the Conservation of Marine Turtles; the Turtle Islands Heritage Protected Area (TIHPA), the first trans-frontier protected area for marine turtles in the world; and the recently-concluded Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia, which took effect on 1 September 2001, following the conclusion in Manila in June 2001 of a comprehensive Conservation and Management Plan. An Advisory Committee was recently appointed following the first Meeting of Signatory States in Bangkok this January 2003 (for details, see <<http://www.wcmc.org.uk/cms/>>).

### **The rest of the story**

Certainly in South and Southeast Asia there are sufficient laws to protect marine turtles, though probably not sufficient to protect their habitats. Strict enforcement of protective laws and other conservation programs in the last 30 years in Asia suggest, that in a few cases, long-term conservation efforts can help maintain and restore turtle populations. But laws alone do not work. Given the high human densities in the region, it is almost impossible to protect turtles without involving local communities, and it is hard to justify the need for protecting sea turtles to the economically and socially marginalized. Unfortunately, government agencies, non-government agencies, biologists and conservationists have not always shown adequate commitment to improving the welfare of these communities as part of their conservation agenda. Nor have they, for the most part, attempted to or even been inclined to involve these communities in the decision-making process. It is little wonder that there is no acceptance of the laws, making them nearly impossible to implement and enforce, especially given the available resources. Hence, while international instruments and national laws have their role, they achieve little without grassroots-level consultation and a deep commitment by governments and conservationists to the welfare of local communities.

Various individual projects do work. When it comes to *in situ* conservation measures, among the most successful are nest adoption programmes, volunteer programmes, and turtle-based ecotourism. Nest adoption programmes involve "selling" nests on the beach, which are allowed to hatch naturally, to members of the public and tourists, often providing a certificate of "ownership/adoption". In many cases these are purchased from egg harvesters holding concessions for the beach involved. These programmes are in place in Bali, Derawan and Sanggalaki (Indonesia), Pulau Redang (Malaysia) and in Thailand. Volunteer programmes, such as the ones on Pulau Redang and at Ma'Daerah in Terengganu, Malaysia, use "self pay" volunteer programs or provide workers at little or no cost to care for nesting turtles and incubating eggs, while collecting data on turtle reproductive success and nesting trends. Turtle-based ecotourism, as in the case at the Sabah Turtle Islands Park, provides income for conservation activities. The Turtle Conservation Project (TCP) in Sri Lanka has initiated community-based programs in southern Sri Lanka, and monitored populations and trade, considerably raising the awareness with regard to sea turtles in the country. Recent public awareness projects with significant scientific content have also sprouted in the Maldives (A. Azeez pers. comm.). In Bangladesh, monitoring and conservation programs are in place in St. Martin's island, one of their main nesting beaches for olive ridleys and green turtles (Islam 2002). In India, conservation projects by students and local fishing communities at numerous sites along the east and west coasts have enhanced awareness considerably (see Shanker 2003, and references therein). A national level sea turtle conservation project has, for the first time, surveyed the entire coast of India for status and threats (see Shanker & Choudhury 2001), and has also had some success in involving fisheries agencies in turtle conservation, particularly in TED promotion programs (Choudhury 2003)

At regional levels, the development of trans-border agreements or multi-lateral instruments serves to promote awareness and commitment at the national level. At the national level, individual State, District or Provincial rights over natural resources, which often conflict with overriding national legislation or goals, are frequently constraints behind successful conservation measures. At the international level, turtles migrate across borders with little regard to visas and residence permits, promoting the need for bi- and multi-lateral treaties. Examples of successful bilateral policies already exist in the region, the Turtle Islands Heritage Protected Area (TIHPA) between the Philippines and Malaysia being a good example. Other trans-border approaches should also be investigated in the region, particularly among Thailand, Cambodia and Viet Nam, between Indonesia and Australia, and between the northern Indian Ocean nations.

To date, little use of existing information has been made, while at every level, there is a need to incorporate existing scientific, technical and traditional knowledge into management plans. Any potential national management plan has to have the acceptance of the general public, and this is not yet commonplace. Much of the current legal infrastructure in most Asian countries was arrived at without the participation of the general public, and this translates into problematic compliance and nearly impossible enforcement. The required acceptance can be gained through discussions at public fora, through meetings at the provincial level and down to the community level, raising awareness and benefits to the people of the need to preserve marine turtles and the ways in which conservation efforts will impact their lives and livelihoods. This calls for greater dialogue between the stakeholders and transparency and participation in the decision making process.

It is time for the people of the region to understand that turtles are an important component of marine ecosystems, that they offer benefits far beyond the tangible, and that their conservation is a public process, not that of a handful of dedicated individuals. For this there is a need for a widespread awareness campaign, coupled with programmes which (1) assess the socio-economic status of those affected by changed management strategies and if necessary provide alternative livelihoods, (2) are supported by contemporary knowledge and sound research and monitoring techniques.

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Australian flatback sea turtle (*Natator depressus*) returns to the sea after nesting on Curtis Island, Queensland, Australia. © Doug Perrine/seapics.com