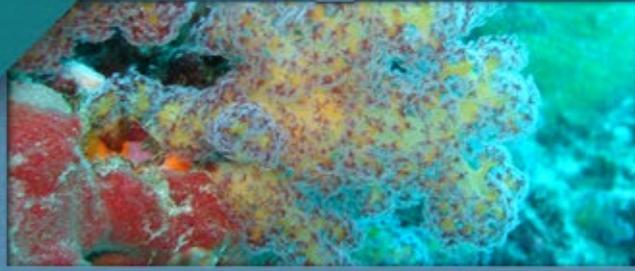




Bay of Bengal Large Marine Ecosystem Project



Marine Turtle Conservation:  
Review Report



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**A REVIEW OF NATIONAL REPORTS OF EIGHT BOBLME COUNTRIES,  
AND EXTENSION OF AN ONLINE BIBLIOGRAPHIC RESOURCE, PURSUANT  
TO IMPLEMENTATION OF THE IOSEA MARINE TURTLE  
MEMORANDUM OF UNDERSTANDING**

Prepared by the Secretariat of the IOSEA Marine Turtle Memorandum of Understanding, for the Food and Agriculture Organization of the United Nations / Bay of Bengal Large Marine Ecosystem Project (FAO-BOBLME), under the terms of Letter of Agreement LAO/RAP/2010/42

Bangkok, December 2011

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## FOREWORD

Over 400 million people in the Bay of Bengal area are dependent on coastal and marine resources for their food, livelihood and security. Rapid population growth, high dependence on resources and increased land use has resulted in over-exploitation of fish stocks and habitat degradation, and has led to considerable uncertainty whether the ecosystem will be able to support the livelihoods of the coastal populations in the future. Most of the Bay of Bengal's resources are shared by two or more countries and therefore trans-boundary or multi-country collaboration is required to ensure their sustainable management and conservation.

Maldives, India, Sri Lanka, Bangladesh, Myanmar, Thailand, Indonesia and Malaysia, have declared their willingness to work together through the Bay of Bengal Large Marine Ecosystem (BOBLME) Project and lay the foundations for a coordinated programme of action designed to improve the lives of the coastal populations through improved regional management of the Bay of Bengal environment and its fisheries.

The BOBLME project, with a total estimated budget of US\$ 31 million, is a five-year initiative with five main components: (1) Development of a Strategic Action Plan to protect the health of the ecosystem and manage the living resources of the Bay on a sustainable basis to improve the food and livelihood security of the region's coastal population; (2) Improving Coastal/Marine Natural Resources Management and Sustainable Use; (3) Better understanding of the BOBLME Environment; (4) Maintenance of Ecosystem Health and Management of Pollution; and (5) Project Management.

A Regional Coordination Unit (RCU), based in Phuket, Thailand, is responsible for the implementation and management of the project to its successful conclusion in accordance with the rules and procedures of the Food and Agriculture Organization (FAO) as executing agency, Global Environment Facility (GEF) as the major donor, and the technical guidance of a Project Steering Committee.

Support for a number of relevant regional and sub-regional activities, and the development of a better understanding of the BOBLME's large-scale processes and ecological dynamics are two of the major expected outcomes of the BOBLME Project. The objective of BOBLME Component 2 is to promote the development and implementation of regional and sub-regional collaborative approaches to common and/or shared issues affecting the health and status of BOBLME. Component 3 aims to support activities and participate and share information with other regional and global environmental monitoring programmes which will lead to better understanding of the BOBLME ecological functions and processes.

In the context of sustainable development, the conservation and management of marine turtles is a transboundary concern, globally and within the Indian Ocean and BOBLME regions. Many communities still utilize turtles for their meat and eggs, as a source of protein, and their shell for artisanal crafts. At the same time, marine turtles have both intrinsic and ecological values as important components of marine ecosystems, among them the critical habitats prioritized by the BOBLME. Threatened or endangered in many parts of the world, they are considered as flagship species on which to base interventions aimed at protecting habitats of importance to numerous other marine species. Major threats to marine turtles include unsustainable exploitation, destruction of nesting and feeding habitats, and incidental mortality in fishing operations.

The IOSEA Marine Turtle Memorandum of Understanding is an intergovernmental agreement that provides a framework through which States of the Indian Ocean and Southeast Asian region, in partnership with other relevant actors and organisations, can work together to conserve and replenish depleted marine turtle populations for which they share responsibility. The MoU and its associated Conservation and Management Plan were developed over a series of consultations and negotiations between 1999 and 2001, under the auspices of the Convention on the Conservation of Migratory Species of Wild Animals (CMS). The Convention and most of its subsidiary Agreements are administered by the United Nations Environment Programme (UNEP). The geographic coverage of the IOSEA MoU extends well beyond the BOBLME area and currently covers 33 Signatory States, including all BOBLME partner countries. Malaysia, the latest IOSEA Signatory, joined the agreement after the current review had commenced.

A prerequisite to setting priorities for conserving and managing the marine turtle resource of the BOBLME region is a solid foundation of up-to-date information on population status, threats, legislative frameworks and ongoing conservation activities. The national reports of IOSEA Signatory States make an important contribution to the identification of information gaps and research priorities, as well as further mitigation measures needed to address identified threats.

The present initiative began by thoroughly reviewing and completing the IOSEA National Reports for countries of the BOBLME region, with emphasis on collection of information on fisheries-turtle interactions and current bycatch mitigation efforts. At the same time, the Site Data Sheets associated with IOSEA National Reports were reviewed and completed in order to document, as comprehensively as possible, species presence/abundance and threats, as well as site-based research and mitigation activities. The compilation and population of a significant online bibliography of turtle-related documentation for countries of the BOBLME/IOSEA Northern Indian Ocean region also formed part of the work. Finally, the present report presents a synthesis of its findings and outlines recommendations -- addressed to BOBLME, IOSEA, and individual countries -- for further actions in relation to research and conservation/mitigation measures.

## PART I: EXECUTIVE SUMMARY

### A. General Comments

1. At the beginning of the project six of the eight BOBLME countries had submitted national reports on their implementation of the IOSEA Marine Turtle MoU, in varying degrees of completeness. Four countries had not prepared datasheets on sites of importance for marine turtles in their country (referred to as Site Datasheets). Now all countries have a Country Report on file and each country has a number of Site Datasheets on file, all available for viewing on the official IOSEA website: [www.ioseaturtles.org](http://www.ioseaturtles.org). The eight reports (without site data sheets) are appended as Annexes 1a to 1h.

2. Some Signatory States have developed National Conservation and Action Plans that have been adapted to their local situations, including relevant research findings and existing legislation. These take into account the IOSEA Marine Turtle MoU and its Conservation and Management Plan (CMP) , as well as the general provisions of the Marine Turtle Strategy and Action Plan for the Northern Indian Ocean (IUCN 2001)

3. Based on overall averages, the BOBLME countries have addressed the Objectives of the Conservation Management Plan of the MoU (Table 1) to a reasonable level of implementation. The overall average value indicates that Bangladesh, India, Indonesia, Sri Lanka, and Thailand have achieved slightly above a middle-level of implementation of the objectives of the MoU and of the 24 programmes.

Table 1. Synopsis of Analysis of Country Reports for the BOBLME Countries.

BOBLME Nation	Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
OVERALL AVERAGE*	3.4	3.5	3.3	1.5	2.2	2.7	3.0	3.0

\* Based on a scale of 0 to 5, differentiated by the following colour-coding:

Category	Colour
Full or near-full implementation	Dark Blue
Active intervention, very substantial progress	Blue
Partial implementation, good progress	Light Blue
Some progress, but limited in scope	Cyan
Very limited progress	Grey
No information available or no progress reported	White

4. Also contained in the overall averages for the BOBLME countries is the impact of the duration of involvement in the MoU. For example, countries with the two lowest average scores (Malaysia and Maldives) have not had as much time or assistance under the MoU to implement and report on the programmes as much as other countries. Maldives joined the MoU in mid-2010, while Malaysia signed the instrument in September 2011 (and it will formally take effect only on 1 December 2011). Nevertheless, Malaysia's national conservation strategy is already very closely aligned with the provisions of the IOSEA CMP.

5. The standard of initial reporting varied among the Country Reports. Some members reported extensively; whereas, a few countries provided only limited information. The insertion of additional references into text and in various sections provides support for the statements made and links to the relevant literature.

## B. Analysis of overall implementation of IOSEA Objectives

6. Implementation of the IOSEA Conservation and Management Plan appears to have improved slightly over that reported in the 2006 and 2008 reviews prepared by the IOSEA Secretariat (which might not be directly comparable, since the 2006 and 2008 reviews used a more detailed, criteria-based evaluation system). The colour-coded matrix in Table 2 gives a visual representation of the current status of implementation by the BOBLME countries. It should be noted that scores are necessarily dependent on availability of information; therefore a low score could reflect an absence of information or under-reporting, rather than lack of implementation.

Table 2. Synopsis of Achievement of IOSEA MoU Objectives for the Conservation and Management of Marine Turtles by BOBLME Countries.

Objective	Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
Objective I: Reducing direct and indirect causes of marine turtle mortality	3.6	3.7	3.2	1.6	3	2.8	2.9	3.4
Objective II: Protecting, conserving and rehabilitating marine turtle habitats	3	3.5	3.5	0	1.5	2.5	3.5	3
Objective III: Improving understanding of marine turtle ecology and populations	4	4	4	3.4	2.5	3.5	3.8	4
Objective IV: Increasing public awareness and enhancing public participation	4.3	4.3	3.7	0.8	2.5	2.3	3	2.7

Objective V: Enhancing national, regional and international cooperation	3.6	3.6	3.6	3	3	3.6	3.6	3.6
Objective VI: Promoting and supporting implementation	2	1.8	2	0	0.8	1.3	1.3	1.3

7. The detailed analysis by IOSEA sub-programme shows that Bangladesh, India and Indonesia, stand out among the BOBLME countries in virtually every category, followed by Thailand and Sri Lanka, although other nations have strength in one or more of the 24 programmes. India has provided extensive comments and citations in support of its Country Report; other countries have shown improvement, especially in linking comments to references and reports. The two areas in which all countries could improve are: (a) Objective 1, Programme 1.4 (reporting of fisheries activities) and (b) Objective 6 (institutional support).

8. All countries provide a general overview of the marine turtle populations in their jurisdiction (Annex 2). Six countries ranked green, hawksbill, and olive ridley turtles as having the highest conservation need; only Malaysia ranked the leatherback turtle as being in the highest category. No country ranked the loggerhead as the highest category, perhaps reflecting its limited distribution in the region.

9. Focusing on activities described in the IOSEA CMP, the highest priority of BOBLME countries was to conduct targeted studies on marine turtles and their habitats (based on the number of countries that identified this issue). Given the number and distribution of known nesting sites, higher priority should probably be assigned to defining the location and extent of *foraging habitats* and determining the threats that impinge on these areas. That does not remove the need to conduct research on the nesting biology of marine turtles. The next highest priorities, based on the number of countries identifying them, were: reducing incidental capture and mortality of marine turtles, establishing habitat protection/conservation measures; establishing/strengthening education, information programmes; enhancing cooperation, information exchange mechanisms; and undertaking capacity building, training, and partnerships.

#### Objective I: Reducing direct and indirect causes of marine turtle mortality

10. All BOBLME States are using a suite of measures to minimize or reduce the mortality of eggs, hatchlings and nesting females. Although many of the problems faced by the BOBLME countries are similar, it is clear from the assembled information that each country faces its own set of issues and has not used the same methods to manage their nesting beaches. Malaysia and Sri Lanka presented the least amount of information, although it is likely that more measures are employed at local levels to improve the national conservation effort than are reported in the Country Reports.

11. All of the BOBLME countries have enacted legislation to prohibit direct harvest and domestic trade in marine turtles, their meat, eggs, parts and products. Only a few provided detailed descriptions of the provisions and penalties for infringement. Traditional use of turtle meat and/or eggs occurs in most countries; Thailand may be the only exception. However, the use of shell

products, consumption of fat, and use of turtle parts in traditional medicine appears to be relatively 'low' throughout the region.

12. The reported level of harvest and the perceived impact of the harvest were typically ranked as 'low' (most countries) or 'moderate' (Indonesia). In contrast, the Maldives reported 'high' levels of harvest and a 'high' level of impact. Both Malaysia and Sri Lanka acknowledged that the level of harvest and perceived impact vary with location. All of these assessments need to be checked against field data in each region of each country to accurately determine the level of harvest.

13. Domestic management programmes directed at reducing the harvest have been established in six of the eight BOBLME countries. The exceptions are Bangladesh and Thailand. Indonesia reported efforts to phase out harvesting, reduce retail sales, and shift egg harvest concessionaires to alternative income sources, which are admirable goals. Unfortunately details were not provided to document the methods used to achieve the goals. For 10 years, Maldives has had a total harvest ban in place on 13 islands where nesting occurs. In addition to trying to reduce the harvest of marine turtles through management practices, Myanmar has an educational programme that is directed at reducing the harvest. The comments by India and Indonesia indicate that both countries are attempting to reduce harvest by dealing with local and national level trade and by attempting to find alternative sources of income for people involved in the trade of turtle products. Documentation of these programmes would be useful to other BOBLME countries.

14. Several different types of fishing activity occur in the Bay of Bengal Large Marine Ecosystem area, including shrimp trawls, set gill nets, anchored fish aggregating devices (FADs), purse seine, longlining, driftnet, and other types of fishing. Shrimp trawling appears to be the most widely used method, occurring in seven of the BOBLME countries. The use of set gill nets and purse seines occurs in six countries. The other types of fishing occur in a mixture of the countries. Most of the fishing effort from shrimp trawlers, gill netters and FAD fishers occurs near the coast, whereas other methods are used further off-shore (e.g., purse seines, longlines).

15. Fishing effort varies among the countries of the BOBLME. Shrimp trawling effort is reported to be 'high' (or 'relatively high') in Bangladesh, India, Indonesia, and Malaysia. Trawling is described as being moderate or unknown in the other countries, with the exception of the Maldives. The other forms of fishing are considered to be at the 'moderate' level, 'low' level or 'unknown'. The one type of fishing that does not fit that pattern is longlining in Indonesia where effort is 'high', but the distribution of the fishing effort is not clear (i.e., in the BOBLME area or outside it). Better documentation of the distribution of the various fishing methods by area and season would assist the development and harmonisation of regional fishing policies and practices that would benefit all BOBLME countries.

16. The perceived impacts of fishing vary among the BOBLME countries in a pattern that is almost the same as that of the fishing effort. Bangladesh, India and Indonesia reportedly require the use of devices that allow the escape of marine turtles. However, the success of implementation varies. Myanmar and Sri Lanka do not require by-catch reduction systems, but Myanmar has held workshops on by-catch reduction.

17. Every country around the BOBLME area reported some illegal fishing. The Maldives identified illegal purse seine operations as a significant problem. Other problems with illegal fishing

include foreign vessels fishing illegally in Indonesian waters and by-catch problems reported by Malaysia. However, the intrusion of foreign vessels is not the only form of illegal activity in the BOBLME area. In Bangladesh, Indonesia, and India, some local fishermen use explosives and other destructive fishing methods.

18. Annex 3 presents an overview of the fisheries occurring in the waters of all BOBLME countries. With few exceptions, many important information gaps remain which have not been addressed by the present study. The Country Reports provide some reference to documents and papers concerning fishing activities in their portion of the BOBLME. There is a need, however, to strengthen the linkage between information provided in the Country Reports and the documents from which that information has been taken. This can be accomplished by providing the full citation to the source document(s) in the appropriate section. India has done the best job in this regard.

## **Objective II: Protecting, conserving and rehabilitating marine turtle habitats**

19. BOBLME countries have identified critical habitats within and outside established protected areas. Most countries state that the national legislation provides protection for marine turtles within their national jurisdiction. Unfortunately, enforcement and monitoring are not wide-spread. Several BOBLME nations have habitat rehabilitation programmes in place; others do not. The function of mangrove, coral, and seagrass habitats as nursery habitat supporting fisheries, as well as marine turtles, has not been well publicized. Additional efforts need to be made to help fishers understand that good habitat management not only helps turtles but also helps their industry.

20. The majority of nesting sites have been located and many foraging areas have been defined. Nesting beaches have been identified by geographic coordinates, defined by species, and categorized by number of nesting females (see analysis in Part III, and the online IOSEA Site Database: <http://iosea-reporting.org/test/reporting/QueryThreats.asp>). Numerous publications have resulted from local, national, and international efforts, many of which have been collaborative. The application of the results to management decision-making is occurring to varying degrees throughout the region.

21. No country monitors all nesting sites, nor should every site be monitored at the same intensity. Having a few, representative sites can provide the data necessary for general management. When specific issues need to be addressed, the world-wide literature, as well as the regional literature, can be quickly reviewed for possible solutions and study methods. The BOBLME countries should contribute information on marine turtle habitats through the IOSEA Site Database which captures information on location, the species present, and the pattern of data collection.

22. Monitoring programmes are in place in all countries, as are education and awareness programmes and egg relocation/hatcheries. However, the effectiveness of the programmes is variable. Unfortunately, no country provided supporting reports or other materials that document their assessment. A periodic review of the goals and outcomes of any conservation programme is essential to determine if the programme is achieving long-term objectives. Seven of the eight countries indicated that they have recently or are currently involved in a review of their beach conservation efforts. The involvement of both Government agencies and NGOs in the evaluation of

programmes is much better than either one evaluating itself. Only Thailand provided documentation (cited seven papers) to support the review process and/or the conclusions of their review. This is an area in which the BOBLME countries could help each other to develop, administer, and evaluate conservation programmes. All countries would benefit from the interaction.

### **Objective III: Improving understanding of marine turtle ecology and populations**

23. Marine turtles have been tagged in every BOBLME country. However, the numbers are relatively small because the number of nesting studies in the BOBLME area is small compared to the number of known nesting beaches. Some turtles have been tracked via satellite in the region and provide an indication of the movements, but the national reports do not give a full picture of the work that has already been done, particularly in India and Thailand. The online IOSEA Satellite Tracking Metadatabase ([http://www.ioseaturtles.org/satellite\\_tracking.php](http://www.ioseaturtles.org/satellite_tracking.php)) includes a basic template to capture metadata about the species tracked, location, year, and type of transmitter. Although several publications have resulted from the international and national cooperation that has occurred in support of satellite tracking, there is a need for continued satellite tracking work and for the results to be shared among the BOBLME nations.

24. Knowledge of the genetic linkages among nesting populations and among foraging area populations is important to the management of marine turtle stocks. Indonesia, India, Malaysia, Myanmar, and Thailand have carried out or have contributed samples for identifying the genetic populations in the region. Maldives and Bangladesh are the only two countries that reported not having at least a partial genetic library for the nesting sites in their countries. Although major genetic groupings have been identified, many questions remain to be answered, particularly concerning the linkages among nesting and foraging sites in the BOBLME countries. This information is essential for reducing the threats to the populations through development of multilateral fishing regulations within the region.

25. Long-term monitoring programmes are necessary to define some population parameters that are useful in managing marine turtle stocks. Bangladesh, Indonesia, and Sri Lanka have programmes that have been running 10 years or longer. Several programmes in other countries were started in the last 5 years. All BOBLME countries report having longer term studies in place at specific sites. Indonesia noted that it has several long-term projects in progress dealing with such issues as DNA, temperature-dependent sex determination, and socio-cultural/economic investment. Myanmar commented that they have developed a 30-year fisheries plan that includes protection of turtle nesting beaches and cooperation/collaboration to implement management.

26. All BOBLME countries provided short comments that offer some insight concerning how results of research and monitoring have been incorporated into decision making, management practices, and/or mitigation of threats. However, only Indonesia and Thailand provided exemplary comments to explain how reviews improve research and monitoring programmes. Half of the countries report that traditional ecological knowledge has been collected and/or is used in research studies. Collecting traditional information is more than a casual exercise; traditional and local people have their own perspective about marine turtles and do have knowledge of turtle habits and

habitats. The exchange of information can facilitate communication and cooperation between local people and researchers.

27. All BOBLME countries have contributed to the improvement of the understanding of marine turtle ecology and populations in the region. The growing body of regional biological information is well linked to the international information base and is of high quality. The majority of nesting sites are known and many foraging areas have been identified. A few long term projects are providing data that will enhance understanding of population trends. Many projects are collaborative with local, regional and international universities and organisations. Unfortunately, the information is not always being used to guide management decisions; there appears to be very little sharing of information or data on marine turtle populations of a regional interest among the BOBLME countries. In addition, issues of standardization of methods and data collection need to be addressed at national and regional levels so that the results of the studies can be compared more easily.

28. Each of the Country Reports provides a list of publications that are relevant to that country. The literature cited by the various countries includes reports and proceedings of workshops, as well as many publications in peer-reviewed journals and books. Many of the lists are quite extensive (e.g., India, Indonesia, Malaysia); however, none is exhaustive. When viewing the number of publications it should be remembered that not every country needs to address every research question and that the BOBLME countries have access to publications from around the world upon which they can develop research and management programmes. The in-country research (as indicated by the publications) provides new data about the species and allows connections to the literature published elsewhere.

#### **Objective IV: Increasing public awareness and enhancing public participation**

29. All BOBLME countries have developed and used an array of educational materials. Some countries have been more active than others. India, Indonesia, Myanmar, and Sri Lanka have been particularly active in developing educational materials. Malaysia and Thailand appear to be less active in producing educational materials, although this may simply be a case of under-reporting. By adopting a practice of communication among the BOBLME countries, existing materials (or their ideas) might be modified for use in other countries. This may be particularly relevant in the case of costly undertakings, such as videos, which might have wider application. IOSEA can assist in this matter, if countries are willing to share information and provide copies of materials to the IOSEA Secretariat.

30. All BOBLME countries should evaluate their educational programmes to determine if alterations and improvements are warranted. Given the number of educational programs in place in the BOBLME region, sharing information on what has been successful and what has not worked should be a priority. IOSEA can facilitate this exchange both by making materials available through its web site and by providing time at regional and international meetings for discussion and exchange.

31. Almost all BOBLME countries report involving stakeholders in the conservation and management measures of marine turtles. Bangladesh, India, Indonesia, and Sri Lanka provided brief descriptions of their efforts. For example, Indonesia is using a co-management business model to develop stakeholder involvement in turtle conservation. The other nations are using different methods to gain stakeholder involvement. However, documentation of when projects started, manpower used, cost, methods employed, and outcomes are generally lacking in the responses. In addition, sharing the outcomes, successful or otherwise, would help all the BOBLME nations to better interact with stakeholders and to fine tune their programmes.

32. Bangladesh, India and Indonesia provided detailed comments on their programmes to facilitate alternative livelihoods for communities that have traditionally impacted. These are typically on a small scale involving one or two communities, although the project in Indonesia dealt with seven communities. Typically, the projects focus on skill development and include activities such as guarding beaches, acting as guides for ecotourism activities, and use of different fishing gear. Unfortunately the comments indicate that the success of the projects has not been very good, partly because the projects tend to be temporary and the cost of living keeps increasing.

#### **Objective V: Enhancing national, regional and international cooperation**

33. All BOBLME countries have developed (or are in an advanced stage of development) national actions plans for the conservation and management of marine turtles in their jurisdiction. Comments made by India, Indonesia, and Myanmar reinforced the presence of legislation supporting their National Action Plans. In most cases components of the IOSEA Conservation and Management Plan (CMP) have been incorporated into the objectives at the national levels. Most plans are available online. As well, concepts and objectives from IUCN's global and regional conservation strategies (1995, 1996, 2001) have been included. Unfortunately, copies of the available national action plans have not yet been filed with the IOSEA Secretariat; however, an exercise will be undertaken in 2012 to collect and make them available on the IOSEA website.

34. The BOBLME countries ranked 'training and capacity building' and 'habitat studies' as the two areas most needing international assistance (six countries ranked these as 'essential' activities). The next most important issue with which they required international assistance was illegal fishing in territorial waters; followed by intergovernmental cooperation to deal with poaching, illegal trade in turtle products. International cooperation was not considered 'essential' by respondents in relation to only one issue (oil spills, pollution, marine debris), notwithstanding the value of regional or transboundary cooperation in this area.

35. Aside from BOBLME, a number of international and regional organizations operate in the BOBLME area, including the Association of South East Asian Nations (ASEAN), the South Asian Association for Regional Co-operation (SAARC), the Indian Ocean Tuna Commission (IOTC) and the Southeast Asian Fisheries Development Center (SEAFDEC). Five of the BOBLME countries reported that they have not taken an active role to encourage Regional Fishery Bodies (RFBs) to adopt marine turtle conservation measures within Exclusive Economic Zones (EEZs) and on the high seas. However, the Maldives indicated that it is regionally involved in the process.

## Objective VI: Promoting and supporting implementation

36. All BOBLME countries reported that they have laws and regulations that help to protect marine turtles and their habitat. However, in virtually all BOBLME countries, the lack of sufficient trained staff and equipment coupled with the large areas to monitor, reduce the effectiveness of implementation and enforcement efforts. The need for technical assistance to train trainers in marine turtle biology, conservation of resources, and law enforcement is an obvious extension of 'need' in capacity building.

37. Four of the BOBLME countries reported that they have conducted a review of policies and laws to address any gaps, inconsistencies or impediments in relation to marine turtle conservation; however it is not known whether these reviews have been documented in any way or whether the reviews resulted in changes in law or policy. A review of the existing laws and regulations would benefit all countries, especially if they assess the effectiveness of the rules and enforcement practices first. Any review should also include an attempt to make laws reciprocal and enforceable, especially in border areas.

## Recommendations in relation to IOSEA implementation

- Signatory States should use this document to identify conservation and management issues, as well as reporting deficiencies, that need to be addressed in up-dating their Country Reports.
- Signatory Countries should up-date the on-line Country Reports annually, or even more frequently, and as publications, reports and new information become available.
- During the review and up-dating of the Country Reports, citations should be assigned wherever possible to support the answers to questions posed in the various programmes of the objectives.
- Communication and coordination among nations should be improved as a matter of urgency to facilitate sharing: information about legislation and enforcement procedures; scientific information on the biology and ecology of marine turtles; educational and public awareness materials and programmes; fishing practices and improvements in gear technology; information concerning habitat rehabilitation; and evaluation and effectiveness of remedial measures.
- Signatories should clearly define threatening processes impacting marine turtles. This will aid identification of necessary remedial actions and assist in the evaluation of outcomes.
- BOBLME countries should coordinate conservation efforts within and among nations of the region, particularly in relation to research methodologies so that results are comparable.
- Better documentation of implementation of measures to reduce incidental capture and mortality of marine turtles is needed as a matter of urgency. If not ameliorated, the impact of fisheries on turtle populations has the potential to override all conservation efforts.
- Documentation of assessment work is necessary. For example, all BOBLME States indicated that they have implemented best practice approaches to reduce threats to marine turtles and their habitats, but no respondent explained how the efficacy of outcomes will be assessed.

- Collaborative research and monitoring, as well as the exchange of technical information among research groups within and among the BOBLME countries were identified as aspects that could be improved among the BOBLME countries.
- Lack of enforcement of existing legislation, resulting from a shortage of resources and manpower, was identified almost universally as a problem to be overcome. All BOBLME countries need to identify and clearly articulate resource shortages and needs, which will help to illustrate what actions are not being undertaken, the real or potential consequences of inaction, and the resources needed to change this situation.

### **Additional comments**

38. For countries such as India, Indonesia, Malaysia, and Thailand that encompass very large areas, only part of which is in the BOBLME region, answering on a country level tends to hide or overshadow specific details concerning implementation in the more limited BOBLME area -- because information germane to other regions is unavoidably included in the assessment. The IOSEA Online Reporting Facility does not support reporting at the provincial/state scale, and is unlikely to do so in the foreseeable future, since the IOSEA MoU itself operates at the national level. Within large countries, provincial /state reports might be prepared using the Country Report form based on province/state boundaries rather than for the entire country; but they would still need to be assembled/compiled into a single national report. This would undoubtedly require more reporting effort, but it would facilitate the capture of information at a management level and prevent the loss that occurs from soliciting information at the country level.

39. IOSEA Signatory States are encouraged to make use of the flexible, online system which allows for updating of reports at any time, by all interested parties who are authorised to do so by virtue of controlled password access. Recognising that some respondents prefer to make use of an offline, word-processor based template, the Country Report form should be re-designed to be a PDF form so that it can be downloaded, filled in, and the contents manually uploaded without changing format. This would alleviate the translation to a word processor format which introduces numerous formatting and sharing problems. Hopefully this option would still be used by only a small number of Signatory States, since it runs counter to more efficient online processing and necessitates cutting/pasting of information which may be prone to introduced error.

### **C. Analysis of information on sites and areas of importance for marine turtles**

40. IOSEA maintains an on-line database of sites and areas of importance for marine turtles for the countries bordering the Indian Ocean region<sup>1</sup>. The IOSEA Site Database contains detailed information in support of the IOSEA on-line Country Reports, including location, species present, type of use (i.e., nesting, foraging), threatening processes, and remedial actions. The information has

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<sup>1</sup> The western coast of India is not within the defined sub-region and the eastern sides of Thailand, Malaysia, and Indonesia are not within the BOBLME boundaries. Site Datasheets from areas outside the BOBLME area were not considered in the present analysis.

been assembled from official contributions from BOBLME countries, widely scattered literature, local knowledge, and other information about the BOBLME area. The on-line Site Database is searchable using a set of selection criteria and provides easy access to information relevant to the IOSEA countries. The database may be accessed by anyone seeking information about marine turtles in the region.

41. The BOBLME area is host to five species of marine turtles: Loggerhead, *Caretta caretta*; Green turtle, *Chelonia mydas*; Olive Ridley, *Lepidochelys olivacea*; Hawksbill turtle, *Eretmochelys imbricata*; Leatherback, *Dermochelys coriacea*. Based on the current information, green and olive ridley turtles were the most represented species in the region. Hawksbill turtles were the next most common; while the leatherback turtle and loggerhead turtle were the least represented species.

42. Each country in the BOBLME sub-region hosts one or more very important nesting sites for at least one of the five species of marine turtles inhabiting the area. Although estimated numbers of nesting turtles vary, important nesting sites for the green and hawksbill turtles occur in every country. For green turtles, the major nesting sites in Malaysia and Indonesia are distributed further to the East (beyond the BOBLME area). Green turtle nesting in Thailand is lower compared to nesting in the other BOBLME countries, but contributes to the regional population. Both species exhibit widespread nesting the Andaman and Nicobar Islands of India.

43. Olive ridley turtles nest in most BOBLME countries (except for the Maldives), with the most important nesting sites for the species situated in India, where large *arribadas* (mass nesting) still occur. Reduced levels of Olive ridley nesting occur in Indonesia, Malaysia, and Thailand. The leatherback turtle uses multiple sites in the Andaman and Nicobar Islands of India; but the number of nesting sites is much lower in Sri Lanka and Thailand. In the BOBLME sub-region, the loggerhead turtle nests mainly in Sri Lanka.

44. Marine turtles utilizing nesting beaches and near-shore habitats face a similar set of threatening processes in the BOBLME region. Five countries for which information was available identified threatening processes very well, and all countries have taken action to address the threatening processes occurring at the nesting sites. Although the same set of threatening processes occurred in the eight BOBLME countries, the same threats were not equally important in each. For example, at the country level in Sri Lanka, *egg collection* was reported to be the most important threatening process; whereas in Thailand, *Agricultural/urban/tourism development* was the most important threatening process. This highlights the need for each country to assess and to act locally but also to communicate and coordinate conservation efforts among the BOBLME sub-region countries.

45. Most of the eight BOBLME countries represented in the IOSEA Database use three or more approaches to reduce the impact of the threatening processes. Assessment of the effectiveness of these measures is an essential part of conservation and management actions. Ideally, each of the threatening processes should be paired with a remedial action. At some sites, little or no remedial action is required because the impact of the threatening processes is minor; however, at other sites a range of remedial actions is required. It is important to share the details of successful and not so successful remedial actions so that better programmes can be developed within and among sites and countries.

## Recommendations in relation to site-based conservation

46. The threatening processes have been operating for decades and remediation will not be achieved in a short time. To achieve successful remediation of threatening processes and recovery of depleted populations requires information and commitment. Research is needed on the species and their numbers using the nesting sites, as well as on the population structure using the near shore habitats. Continued governmental support of research and education projects is needed within each of the BOBLME countries. Each country should communicate and coordinate conservation efforts with other countries, particularly in training, sharing information, and enforcement of regulations.

47. Foraging area population assessment is the one type of study that is lacking in the region. Because the foraging areas provide essential nutrition and safe habitat for marine turtles and because different size classes utilize different habitats, understanding marine turtle populations in foraging areas is essential for conservation management. The first step is the determination of the bathymetric structure in the BOBLME region, followed by the delineation of the distribution of specific habitats (e.g., coral reefs, sea grass meadows, mixed algal turf) that are used by marine turtles. This could be accomplished in conjunction with fisheries assessment in the sub-region because these habitats also support fishing activities and are important to the local economies. Healthy habitats for marine turtles are also healthy habitats for many juvenile and adult fish species.

48. Overarching conservation management issues that impact marine turtle conservation and management in the BOBLME are: (1) the adoption of standardized methods to facilitate collection of data and (2) the standardization of regulations concerning beach development and fishing practices. Comparison among sites within and between countries is essential for sub-regional coordination of conservation and management efforts. Several field manuals have been written to address the issue of standardized methods. Standardization of research methods, in turn, supports both localized and sub-regional conservation and management efforts by providing comparable data for analysis at the sub-regional and larger scales. Additionally, the standardization (coordination) of regulations concerning beach development and fishing practices is an essential part of conservation management. For example, fishing gear regulations could be standardized, particularly in border areas where the resources are being harvested under two sets of country regulations.

49. Descriptions of the physical characteristics of the nesting beaches are, mostly, missing from the IOSEA Site Database. Stakeholders (IOSEA Country Focal Points and other interested parties) should be encouraged to check all existing data in the database relevant to their country to ensure that it is complete, accurate and up to date. The application of local knowledge is essential to ensure accuracy of the information. Because of the dynamic nature of conservation management, a bi-annual review of threatening processes and remedial actions is encouraged. Whenever possible, nest site surveys should be conducted over the BOBLME region to bring all the data to currency.

50. The IOSEA Secretariat should improve the directions supplied and the training of country representatives concerning the completing of the Site Datasheets, the review process, and the on-line up-dating process. For example, the use of citations documenting published scientific papers and reports is preferred. IOSEA should develop and supply to the national Focal Points standards for obtaining and displaying geocoordinate information for the Site Database.

#### **D. Contribution to the IOSEA Bibliography Resource**

51. The IOSEA Secretariat maintains an on-line bibliography of published scientific papers, and unpublished reports concerning marine turtles in the greater Indian Ocean region. Prior to the present undertaking, the IOSEA Bibliography Resource contained approximately 890 references, mostly pertaining to the Western Indian Ocean, many of which are supported by a PDF file of the paper.

52. The current project focused on the BOBLME area has contributed 1346 citations to the IOSEA bibliography, most with abstracts, including 467 with linked PDF versions of the papers and reports, and 879 additional citations, most with abstracts. Taking into account existing duplicate entries, about 1000 new records from the BOBLME region have been added to the searchable online Bibliography Resource, making it a unique tool for practitioners in the region.

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## PART II DETAILED ASSESSMENT OF COUNTRY REPORTS

### Introduction

#### Large Marine Ecosystem Project

The Large Marine Ecosystem (LME) project was developed to address the environmental problems occurring in coastal ecosystems (World Bank 2005). The LME project started working at the global scale by recognizing the need for long-term sustainability of coastal resources and environments. The project aims to help coastal countries address threats to the coastal and marine environments from an integrated ecosystem approach (LME Undated).

The LME approach uses five modules (LME, Undated):

- Productivity module considers the oceanic variability and its effect on the production of phyto- and zooplankton.
- Fish and fishery module concerned with the sustainability of individual species and the maintenance of biodiversity.
- Pollution and ecosystem health module examines health indices, eutrophication, biotoxins, pathology, and emerging diseases.
- Socio-economic module integrates assessments of human forcing and the long-term sustainability and associated socio-economic benefits of various management measures.
- Governance module involves adaptive management and stakeholder participation.

The Bay of Bengal Large Marine Ecosystem (BOBLME) is one of the world-wide network of Large Marine Ecosystem regions (Hellerman et al., Undated). The BOBLME includes eight countries that border the Bay of Bengal: Bangladesh, the eastern coast of India, Indonesia (Aceh, Riau, North and West Sumatra Provinces), the western coast of peninsular Malaysia, the Maldives, Myanmar, Sri Lanka, and the western coast of Thailand (World Bank 2005). As a result, the Bay of Bengal is ecologically, socially, and economically complex (World Bank 2005).

The Bay of Bengal Large Marine Ecosystem includes freshwater, estuarine, and marine habitats. Much of the social and economic activity in the region involves fishing. As a result, the coastal areas of the BOBLME countries share a suite of ecologically interconnected problems that vary in intensity throughout the region.

Multiple stakeholders use the coastal and off-shore environments of the Bay of Bengal (Aziz Ahmad et al, 1998), ranging from family-based farms to community-based aquaculture to national and international fisheries. Coastal inhabitants engage in intensive fishing to support both their local markets and export markets. In addition the marine resources are used by fishing fleets from other nations. There has been a steady increase in the tonnage of fish caught in the region (FAO 2003). Although coastal fishes, pelagic fishes, and crustaceans contribute about 30 percent to the total catch, there is inadequate information on the status of the fisheries resources to allow the sustainability of the total fishery to be evaluated (FAO 2003).

Concern for the conservation of marine turtles within the BOBLME is derived from module 2 (fish and fishery module concerned with the sustainability of individual species and the maintenance

of biodiversity) and from the growing literature on the biology of turtles in the region (e.g., *Marine Turtles of the Indian Sub-continent*).

To address the international and national issues impacting marine turtles globally, the IUCN/SSC Marine Turtle Specialist Group (MTSG) developed a Global Strategy for the Conservation of Marine Turtles (IUCN 1995). The strategy contains seven themes: (1) Research and monitoring, (2) integrated management for sustainability of populations, (3) capacity building, (4) public awareness (information and education), (5) community participation, (6) regional and international cooperation, (7) evaluation of the status of marine turtles, and (8) funding conservation. This volume addresses actions that should be taken to conserve marine turtles at the local, national and regional levels. In 1996 an action plan was developed for the Western Indian Ocean (IUCN 1996) and in 2001 a similar plan was prepared for the Northern Indian Ocean (MTSG 2001); both were structured around the themes of the global strategy. Rich in useful information and guidance, none of these documents embodied any legal imperative for governments to act in concert to address the issues that had been identified.

The Convention on Migratory Species (CMS), an intergovernmental treaty administered by the United Nations Environment Programme, has a remit to conserve a vast array of migratory species throughout their range. One of the instruments at its disposal to forge cooperation among countries and coordination with other actors is the non-binding Memorandum of Understanding (MoU). The Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia region was concluded in 2001 “to protect, conserve, replenish and recover marine turtles and their habitats, based on the best scientific evidence, taking into account the environmental, socio-economic and cultural characteristics of the signatory States.” (CMS, 2001).

The IOSEA MoU, which now has 33 signatories across the region, identifies important conservation issues and major threats. Major threats include unsustainable exploitation of marine turtles and their eggs, destruction of nesting and foraging habitats, and incidental mortality in fishing operations. An integral part of the MoU is the Conservation and Management Plan (CMP) which defines six objectives containing 24 programmes and 105 specific activities designed to: (1) reduce threats, (2) conserve critical habitat, (3) exchange scientific data, (4) increase public awareness and participation, (5) promote regional cooperation, and (6) seek resources for implementation (CMS, 2001). All of the BOBLME countries are also IOSEA signatories and all have developed national plans for the conservation of marine turtles that broadly encompass these objectives; some of them are very closely aligned with the provisions of IOSEA.

## **Reporting**

The IOSEA MoU requires preparation of an initial assessment of the status of marine turtles and encourages regular reports on progress towards implementation of the MoU. The Signatory States are encouraged to use an Online Reporting Facility, including a standardized template, to submit and to revise their reports whenever new information becomes available.

## **Structure of Report**

The present document provides a review of the eight countries of the BOBLME in the

format of previous analyses of the Country Reports prepared by IOSEA Signatory States. The format of the Country Reports follows the structure of the six objectives outlined in the IOSEA Conservation and Management Plan (CMP) (Table 3).

**Table 3. The Six Main Objectives of the IOSEA Conservation and Management Plan**

Objective I: Reducing direct and indirect causes of marine turtle mortality
Objective II: Protecting, conserving and rehabilitating marine turtle habitats
Objective III: Improving understanding of marine turtle ecology and populations
Objective IV: Increasing public awareness and enhancing public participation
Objective V: Enhancing national, regional and international cooperation
Objective VI: Promoting and supporting implementation

## Methods

The present report is based on a review of the Country Reports for each of the BOBLME countries. Before being placed on the IOSEA web site, the current Country Reports were re-circulated in September 2011 to the contributors and to the government representatives for final review and any necessary revision. The reports may thus be considered as the best possible representation of the situation each country, as of the date of their completion. It is possible that the contents will have been further improved in the meanwhile, and it is very probable that further additions in the coming months will enhance their value.

### Reporting Template

The Country Report template is available on-line and for downloading at the [www.ioseaturtles.org](http://www.ioseaturtles.org). The current template, which follows the structure of the CMP, is a slightly revised version of the one used in 2006 and 2008. Minor adjustments were made to the format but the information requested is broadly similar. Maintaining continuity among the versions of the template format facilitates comparison of results among reporting periods over time.

### Process of Review

The process of reviewing the Country Reports was iterative. The existing Country Reports were downloaded from the IOSEA web site ([www.ioseaturtles.org](http://www.ioseaturtles.org)), and reviewed for content and completeness. Questions and requests for additional information and/or clarification were added to the reports. The Country Reports were then sent to specialists who deal with marine turtle issues within the government departments and NGOs in each country (Annex 4). These people were asked to review the Country Reports by editing existing information, by contributing additional information, and by contributing published papers and reports. The contributions were then amalgamated into a revised Country Report for each country.

### Scoring System

Scoring criteria were developed to objectively measure the performance of each Signatory State in relation to the measures contained in the CMP. Detailed analysis of the Country Reports

was based on assigning values to provide a numerical basis for assessment [5: excellent, 4: very good, 3: adequate 2: incomplete, 1: inadequate, 0: no answer]. The assessment is, however, based on subjective judgment of the completeness of the responses. Although the numerical approach appears to be comparative, it is not intended to be. This is essentially the same scheme that was used in previous reviews.

### Evaluation Matrix

The average results for a given country are displayed only as colour-codes in the evaluation matrix, in order to provide an indication of the implementation progress (Table 4). Six colour categories are used to summarize the findings at the level of each programme within the CMP. The matrix displays results at the level of each programme; whereas, the analysis was conducted at the question level.

The evaluation matrix was not intended to rank one Signatory State against another. The evaluation matrix is intended to be used to identify gaps in implementation and reporting across programmes. The results for any given Signatory State may help to identify areas where that Signatory State has excelled or areas where a given Signatory may need assistance to implement a programme more effectively.

**Table 4. Colour Codes Used in Displaying the Average Results of the Progress of Implementation IOSEA MoU.**

Category	Colour
Full or near-full implementation	Dark Blue
Active intervention, very substantial progress	Medium Blue
Partial implementation, good progress	Light Blue
Some progress, but limited in scope	Very Light Blue
Very limited progress	Grey
No information available or no progress reported	White

As in previous reviews, a number of points should be kept in mind while perusing this information:

- § The assessments at the question level are subjective and open to interpretation.
- § Absence of information does not necessarily mean that activities have not taken place in that country. Absence of information may be indicative of under-reporting or that the information was not available when the Country report was prepared.
- § For some countries, the information submitted is not comprehensive. A rating of “limited progress” may understate the extent of actual implementation.
- § “Notable responses” are indicated to draw attention to informative explanations provided by a Signatory State.

## Results and Discussion

### Signatory Status and Review History of the IOSEA MoU

All eight BOBLME countries that border the Bay of Bengal (Bangladesh, India, Indonesia, Malaysia, Maldives, Myanmar, Sri Lanka, and Thailand) are signatories to the Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia (IOSEA MoU). The MoU will formally take effect in Malaysia, the last signatory, on 1 December 2011 (Table 5). All other signatories have reviewed or updated their national reports since 2008.

Table 5. Signatory Status and Reporting History of BOBLME Countries.

Country	Date MoU Signed	Date of previous (internal) report update	Date of last external report review
Bangladesh	1-Jan-2004	21-Jul-2010	30-Sept-2011
India	1-May-2007	18-Aug-2010	30-Sept-2011
Indonesia	1-Jun-2005	3-Mar-2008	30-Sept-2011
Malaysia	19-Sept-2011	New Signatory 2011	30-Sept-2011
Maldives	01-Jul-2010	18 Jan 2011	30-Sept-2011
Myanmar	1-Sep-2001	26-Jul-2008	30-Sept-2011
Sri Lanka	1-Sep-2001	18-Aug-2010	30-Sept-2011
Thailand	1-Mar-2005	18-Aug-2010	30-Sept-2011

### Detailed Analysis of Country Reports

Over all, the BOBLME countries have improved their Country Reports through the current review process. At the beginning of the process the standard of reporting varied greatly among the countries. Bangladesh had a Country Report that was virtually unchanged through the iterations of review. Sri Lanka, Thailand, Indonesia, and Myanmar started the review process with Country Report documents that required some up-dating to better reflect the current status of the implementation of the MoU. In contrast, the Maldives started with a Country Report that contained almost no information and now has one that provides information on the on-going activities in the Atoll nation. There is still work to be done to better complete the Country Report, but the Maldives has taken a large step toward producing a comprehensive Country Report. Although not a Signatory State during the review process, Malaysia has provided information on the activities occurring along its western coast as well as elsewhere. Malaysia is a large, diverse country that is not easily summarized as a whole. India started the review process with a reasonable foundation document that now contains many detailed comments that explain the majority of 'tick box' answers and references that link the response to a published paper or report.

Like Malaysia, Indonesia and India are very large countries with major portions inside and major portions outside the BOBLME region. Trying to summarize information from a national

perspective across such large areas is very difficult. For these countries and Thailand, which has coastline facing two ocean basins, separate province/state Reports could be prepared that reflect the activities occurring within the province/state boundaries. These might then be consolidated into a comprehensive report for the entire country, so as not to lose useful detailed information from the various regions.

The detailed analysis by sub-programme (Table 6) shows that Bangladesh, India and Thailand stand out among the BOBLME countries in virtually every category, although other nations have strength in one or more of the 24 programmes. Again, India has provided extensive comments and citations in support of their Country Report; other countries have shown improvement, especially in linking comments to references and reports. The two areas in which all countries could improve are (a) Objective 1, Program 1.4 (reporting of fisheries activities) and (b) Objective 6 (support of the MoU).

In the following table (Table 6) a set of superscripts is used to denote conditional explanations of the scores. Superscript meaning: a: information not available, b: only partial information available, c: likely under reporting of current situation, d: links to supporting information/documents needed, e: little international collaboration has occurred, f: data have not been compiled. The superscripts are used consistently throughout this document.

Table 6. Summary of the Detailed Analysis of Country Reports for the BOBLME Countries.

Programme	Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
1.1 Overview given of species, habitats, achievements, challenges	4	4	4	4	3	3	4	4
1.2 Best practices identified / applied to minimize threats	3	4	2	0 <sup>a</sup>	3	2.5	3	4
1.3 Studies conducted to correct adverse incentives	4	4	3	0 <sup>a</sup>	3	2	3	4
1.4 Fisheries interactions identified; incidental capture/mortality reduced <sup>1</sup>	3.3	3.2	3.1	1.8 <sup>d</sup>	2.7 <sup>d</sup>	3.0	2.2 <sup>d</sup>	2.6 <sup>d</sup>
1.5 Turtle uses & values identified; legislation / management in place	3	3	3	2	4	3	3	3
1.6 Nesting beach management programmes developed	4	4	4	2	2	3	2	3
2.1 Habitat protected / monitored	3	4	4	0 <sup>a, c</sup>	1 <sup>b</sup>	3	4	3
2.2 Degraded habitats rehabilitated	3	3	3	0 <sup>a</sup>	2	2	3	3
3.1 Basic species and habitat related studies conducted	5	5	4	5	3	4	4	5
3.2 Collaborative research and monitoring conducted	4	4	4	2.5 <sup>a, e</sup>	2 <sup>a</sup>	4	4	4
3.3 Research results applied; management priorities identified	3	3	4	3	3	3	4	4

3.4 Data collection standardized / information exchanged	4	4	4	3	2 <sup>f</sup>	3	3	3
4.1 Education, information programmes implemented	5	5	4	2.5 <sup>a,c</sup>	3	4	5	4
4.2 Alternative livelihood opportunities developed	4	4	3	0 <sup>a</sup>	2	1 <sup>c</sup>	1 <sup>c</sup>	1 <sup>c</sup>
4.3 Public / private sector involvement encouraged	4	4	4	0 <sup>a</sup>	2.5 <sup>c</sup>	2	3	3
5.1 Trade regulations cooperatively enforced	4	4	4	4	3	4	4	4
5.2 Mgmt. issues identified; national actions prioritised	4	4	4	4	3	4	4	4
5.3 Cooperative mgmt. and information exchange enhanced	4	3	3	2 <sup>c</sup>	3	3	3	3
5.4 Capacity building / training strengthened	3	4	4	2 <sup>c</sup>	3	4	4	4
5.5 Legislation reviewed; enforcement strengthened	3	3	3	3	3	3	3	3
6.1 New members solicited; MoU status considered	1 <sup>a</sup>	2	2	0 <sup>a</sup>	1 <sup>a</sup>	1 <sup>a</sup>	1 <sup>a</sup>	1 <sup>a</sup>
6.2 Secretariat / Advisory Committee supported	2	0 <sup>a</sup>	0 <sup>a</sup>	0 <sup>a</sup>	0 <sup>a</sup>	0 <sup>a</sup>	0 <sup>a</sup>	0 <sup>a</sup>
6.3 Resources sought for domestic implementation	2	2	3	0 <sup>a</sup>	0 <sup>a</sup>	2	2	2
6.4 Government coordination / cooperation improved	3	3	3	0 <sup>a</sup>	2	2	2	2

Superscripts: 1: Question 1.4 contains 9 parts; the assessment of each was averaged to give the value, a: information not available, b: only partial information available, c: likely under reporting of current situation, d: links to supporting information/documents needed, e: little international collaboration has occurred, f: data have not been compiled.

## OBJECTIVE I: REDUCING DIRECT AND INDIRECT CAUSES OF MARINE TURTLE MORTALITY

**General tendency:** Good progress; average 3

**Notable responses:** Bangladesh, India, Sri Lanka, Thailand

All BOBLME countries are involved in reducing the direct and indirect threats that cause marine turtles mortality (Table 7). India provided a detailed response that is linked to the published literature. Other countries provided responses that contain varying amounts of detail. All countries could improve their responses and, hence, the outcomes for marine turtles by better documenting their efforts. In addition, more detail concerning the implementation of best practices (Prg 1.2) would be helpful, including description of the efforts of NGOs and the fishing industry to reduce turtle mortality.

**Table 7. Summary of programs within Objective 1 of the IOSEA MoU.**

Programme	Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
1.1 Overview given of species, habitats, achievements, challenges	4	4	4	4	3	3	4	4
1.2 Best practices identified / applied to minimize threats	3	4	2	0 <sup>c</sup>	3	2.5	3	4
1.3 Studies conducted to correct adverse incentives	4	4	3	0 <sup>c</sup>	3	2	3	4
1.4 Fisheries interactions identified; incidental capture/mortality reduced <sup>1</sup>	3.3	3.2	3.1	1.8	2.7	3	2.2	2.6
1.5 Turtle uses & values identified; legislation / management in place	3	3	3	2	4	3	3	3
1.6 Nesting beach management programmes developed	4	4	4	2	2	3	2	3

Superscripts: 1: Question 1.4 contains 9 parts; the assessment of each was averaged to give the value, a: information not available, b: only partial information available, c: likely under reporting of current situation, d: links to supporting information/documents needed, e: little international collaboration has occurred, f: data have not been compiled.

### 1.1 Introduction to Marine Turtle Populations and Habitats, Challenges and Conservation Efforts

All countries provided a general overview of their marine turtle populations in their jurisdiction. However, comments on associated habitats and population trends were generally lacking. Some highlighted their country's main challenges and achievements in marine turtle conservation. The inclusion of citations in this section provides the reader with quick access to the important literature on marine turtles for the country. Ideally the citations would include review articles and more data rich studies upon which conservation management decisions can be made.

## **1.2 Identification and Application of Best Practices to Minimise Threats**

In general, the responses to this question were informative. Nearly all countries mentioned that volunteers were involved in local projects and that educational and awareness programmes were important contributions to protecting resources in their territorial waters. However, few countries provided details of the programmes. For example control of fishing practices through regulations on fishing areas, gear, and season can contribute to both improved harvest of target species and turtle conservation. The use of Trawler Efficiency Devices (TEDs) reduces turtle mortalities and by-catch. Although not mentioned by all countries, enforcement was mentioned as being important but (typically) ineffective.

## **1.3 Correction of Adverse Incentives that Contribute to Turtle Mortality**

All BOBLME countries reported at least some efforts in identifying and ameliorating adverse incentives that contribute to marine turtle mortality. However, details tend to be lacking. By providing greater detail of incentives that have not worked, as well as those that have worked, countries help themselves and each other.

### **1.3.1 Socio-economic Studies**

To varying degrees BOBLME countries referred to socio-economic activities and studies that have been conducted in coastal communities. These indicate that an effort is being made in the majority of countries. For example, Bangladesh has studied consumption/use of turtles; and Thailand conducted a study of the interactions between artisanal fishing practices and turtles. In Indonesia numerous studies have been conducted. The application of the results has been slow in all countries, but the situations are varied and complex. Continued effort is needed to find ways for communities to reduce their impact on turtles while maintaining (improving) their economic base.

### **1.3.2 Identification/Correction of Adverse Incentives**

No single reason emerges as dominant in the responses for identifying adverse incentives to turtle conservation (Table 8). This is understandable given the extent of the BOBLME area and the complexity of the social and economic issues of the area. In addition, it indicates that addressing the issues will be difficult and must be done at a province/state or, in some cases, local level.

With the exceptions of Malaysia, and Myanmar, most countries provided answers by checking the appropriate boxes or brief explanations. Some countries indicated that the possible incentives listed in the template were not ones that were acting in their countries. Sri Lanka provided a comment that positive incentives were needed.

Given the number of 'None of the above or Not Applicable' responses to the options listed in the question, BOBLME countries should look for negative incentives that work against the conservation of turtles. It is clear that negative incentives operating in the BOBLME countries involve issues not listed in the question. These need to be identified to help find positive ways to reverse the local situations using practical approaches to improve turtle conservation.

Table 8. Answers to the question: Which of these adverse economic incentives are underlying threats to marine turtles in your country?

Possible incentive	Number of 8 countries answering: YES / NO / Blank
High prices received from turtle products relative to other commodities	2 / 5 / 1
Lack of affordable alternatives to turtle products	1 / 5 / 2
Ease of access to the turtle resource (e.g. by virtue of proximity or ease of land/water access)	3 / 4 / 1
Low cost of land near nesting beaches	2 / 4 / 2
Low penalties against illegal harvesting	1 / 5 / 2
Other 1	Tourism, Poverty, lack of enforcement
Other 2	Lack of enforcement, Religious issues, None of the listed possibilities

### 1.3.3 Has Your Country Taken Any Measures to Try to Correct These Adverse Economic Incentives?

Seven countries answered ‘Yes’ indicating they had taken some action to mitigate adverse economic incentives; Myanmar reported that no action had been taken. Two countries (India and Sri Lanka) commented briefly on the activities in their countries, including such things as community participation in patrolling beaches, community-based Ecotourism, and people being employed to collect data. Two other countries (Bangladesh and Thailand) reported that education programmes would help. The sharing of approaches to correcting adverse incentives within and among countries would benefit all concerned parties.

### 1.4 Reduction of Incidental Capture and Mortality

Several different types of fishing activity occur in the Bay of Bengal Large Marine Ecosystem area, including shrimp trawls, set gill nets, anchored fish aggregating devices (FADs), purse seine, longlining, driftnet, and other types of fishing (Table 9). Shrimp trawling is the most widely used method, occurring in seven of the BOBLME countries. The use of set gill nets and purse seines occurs in six countries. The other types of fishing occur in a mixture of the countries.

Supplying of supporting documentation that links the assessment to a source of primary data is improving; however, more supporting documentation is necessary. Copies of supporting documents should be supplied to the IOSEA Secretariat for inclusion in the on-line Bibliography Resource.

Table 9. Reported types of fishing devices used in BOBLME countries.

	Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
a) Shrimp trawls	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes

<b>b) Set gill nets</b>	Yes	Yes	Yes	Yes	No	No	Yes	Yes
<b>c) Anchored Fish Aggregating Devices (FADs)</b>	No	Blank	Yes	Unknown	yes	No	Unknown	No
<b>d) Purse seine (with or without FADs)</b>	Yes	no	Yes	Yes	No	Yes	Yes	Yes
<b>e) Longline (shallow or deepset)</b>	Yes	Yes	Yes	Unknown	60 m depth	Yes	Yes	Blank
<b>f) Driftnet</b>	Yes	Yes	Yes	Yes	No	Yes	None	No
<b>g) Other2 (from 1.4.1):</b>	Nets	Nets	Danish Seine Net	Yes	No	Traps	None	Pair Trawls
<b>h) Other2 (from 1.4.1):</b>	Crafts	dynamite	Blank	Yes	No	Nets	None	squid traps

Most of the fishing effort from shrimp trawlers, gill netters and FAD fishers occurs near the coast, whereas other methods are used further off-shore (e.g., Purse seines, longlines).

The Country Reports provide some reference to documents and papers concerning fishing activities in their portion of the BOBLME. There is a need, however, to strengthen the linkage between information provided in the Country Reports and the documents from which that information has been taken. This can be accomplished by providing the full citation to the source document(s) in the appropriate section. India has done the best job in this regard.

Better documentation of the distribution of the various fishing methods by area and season would assist the development regional fishing policies and practices that would benefit all BOBLME countries.

#### 1.4.2 Please Indicate the Relative Level of Fishing Effort and Perceived Impact of Each of the above Fisheries on Marine Turtles (e.g. in terms of by-catch).

##### Fishing Effort

Fishing effort varies among the countries of the BOBLME (Table 10). Shrimp trawling effort is reported to be 'high' (or 'relatively high') in Bangladesh, India, Indonesia, and Malaysia. Trawling is described as being moderate or unknown in the other countries, with the exception of the Maldives. The other forms of fishing are considered to be at the 'moderate' level, 'low' level or 'unknown'. The one type of fishing that does not fit that pattern is longlining in Indonesia where effort is 'high', but the distribution of the fishing effort is not clear (i.e., in the BOBLME area or outside it). Knowing where fishing occurs, what gear is being used, and the level of effort expended is important from the point of view of regional cooperative management of fish resources and the management of the impact of the fishing on non-target species.

Table 10. Estimation of the fishing effort by different methods in the BOBLME countries.

(NA = not applicable)

Fishing Effort	Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
a) Shrimp trawls	High	High	High	Relatively High	NA	Moderate	Unknown	Unknown
b) Set gill nets	Moderate	Unknown	Unknown	Moderate	NA	Blank	Unknown	Moderate
c) Anchored Fish Aggregating Devices (FADs)	No	None	Moderate	Unknown	No turtles caught	None	Unknown	None
d) Purse seine (with or without FADs)	Moderate	Blank	Moderate	Unknown	NA	Moderate	Unknown	Moderate
e) Longline (shallow or deepset)	Moderate	Unknown	Relatively High	Moderate	No turtles caught	Low	Moderate	Low
f) Driftnet	Moderate	Low	Moderate	Moderate	NA	Low	None	No
g) Other2 (from 1.4.1):	Moderate	Monofilament	Low	Unknown	NA	Low	None	Moderate
h) Other2 (from 1.4.1):	Moderate	Low	Blank	Unknown	NA	Low	None	Low

### Perceived Fishing Impacts

The perceived impacts of fishing vary among the BOBLME countries (Table 11) in a pattern that is almost the same as that of the fishing effort. The perception of the impact of shrimp trawling is 'high' (or 'relatively high') in Bangladesh, India, Indonesia, and Malaysia. Trawling is described as being 'low' or 'unknown' in the other countries, with the exception of the Maldives. The other forms of fishing are considered to be at the 'low' level or 'unknown'. The perceived impact of longlining in Indonesia, Myanmar and Thailand is low. One obvious outcome of this tabulation is that the scaling of perceived impact tends to be one level lower than the same method on the effort scale.

Table 11. Estimation of the perceived impacts of fishing in the BOBLME countries.

Perceived Impact	Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
a) Shrimp trawls	High	High	High	Relatively High	NA	Low	Unknown	None
b) Set gill nets	Moderate	Unknown	Unknown	Moderate	NA	Blank	Unknown	Moderate
c) Anchored Fish Aggregating Devices (FADs)	No	None	Low	Unknown	No turtles caught	None	Unknown	None

d) Purse seine (with or without FADs)	Unknown	Blank	Moderate	Unknown	NA	Low	Unknown	Moderate
e) Longline (shallow or deepset)	Unknown	Unknown	Relatively High	Moderate	no turtles caught	Low	Moderate	Low
f) Driftnet	Unknown	Low	Moderate	Moderate	NA	Low	None	No
g) Other2 (from 1.4.1):	Unknown	Low	Low	Unknown	NA	Low	None	Moderate
h) Other2 (from 1.4.1):	Unknown	Low	Blank	unknown	NA	Low	None	Low

The assessments of fishing effort and perceived impact are mostly subjective. India has provided the greatest level of linked documentation of any of the BOBLME countries to support their analysis. Many other countries provide a citation or a general reference to the source documents but copies have been difficult to obtain. The addition of comments and citations would greatly enhance an objective assessment of the situation. In the near future, Signatory States should be asked to provide a revision of sections 1.4.1 and 1.4.2 in their on-line Country Reports. A more detailed analysis of the impact of fishing in the BOBLME region is available (see: Preston, 2004).

**1.4.3 Describe Any Illegal Fishing that is Known to Occur in or Around the Waters of Your Country that May Impact Marine Turtles. Describe the Measures Being Taken to Deal with This Problem and Any Difficulties Encountered in This Regard.**

Every country around the BOBLME area reported some illegal fishing (Table 12). The Maldives identified illegal purse seine operations as a significant problem. Other problems with illegal fishing include foreign vessels fishing illegally in Indonesian waters and by-catch problems reported by Malaysia. However, the intrusion of foreign vessels is not the only form of illegal activity in the BOBLME area. In Bangladesh, Indonesia, and India, some local fishermen use explosives and other destructive fishing methods.

**Table 12. Evaluation of illegal fishing in the BOBLME countries.**

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
Comment	Comment	Comment	by-catch is significant problem	Illegal purse seiners	Some	Some	Comment

Bangladesh commented that sanctuaries and off-seasons have been declared; the comment continues to make suggestion of other positive actions that could be initiated, such as monitoring to define the effects of fishing. India commented that the states are in charge of within-state fisheries but that they receive support from the Coast guard and Navy. Indonesia commented that regulations have been put in place and they use the law against terrorism as part of the

enforcement. Thailand's comment reflects the situation in many countries because although laws are in place, enforcement is difficult.

It is extremely difficult for a country to manage its fish stocks when the stocks are being harvested in unsustainable manners. Unregulated take from the fish resources and the use of destructive fishing methods increase the rate at which the stock is destroyed. It is urgent that BOBLME countries be encouraged to monitor fishing activity and enforce fishing regulations. Also cooperation among the BOBLME nations should be encouraged to ensure the long-term sustainability of the fish stock and, hence, the fishing industry which provides significant income at all levels (family, local, regional, national, international).

#### **1.4.4 Which of the Following Methods are Used by Your Country to Minimise Incidental Capture/Mortality of Marine Turtles in Fishing Activities?**

There are several actions that countries can take to minimize the incidental capture and mortality of marine turtles in fishing. These include appropriate handling of incidentally caught turtles; devices that allow the escape of marine turtles (e.g. TEDs); measures to avoid encirclement of turtles in purse seines; appropriate combinations of hook design, bait type, depth, gear specifications and fishing practices; monitoring and recovery of FADs; net retention and recycling schemes; spatial and temporal control of fishing; and effort management control.

The BOBLME countries, with the exceptions of Bangladesh and Malaysia, have adopted recommended handling measures for dealing with incidentally caught turtles (Table 13). Indonesia and Myanmar provided noteworthy explanations.

Bangladesh, India and Indonesia require the use of devices that allow the escape of marine turtles (Table 13). However, the success of implementation varies. Myanmar and Sri Lanka do not require by-catch reduction systems, but Myanmar has held workshops on by-catch reduction. Malaysia left the answer blank and the Maldives and Thailand responded with 'NA' (not applicable) because either trawling does not occur in the country or other regulations reduce by-catch.

Indonesia and the Maldives have adopted the use of combinations of hook design, bait type, gear specifications and fishing practices as means of mitigating sea turtle by-catch (Table 13). The other countries either answered 'No' or 'NA' to the question, indicating that they have not encouraged the use of these methods.

Five countries reported that fishing activities are spatially and temporally controlled (Table 13). Although these controls are intended to manage the fishery, they benefit turtles. The control measures should be reexamined to determine if modification could be made to enhance both benefits to fishery and turtles. Four countries indicated that efforts are made to manage the fisheries through regulations and other control measures, including limiting capacity.

Table 13. Methods used by BOBLME countries to minimise incidental capture/mortality of marine turtles in fishing activities?

	Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
a) Appropriate handling of incidentally caught turtles (e.g. resuscitation or release by fishers using equipment such as de-hooking, line cutting tools and scoop nets)	No	Yes	Yes	Blank <sup>a</sup>	Yes	Yes	Yes	Yes
b) Devices that allow the escape of marine turtles (e.g. turtle excluder devices (TEDs) or other measures that are comparable in effectiveness)	Yes	Yes	Yes	Blank <sup>a</sup>	NA	No	No	NA
c) Measures to avoid encirclement of marine turtles in purse seine fisheries	No	No	Yes	Blank <sup>a</sup>	NA	Yes	No	No
d) Appropriate combinations of hook design, type of bait, depth, gear specifications and fishing practices	No	NA	Yes	Blank <sup>a</sup>	Yes	No	Blank <sup>a</sup>	No
e) Monitoring and recovery of fish aggregating devices (FADs)	No	No	Yes	Blank <sup>a</sup>	Yes	NA	Blank <sup>a</sup>	Yes
f) Net retention and recycling schemes	No	No	Yes	Blank <sup>a</sup>	NA	Yes	Blank <sup>a</sup>	No
g) Spatial and temporal control of fishing (e.g. seasonal closures)	No	Yes	Yes	Blank <sup>a</sup>	NA	Yes	Yes	Yes
h) Effort management control	No	Yes	NA	Blank <sup>a</sup>	NA	Yes	Blank <sup>a</sup>	Yes
Other	fishers release turtles	Blank	Blank	Blank	Blank	Blank	Blank	Blank

Superscripts: a: information not available, b: only partial information available, c: likely under reporting of current situation, d: links to supporting information/documents needed, e: little international collaboration has occurred, f: data have not been compiled.

Over all, the BOBLME countries have employed the use of available methods to reduce by-catch, although the methods used vary among the countries, at least in part in response to differences in fishing practices.

#### 1.4.5 Which of the Following Programmes has Your Country Developed - in Consultation with the Fishing Industry and Fisheries Management Organisations - to Promote Implementation of Measures to Minimise in National Waters and in the High Seas?

Three BOBLME countries have on-board observer programs but only two of these have vessel monitoring systems in place. In contrast, six countries use inspections (i.e. at sea, in port, at landing sites) to monitor fish take (Table 14).

Seven of the eight countries have training programmes and/or hold workshops to help educate fishers in the use of different fishing gear. Malaysia was the only country not reporting in this section, partly because information was not available. Although Sri Lanka does not use On-board observer programmes or vessel monitoring, it does use regulation in marine protected areas and education programmes developed and delivered by Government officers and members of NGOs to educated fishers.

Table 14. Programmes developed to promote reduction in the incidental capture and mortality of turtles.

	Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
a) Onboard observer programmes	No	No	Yes	Blank <sup>a</sup>	Yes	Yes	None	No
b) Vessel monitoring systems	No	No	Yes	Blank <sup>a</sup>	Yes	No	None	No
c) Inspections (i.e. at sea, in port, at landing sites)	Yes	Yes	Yes	Blank <sup>a</sup>	Yes	Blank <sup>a</sup>	Yes	Yes
d) Training programmes / workshops to educate fishers	Yes	Yes	Yes	Blank <sup>a</sup>	Yes	Yes	Yes	Yes
e) Informative videos, brochures, printed guidelines etc.	Yes	Yes	Yes	Blank <sup>a</sup>	Yes	Yes	Yes	Yes

Superscripts: a: information not available, b: only partial information available, c: likely under reporting of current situation, d: links to supporting information/documents needed, e: little international collaboration has occurred, f: data have not been compiled.

#### 1.4.6 Programme Reviews

Five countries reported that the mitigation measures are periodically reviewed and evaluated for their efficacy. Two reported a 'No' or 'Unsure' answer; one left it blank. Probably the best summary of the situation was prepared by India. The answer supplied by a non government person suggested that a 'No' answer was more correct over the large area of India's jurisdiction, although in some places a 'Yes' answer was correct. This highlights the differences that occur over

large areas and reinforces that smaller (e.g., province/state level analysis would actually provide better guidance for conservation efforts than a country-wide assessment).

Programme reviews are an important part of the mitigation measures because situations change. In-country reviews of practices and regulations facilitate and encourage changes that better conserve the fishery and reduce the by-catch. The involvement of the fishers as well as government and NGOs in the process helps to ensure that all stakeholders are represented. The involvement of other BOBLME nations and the international community in a national review can contribute to the success of improving fisheries management and marine turtle conservation.

#### 1.4.7 Research and Development

Five of the BOBLME countries reported that they collect data with a view to reducing by-catch (Table 15). Bangladesh noted that data are collected occasionally and that local people are being involved through training and workshops. India commented that along with the central government agencies, State wildlife agencies collect information. Indonesia stated that it has conducted interviews with fishermen on tuna longliners and shrimp trawls, and is experimenting with circle hooks and TEDs. Unfortunately, details are lacking in all responses. Although Bangladesh, India and Indonesia provided relevant information, details (e.g., types of data collected, research projects) and citations of supporting documents were lacking.

**Table 15. Types of data collection, research and development undertaken to support the reduction of marine turtle incidental catch.**

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
Comment	Comment	Comment	Blank <sup>a</sup>	At selected locations	DoF collects information	Blank <sup>a</sup>	Blank <sup>a</sup>

Superscripts: a: information not available, b: only partial information available, c: likely under reporting of current situation, d: links to supporting information/documents needed, e: little international collaboration has occurred, f: data have not been compiled.

#### 1.4.8 Information and Technical Exchanges

Four of the BOBLME countries reported that they exchanged some information and/or technical assistance about by-catch mitigation internationally (Table 16). Most BOBLME countries exchange information informally among researchers and at regional meetings. The NGO 'TCP' (Sri Lanka) has distributed its by-catch survey findings internationally. Citations to reports and brief summaries of the information exchanges would be helpful to all parties.

**Table 16. Formal and/or informal exchange of information and technical assistance among BOBLME countries.**

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
No	No	Yes	Blank <sup>a</sup>	Yes	Yes	Yes	Unsure

Superscripts: a: information not available, b: only partial information available, c: likely under reporting of current situation, d: links to supporting information/documents needed, e: little international collaboration has occurred, f: data have not been compiled.

#### 1.4.9 Driftnet Enforcement

Two countries provided extended comments about enforcing regulation concerning drift nets (Table 17). Bangladesh noted that drift nets are banned from restricted areas in the Sundarbans and during fish breeding seasons. India commented that the use of drift nets is not well known but their use is being investigated. India

An additional two countries reported that drift nets are not allowed under existing laws. Thailand is considering legislation to prohibit drift nets fishing but has none at present. Three countries left the answer blank. This may indicate that no legislative action has been taken or that the process of developing regulations is not complete. Three gave an indication that compliance was poor.

**Table 17. BOBLME country responses concerning support for UN general assembly moratorium on the use of large-scale drift nets (resolution 46/215).**

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
Comment	Comment	Blank	Blank	prohibited by law	Drift nets not allowed	Blank	None

#### 1.5 Identification of Turtle Uses/Values, Legislation, and Management Regimes

All BOBLME countries are dealing with the issue of use of marine turtles through legislation which prohibits both national and international trade in marine turtle products. Most countries acknowledged that traditional and cultural use of marine turtles continues at a low level and most are working to reduce the impact even more.

##### 1.5.1 Direct Harvest and Domestic Trade

All of the BOBLME countries have enacted legislation to prohibit direct harvest and domestic trade in marine turtles, their meat, eggs, parts and products (Table 18). Only a few provided

detailed descriptions of the provisions and penalties for infringement. However, traditional use of turtle meat and/or eggs occurs in most countries; Thailand may be the only exception.

India commented that marine turtles are protected species and harvest is prohibited but did not provide information on penalties. Indonesia stated that no harvest is allowed with a maximum penalty of 5 years in jail and up to RP 2 million in fines. The Maldives has a 10 year moratorium from 2006 on the taking of turtles but gave no details of the penalties. Sri Lanka and Thailand stated that it has legislation in-place to protect turtles but did not give details of penalties

**Table 18. Does your country have legislation to prohibit direct harvest and domestic trade in marine turtles, their eggs, parts and products; and to protect important turtle habitats?**

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
Yes	Comment	Comment	Yes	Yes	Yes	Yes, FFPA	Yes, WRPA

### 1.5.2 Economic Uses and Cultural Values

Six of the eight BOBLME countries reported traditional and cultural use of marine turtles (Table 19). Only Malaysia and Thailand did not. Three countries (Bangladesh, India, Indonesia) acknowledged that six or seven of the listed uses occurred within their jurisdiction. The level of use was ranked as moderate or low. Maldives, Myanmar and Sri Lanka reported that some traditional and cultural use of turtles occurs within their borders.

The consumption of meat and eggs that occurred in six countries was ranked as “low” by all but the Maldives (both ranked ‘high’). Both Indonesia and Sri Lanka reported egg consumption as ‘moderate’. The only other ‘high’ rank involved Eco-tourism programmes in the Maldives.

Interestingly, traditional and/or cultural use of turtles in Bangladesh and India was described as ‘moderate’. For the other countries this use was ranked as ‘low’ or ‘unknown’. The use of shell products, consumption of fat, and use of turtle parts in traditional medicine appears to be relatively ‘low’ throughout the region. The ‘no’ responses by Malaysia and Thailand need further explanation and/or supporting documentation. Although it may be the case, it seems improbable that there is no use of turtle meat, eggs, or other parts for food or commerce in these countries, given the near subsistence level of living by many people.

**Table 19. Economic uses and cultural values of marine turtles in BOBLME countries?**

	Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
Meat	Yes, Low	Yes, Low	Yes, Low	No	Yes, High	Yes,	Yes, Low	No

consumption						Unknown		
Egg consumption	Yes, Moderate	Yes, Low	Yes, Moderate	No	Yes, High	Yes, Low	Yes, Moderate	No
Shell products	Yes, Low	Yes, Low	Yes, Low	No	No Unknown	Yes, Low	No	No
Fat consumption	Yes, Low	Yes, Low	No	No	No Unknown	No	No	No
Traditional medicine	Yes, Low	Yes, Low	Yes, Unknown	No	No Unknown	No	No	No
Eco-tourism programmes	Yes, Moderate	Yes, Low	Yes, Low	No	Yes, High	Yes, Moderate	Yes, Moderate	No
Cultural / traditional significance	Yes, Moderate	Yes, Moderate	Yes, Low	No	Unknown	Yes, Low	No, Unknown	No, but eggs are collected
Other (list and rank)	Blank	Blank	Blank	No	Export prohibited	Blank	Major threats ID	Blank

### 1.5.3 Relative Level and Impact of Traditional Harvest on Marine Turtles and Their Eggs.

The reported level of harvest and the perceived impact of the harvest were typically ranked as 'low' (most countries) or 'moderate' (Indonesia) (Table 20). In contrast, the Maldives reported 'high' levels of harvest and a 'high' level of impact. Both Malaysia and Sri Lanka acknowledged that the level of harvest and perceived impact vary with location. All of these assessments need to be checked against field data in each region of each country to accurately determine the level of harvest. Doing a field assessment to determine the distribution and level of harvest will likely lead to ideas of how the harvest can be managed and how the reliance on the harvest by local people might be redirected to other, sustainable sources of food and/or income.

Table 20. The relative level and perceived impact of traditional harvest on marine turtles and their eggs.

	Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
Level of harvest:	Low	Low	Moderate	Varies with local	High	Low	Unknown varies with local	None
Impact of harvest:	Low	None	Moderate	Varies with local	High	Unknown		None

### 1.5.4 Management Regimes

Domestic management programmes directed at reducing the harvest have been established in six of the eight BOBLME countries (Table 21). The exceptions are Bangladesh and Thailand. Indonesia reported efforts to phase out harvesting, reduce retail sales, and shift egg harvest

concessionaires to alternative income sources, which are admirable goals. Unfortunately details were not provided to document the methods used to achieve the goals. The Maldives has a total harvest ban in place on 13 islands where nesting occurs for 10 years. In addition to trying to reduce the harvest of marine turtles through management practices, Myanmar has an educational programme that is directed at reducing the harvest. The comments by India and Indonesia indicate that both countries are attempting to reduce harvest by dealing with local and national level trade and by attempting to find alternative sources of income for people involved in the trade of turtle products. Documentation of these programmes would be useful to other BOBLME countries.

All responses would have been improved with reference to supporting documents.

**Table 21. Domestic management programmes established to limit the levels of intentional harvest?**

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
No	Yes, comment	Yes, comment	Yes, some	Yes, total ban 13 islands	Yes, Ed Program	Working with BOBLME	Unknown

### 1.5.5 Management Agreements

None of the BOBLME countries have management agreements with other concerned States (Table 22). Malaysia stated that it is involved with international agreements (CITES and CBD) and Sri Lanka said that it is working with BOBLME to lower the levels of traditional harvest of marine turtles. The other countries acknowledged that formal agreements are lacking in the BOBLME area. Because marine turtle populations extend beyond the boundaries of nations, communication and, where appropriate, cooperation concerning enforcement of regulations across boundaries would benefit the turtle populations.

**Table 22. Management agreements in place to control levels of traditional harvest, and to ensure that such harvest does not undermine conservation efforts.**

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
None	No	No	CITES, CBD	NA	No	Working with BOBLME	Blank

## 1.6 Development of Nesting Beach Management Programmes

All BOBLME countries have programmes designed to minimize or reduce mortality of eggs, hatchlings, and nesting females that are reviewed at least intermittently. Although some detailed information and a few examples are given in the Country Reports, most details of the programs (goals, measurable outcomes, application of results) have not been supplied to IOSEA.

### 1.6.1 Nesting Beach Management

All BOBLME States are using a suite of measures to minimize or reduce the mortality of eggs, hatchlings and nesting females (Table 23). Malaysia and Sri Lanka presented the least amount of information, although it is likely that more measures are employed at local levels to improve the national conservation effort than are reported in the Country Reports. Although many of the problems faced by the BOBLME countries are similar, it is clear from the assembled information that each country faces its own set of issues and has not used the same methods to manage their nesting beaches. For example, re-vegetation of frontal dunes is not deemed as a necessary measure in four countries.

In contrast, building location/design regulations are not in place in India and Thailand, although restrictions on light pollution of the beach are used in India but not Thailand. It appears that the BOBLME countries have a lot of information and experience to share and would benefit from sharing their experiences in beach management.

Monitoring programmes are used by all countries, as are education and awareness programmes and egg relocation/hatcheries. However, the effectiveness of the programmes is variable ('Unknown' to 'Excellent' ratings given in self-assessment). Unfortunately, no country provided supporting reports or other materials that document their assessment. Although the programmes may be effective, the question of 'How was the effectiveness determined?' must be answered. This question is notoriously difficult to answer in education programmes where a change in behavior is the desired outcome and easy to answer in situations where the desired outcome is, for example, more dune vegetation or no vehicle tracks on the dune.

There are two positive outcomes that are easily seen in this table. First, most BOBLME countries are actively involved in trying to minimize the mortality of eggs, hatchlings, and nesting females and the second, is that they recognize that there is room for improvement ('Good' rather than 'Excellent' ratings). This indicates that the efforts will continue. It would be best if goals and measurable outcomes were identified for each category examined to ensure that the manpower and financial support are achieving the goals.

Table 23. Measures designed to minimise the mortality of eggs, hatchlings, and nesting females and the estimated relative effectiveness of these measures.

	Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
Monitoring/protection programmes	Yes, Good	Yes, Excellent	Yes, Good	Yes, Unknown	Yes, Unknown	Yes, Low	Yes, Unknown	Yes, Good
Education/awareness programmes	Yes, Good	Yes, Good	Yes, Good	Yes, Low	Yes, Low	Yes, Good	Yes, Unknown	Yes, Low
Egg relocation/hatcheries	Yes, Good	Yes, Good	Yes, Good	Yes, Low	Yes, Good	Yes, Good	Yes, Low	Yes, Good
Predator control	Yes, low	Yes, low	Yes, Good	Unknown	NA	Yes, Good	Unknown	Yes, Good
Vehicle / access restrictions	Yes, Good	Yes, Good	Yes, Good	Unknown	NA	NA	Unknown	No
Removal of debris / clean-up	Yes, low	Yes, Good	Yes, Good	Unknown	NA	Yes, Low	Unknown	Yes, Good
Re-vegetation of frontal dunes	Yes, Good	No	Yes, Low	Unknown	NA	NA	Unknown	No
Building location/design regulations	Yes, Excellent	No	Yes, Good	Unknown	Yes, Good	Yes	Unknown	No
Light pollution reduction	Yes, Low	Yes, Good	Yes, Good	Unknown	Yes, Good	NA	Unknown	No

### 1.6.2 Programme Reviews

The intermittent review of the goals and outcomes of any conservation programme is essential to determine if the programme is achieving long-term objectives. Seven of the eight countries indicated that they have recently or are currently involved in a review of their beach conservation efforts (Table 24).

Table 24. Recent evaluation of nest and beach management programmes to minimise the mortality of eggs, hatchlings and nesting females.

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
Yes, not wide spread	Yes	Yes, comment	No	Yes, in progress	Yes, conservation areas only	Yes, Gov & NGOs	Yes, 7 refs listed

In addition, the involvement of both Government agencies and NGOs in the evaluation of programmes is much better than either one evaluating itself. Only Thailand provided documentation (cited seven papers) to support the review process and/or the conclusions of their review. This is an area in which the BOBLME countries could help each other to develop, administer, and evaluate conservation programmes. All countries would benefit from the interaction.

## OBJECTIVE II: PROTECTING, CONSERVING, AND REHABILITATING MARINE TURTLE HABITATS

General tendency: Good Progress; average 2.6

Notable responses: Bangladesh, India, Indonesia, Sri Lanka

BOBLME countries have identified critical habitats within and outside established protected areas. Most countries state that the national legislation provides protection for marine turtles within their national jurisdiction. Unfortunately, enforcement and monitoring are not wide-spread. Several BOBLME nations have habitat rehabilitation programmes in place; others do not. The function of mangrove, coral, and seagrass habitats as nursery habitat supporting fisheries, as well as marine turtles, has not been well publicized. Additional efforts need to be made to help fishers understand that good habitat management not only helps turtles but also helps their industry.

Table 25. Summary of efforts to protect, conserve, and rehabilitate marine turtle habitats.

Programme	Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
2.1 Habitat protection outside established protected areas	3	4	4	0 <sup>a</sup>	1 <sup>b</sup>	3	4	3
2.2 Degraded habitats rehabilitated	3	3	3	0 <sup>a</sup>	2	2	3	3

Superscripts: a: information not available, b: only partial information available, c: likely under reporting of current situation, d: links to supporting information/documents needed, e: little international collaboration has occurred, f: data have not been compiled.

### 2.1 Measures to Protect and Conserve Marine Turtle Habitats

Protecting and conserving marine turtle habitat benefits not only the turtles but the other organisms that share the seagrass, mangrove and coral reef habitats. In addition, protecting habitat helps to keep commercial fish populations healthy by providing habitat for spawning and juvenile growth of many species. It appears that many of the BOBLME countries have active programmes or have had programmes to protect habitats used by marine turtles, however, detailed information concerning these projects is lacking.

#### 2.1.1 Establishment of Habitat Protection/Conservation Measures Outside Established Protected Areas.

Bangladesh, India, Indonesia, and Sri Lanka provided detailed comments concerning their activities to protect habitat outside established protected areas (Table 26A). Efforts include identifying nesting and foraging areas, beach clean-up by locals and NGOs, cash incentive programmes, and education programmes.

#### 2.1.2 Are Assessments Routinely Made of the Environmental Impact of Marine and Coastal Development on Marine Turtles and Their Habitat?

Only four countries routinely assess the environmental impact of marine and coastal development on marine turtles and their habitat (Table 26B). Sri Lanka has some research

underway. Indonesia responded 'No' to the question but stated that the issue is covered under their Environmental Impact Assessment legislation. There is good evidence from elsewhere in the world of the impact(s) of development on nesting and foraging marine turtle populations. In addition, there are many examples of how the impacts of coastal development can be mitigated. An on-line search would provide ideas and methods that might be applied locally and regionally.

### 2.1.3 Is Marine Water Quality (Including Marine Debris) Monitored Near Turtle Habitats?

Five countries responded that limited monitoring of water quality was conducted (Table 26C). Bangladesh reported limited monitoring and India stated that as part of a pilot project to monitor water quality near turtle habitat in West Bengal but follow-on of the pilot to other areas was not reported. Myanmar and Sri Lanka reported limited monitoring. Thailand did not elaborate on its answer. It is clear that assessment and monitoring of water quality is not seen as a major issue in most countries.

### 2.1.4 Are Measures in Place to Prohibit the Use of Poisonous Chemicals and Explosives?

Five BOBLME countries prohibit the use of poisonous chemicals and explosives for fishing (Table 26D). However, they typically acknowledge that enforcement is poor due to limited manpower and resources.

Table 26. Details of efforts to protect, conserve, and rehabilitate marine turtle habitats.

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
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#### A 2.1 Establishment of habitat protection/conservation measures outside established protected areas

Comment	Comment	Comment	No	No, but 25 protected areas	Education programmes & laws	Comment	Blank
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#### B 2.1.2 Are assessments routinely made of the environmental impact of marine and coastal development on marine turtles and their habitat?

No, Some in past	Yes, EIA required	No, covered under EIA	No information	No	No	Yes, comment	Yes
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#### C 2.1.3 Is marine water quality (including marine debris) monitored near turtle habitats?

Yes, Limited	Yes, but no project	No	No information	No	Limited	Yes, limited	Yes
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#### D 2.1.4 Are measures in place to prohibit the use of poisonous chemicals and explosives?

No, not yet	Use is prohibited	Use is prohibited	No information	Yes	Use is prohibited	Use is prohibited	Blank
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## 2.2 Rehabilitation of Degraded Habitats

In general, the BOBLME countries are involved in mapping the near-shore and off-shore areas, revising regulations, development of recovery plans, reduction of specific threats, and conduct of education and awareness activities directed at protecting these habitats with a view of controlling and improving the fishing industry. The improvement/restoration of degraded habitats will benefit both fisheries and marine turtles. Given the level of experience that these countries have in recovery and restoration of marine habitats, the sharing of information at national and international meetings and workshops would benefit all.

Bangladesh, India, Indonesia, Maldives, Sri Lanka, and Thailand reported that they have active programmes involved in monitoring and restoring coral reefs, mangroves and seagrass habitats (Table 27). However, most of these are of limited scale.

Table 27. Efforts being made to restore and recover degraded coral reefs, mangrove and seagrass habitats.

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
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A 2.2.1 Are efforts being made to recover degraded coral reefs? If yes, give details (location, duration, effectiveness, lessons learned, future plans etc).

Yes, limited area, 2	Yes, comment	Comment	Unknown	Yes	No	Yes, active projects	Yes
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B 2.2.2 Are efforts being made to recover degraded mangrove habitats that are important for turtles?

Yes, limited area	Yes, comment	No	Unknown	No	Yes	Yes, active projects	Yes
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If yes, give details (location, duration, effectiveness, lessons learned, future plans etc.)

Only 2 sites	Comment					Several locations	
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C 2.2.3 Are efforts being made to recover degraded sea grass habitats? If yes, give details (location, duration, effectiveness, lessons learned, future plans etc.).

Yes, link to report	Yes, comment	No	Unknown	No	No	No projects	Yes
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India provided comments on all three questions. The waters around Orissa have been declared no fishing zones during the turtle nesting season. Development on-shore and off-shore are required to conduct EIA studies and have environmental management plans approved before proceeding. A one year study was carried out to assess water quality in West Bengal. Indonesia

outlined several projects (beach clean-up, habitat protection, ecotourism, cash incentives for local beach guards) focused on critical habitat outside protected areas. Sri Lanka noted several projects including training local people in conservation techniques and training wildlife officials to ensure adequate protection. Other countries also commented about conserving coral reef but made fewer comments about mangroves and seagrass areas. It is unclear whether most of these various programmes are completed or are on-going, and whether the information obtained has actually been used to improve water quality.

The use of Geographic Information system (GIS) mapping of the marine habitat, as is occurring in each country, will benefit all countries in the BOBLME region. Information on the distribution and delineation of marine habitats is important for managing the resources because the habitats and the location(s) of impacting / threatening processes (e.g., dredging, shipping channels, fishing areas) can be represented on a map which is easily understood. Identification of areas of important habitat for turtles and fisheries within countries and shared between countries allows management decisions and efforts to be focused where the greatest needs occur and to be coordinated across borders.

## OBJECTIVE III: IMPROVING UNDERSTANDING OF MARINE TURTLE ECOLOGY AND POPULATIONS

**General tendency:** Very Good Progress; average 3.6

**Notable responses:** Bangladesh, India, Indonesia, Malaysia, Maldives, Myanmar, Sri Lanka, Thailand

All BOBLME countries have contributed to the improvement of the understanding of marine turtle ecology and populations in the region (Table 28). The growing body of regional biological information is well linked to the international information base and is of high quality. The majority of nesting sites are known and many foraging areas have been identified. A few long term projects are providing data that will enhance understanding of population trends in the region. Many projects are collaborative with local, regional and international universities and organisations. Unfortunately, the information is not always being used to guide management decisions. In addition, issues of standardization of methods and data collection need to be addressed at national and regional levels so that the results of the studies can be compared more easily.

Table 28. Summary of efforts to improve understanding of marine turtle ecology and populations.

Programme	Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
3.1 Basic species and habitat related studies conducted	5	5	4	5	3	4	4	5
3.2 Collaborative research and monitoring conducted	4	4	4	2.5 <sup>a, e</sup>	2 <sup>a</sup>	4	4	4
3.3 Research results applied; management priorities identified	3	3	4	3	3	3	4	4
3.4 Data collection standardized / information exchanged	4	4	4	3	2 <sup>f</sup>	3	3	3

Superscripts: a: information not available, b: only partial information available, c: likely under reporting of current situation, d: links to supporting information/documents needed, e: little international collaboration has occurred, f: data have not been compiled.

### 3.1 Targeted Marine Turtle and Habitat Studies

The majority of nesting sites have been located and many foraging areas have been defined. Nesting beaches have been identified by geographic coordinates, defined by species, and categorized by number of nesting females (see IOSEA Site database online). Numerous publications have resulted from local, national, and international efforts, many of which have been collaborative. The application of the results to management decision making is occurring to varying degrees throughout the region.

### 3.1.1 Published Literature

Each of the Country Reports provides a list of publications that are relevant to that country (Table 29). The literature cited by the various countries includes reports and proceedings of workshops, as well as many publications in peer-reviewed journals and books. Many of the lists are quite extensive (e.g., India, Indonesia, Malaysia). However, none are exhaustive. For example, more than 60 papers have been published concerning marine turtles in Sri Lanka, yet the Country Report lists only five with an additional reference to the publications by the Turtle Conservation Project (TCP). Other countries have also under reported the amount of research that has been conducted on turtles within their jurisdiction.

Table 29. Number of citations provided by the BOBLME countries in their Country Reports.

COUNTRY	Number of citations	Years Spanned
Bangladesh	10	1982-2005
India	63	1953-2005
Indonesia	20	1982-2006
Malaysia	29	1975-2005
Maldives	5	1984-2006
Myanmar	9	1911-2007
Sri Lanka	5	1997-2002
Thailand	14	1981-2006

The publications cited by the BOBLME countries indicate active research programmes are in place. When viewing the number of publications it should be remembered that not every country needs to address every research question and that the BOBLME countries have access to publications from around the world upon which they can develop research and management programmes. The in-country research (as indicated by the publications) provides new data about the species and allows connections to the literature published elsewhere.

From an international point of view, four books should be part of any marine turtle conservation/management library. They provide chapters on many aspects of marine turtle biology and ecology, as well as human interactions with turtles (Lutz and Musick, 1997, Lutz et al., 2003, Plotkin, 2007, Bolten and Witherington, 2003). In addition, the book *Marine Turtles of the Indian Sub-continent: status, threats and conservation* (K. Shanker and B.C. Choudhury, 2006) provides chapters that deal with marine turtles in three of the BOBLME countries (Bangladesh, Sri Lanka and India (state by state)) and additional access to the regional literature. Together these works provide a wealth of resource information for conservation/management in the region and citations that link to the international literature.

The IOSEA has amassed over 1400 citations to publications that deal with issues relevant to the BOBLME and greater Indian Ocean area. Many of the citations are supported by PDF copies that can be accessed through the IOSEA Bibliography. BOBLME countries are encouraged to provide the IOSEA Secretariat with copies of reports and other documents pertaining to the conservation and management of marine turtles within their jurisdiction.

### 3.1.2 Long-term Monitoring

Long-term monitoring programmes are necessary to define some population parameters that are useful in managing marine turtle stocks. Bangladesh, Indonesia, and Sri Lanka have programmes that have been running 10 years or longer. Several programmes in other countries were started in the last 5 years. All BOBLME countries report having longer term studies in place at specific sites (Table 30). Indonesia noted that it has several long-term projects in progress dealing with such issues as DNA, temperature-dependent sex determination and socio-cultural/economic investment. Myanmar commented that they have developed a 30-year fisheries plan that includes protection of turtle nesting beaches and cooperation/collaboration to implement management.

No country monitors all nesting sites, nor should every site be monitored at the same intensity. Having a few, representative sites can provide the data necessary for general management. When specific issues need to be addressed, the world-wide literature, as well as the regional literature, can be quickly reviewed for possible solutions and study methods. What this does require is knowledge of the distribution of nesting habitats (for example, through the IOSEA Site Database) and foraging habitats, as well as some knowledge of the demography of the population. The BOBLME countries should contribute information on marine turtle habitats through the IOSEA Site Database which captures information on location, the species present, and the pattern of data collection.

Table 30. Long-term Monitoring Programmes

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
RPTs on a web site	Yes, list	Yes, comment	Yes, at specific sites	Yes	Yes, comment	Yes, several	Yes, one site

### 3.1.3 Genetic Studies

Knowledge of the genetic linkages among nesting populations and among foraging area populations is important to the management of marine turtle stocks. The Maldives and Bangladesh are the only two countries that reported not having at least a partial genetic library for the nesting sites in their countries. Indonesia, India, Malaysia, Myanmar, and Thailand have carried out or have contributed samples to identifying the genetic populations in the region (Table 31). India noted that genetic studies have not been completed. Indonesia commented that they contributed to a large scale genetics study of green turtles in the southeastern Asian region that has been published. Malaysia said they have some projects on-going but not for all species. Myanmar stated that they have a cooperative (with SEAFDEC-MFRDMD) program nearing completion on the genetics of green turtles and one starting for hawksbill turtles. Sri Lanka has started an analysis of leatherback genetic associations.

**Table 31. Studies of Marine Turtle Genetics**

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
No	Yes, comment	Yes, comment	Yes, not complete	No	Yes, comment	None complete, Leatherback started	Yes, several sites

Although major genetic groupings have been identified, many questions remain to be answered, particularly concerning the linkages among nesting and foraging sites in the BOBLME region. This information is essential for reducing the threats to the populations through development of multilateral fishing regulations within the region. Marine turtle populations nesting and foraging in Bangladesh and the Maldives need to be characterized in the context of the known linkages in the BOBLME area. In addition detailed information about the studies, such as details of start dates, completion dates, titles of reports and publications, and the cooperating parties, should be included in the Country Reports

### 3.1.4 Identify Migration Routes

#### Tagging Studies

Marine turtles have been tagged in every BOBLME country (Table 32). However, the numbers are relatively small because the number of nesting studies in the BOBLME area is small compared to the number of known nesting beaches. Most countries provided notes about their tagging program including such information as location, type of tag, and, in some cases, the numbers of turtles tagged. Tagging studies are providing good information about the nesting turtles, such as the inter-nesting interval, number of clutches produced, and the number of eggs laid. This work should continue as part of monitoring for possible changes in the populations. With subsequent return to tags, foraging areas, and points along the migration routes will be identified.

#### Satellite Tracking Studies

Some turtles have been tracked via satellite in the region and provide an indication of the movements (Table 32), but the national reports do not give a complete picture of the work that has already been done, particularly in India and Thailand. Unfortunately, too few turtles have been tracked to support generalizations about migration routes and the location of foraging areas. Bangladesh, Myanmar, and Thailand provided extensive comments about their activities and some data. However, additional information and citations of published scientific papers and reports would help readers of the Country Reports to understand the situation. The inclusion of maps showing the pathways taken by the satellite-tracked turtles would contribute to the understanding of the areas that are important to the turtles. The maps could be up-dated as new pathways are defined.

The online IOSEA Satellite Tracking Metadatabase includes a basic template to capture metadata about the species tracked, location, year, and type of transmitter. Although several publications have resulted from the international and national cooperation that has occurred in

support of satellite tracking, there is a need for continued satellite tracking work and for the results to be shared among the BOBLME nations.

**Table 32. Methods used to identify migration routes of turtles**

	Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
a) Tagging	Yes, extensive notes	Yes	Yes	Yes, not complete	Yes	Yes	Yes	Yes, inconel & microchips
b) Satellite tracking	No	Yes	Yes	Yes, not complete	Yes	Yes	Yes	Yes, PTTs greens
Other	Blank	Yes	Blank	Blank	Blank	Blank	Blank	Blank

### 3.1.5 Population Dynamics and Survival Rate Studies

Studies of marine turtle population dynamics and/or survival rates are difficult because they require long-term manpower and financial support. The information available for the BOBLME area is growing and most countries have at least one long-term project (Table 33). India stated that it has conducted several studies on olive ridley turtles in the vicinity of Orissa. Indonesia noted that several types of data are being collected to better define the populations and how they change. Sri Lanka and Malaysia are conducting detailed studies at selected sites. The importance of these studies will increase with time. Sharing the results will help other BOBLME countries focus their resources better as well.

**Table 33. Population dynamics and survival rate studies**

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
No	Yes, comment	Yes, comment	Yes, at specific sites	No	Yes, questionnaires	Yes, Selected sites	Unsure, older records

### 3.1.6 Disease Studies

Only two BOBLME countries report having information on the diseases of marine turtle in their areas (Table 34). Indonesia has contributed the greatest amount of information based on studies done at the Bali slaughter houses between 1993 and 1995. This work indicated that turtles exhibit a wide range of pathological conditions, including some that can debilitate the turtle and increase mortality. Thailand noted that some work has been done on captive green turtles.

All nesting projects can collect data on fibropapillomas by specifically looking at each nesting turtle and recording the presence or absence (location, size) on the data sheet. It is important to note that the turtle was examined and to record what was found, especially if the result is absence. If a turtle is subsequently found with fibropapillomas, or if the frequency of occurrence in the population increases, the records provide evidence that conditions are changing and, as a result, research efforts can be focused on determining the causal conditions.

**Table 34. Studies on diseases of marine turtles in BOBLME countries.**

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
No	Unsure	Yes, comment	Unsure	No	No	No	Yes, some

### 3.1.7 Traditional Knowledge

Half of the BOBLME countries report that traditional ecological knowledge has been collected and/or is used in research studies (Table 35). Some of the information was gathered during interviews; other information was gathered indirectly. Bangladesh, India, and Sri Lanka are among those providing brief examples.

Bangladesh commented that traditional knowledge is used in ecotourism talks and walks. India noted that researchers have used traditional capture methods to gather turtles for research. Sri Lanka has collected some traditional information and used it to identify nesting locations and seasons.

**Table 35. Traditional ecological knowledge is used in research**

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
Yes	Yes	Blank	Unsure	Yes	No	Yes, ID species, nesting locations	No

Collecting traditional information is more than a casual exercise; traditional and local people have their own perspective about marine turtles and do have knowledge of turtle habits and habitats. The exchange of information can facilitate communication and cooperation between local people and researchers, as well as supporting integrated management.

### 3.2 Collaborative Research and Monitoring

Because the Bay of Bengal is ecologically, socially, and economically complex, many international, regional and sub-regional organizations operate in the region. Through a cooperative network of government agencies and NGOs, the BOBLME countries can achieve balanced conservation management of the shared resources in the area and protect the species and their habitats that are at risk.

#### 3.2.1 Regional or Sub-regional Action Plans

The resources of the BOBLME are shared; so too many of the environmental problems are shared. Many of the solutions will also be shared. All BOBLME countries have involvement with regional or sub-regional programmes and action plans that identify priority research and monitoring needs, most of which focus on fisheries (Table 36).

The countries that border the BOBLME can cooperate through (or at least base their inter-organisation structures on) organizations such as the Association of South East Asian Nations (ASEAN), the South Asian Association for Regional Co-operation (SAARC), the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), the South Asian Co-operative Environment Programme (SACEP), the UNEP Regional Coordinating Unit for East Asian Seas, and the Indian Ocean Marine Affairs Co-operation (IOMAC).

An important area of existing regional cooperation is fisheries. Because the resources are shared and harvested at local, national, regional, and international levels, coordinated management is necessary to conserve the resources and sustain the harvest and its benefits. Fisheries organizations that operate in the region include the Indian Ocean Fisheries Commission (IOFC), the Indian Ocean Tuna Commission (IOTC), the International Forum for the Indian Ocean (IFIOR), the Indian Ocean Rim Initiative, the Asia-Pacific Fishery Commission (APFIC), and the Network of Aquaculture Centres for Asia (NACA). The Bay of Bengal Program (BOBP) is an FAO initiative; Myanmar is the only country that does not participate in the BOBP.

Table 36. List of regional or sub-regional action plans

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
Yes SACEP's Marine Conservation and Protected Areas programme	Yes, bilateral arrangements with Bangladesh, Pakistan, Sri Lanka	Yes, ASEAN MoU, IOSEA CMP, SSME	working with BOBLME	IOSEA	Yes, comment SEAFDEC and the SEASTAR 2000	Review of priorities underway	Yes, SEASTAR, SEAFDEC

### 3.2.2 Collaborative Studies and Monitoring

International collaborative studies help local and regional projects link to regional and larger scales of information. This level of cooperation is especially important to the understanding of genetic linkages among nesting sites and foraging areas. At least three BOBLME countries have cooperated in linking marine turtles within their jurisdictions to the larger regional populations (Table 37). Similarly, five countries have been involved in migration studies with neighbors and other international research teams. Few countries collaborate at the international level on conservation and ecological issues, such as the habitat assessment occurring in Sri Lanka. This does not mean that the research projects in the BOBLME countries are working in isolation. They have access to the international literature and have regular communication with researchers from around the world. It must be remembered that a 'No' answer in the section indicates the lack of international collaborative studies. It does not mean that studies have not been conducted at the national level or that advice has not been sought from international sources.

Indonesia noted that it has had several international collaborators on genetic and migration studies but none occurred in the BOBLME area. Indonesia and Myanmar provided extensive comments about their activities with international collaborators.

Table 37. Themes of international collaborative studies in the BOBLME area.

	Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
a) Genetic identity	No	No	Yes, comment	Blank <sup>a</sup>	No	Yes, comment	Blank	Yes
b) Conservation status	No	No	Blank	Blank <sup>a</sup>	No	No	Workshop	Yes
c) Migrations	No	Yes, comment	Yes, comment	Blank <sup>a</sup>	No	Yes, comment	yes	Yes
d) Other biological and ecological aspects	Blank	Yes	Blank	Blank	No	Blank	Habitat assessment	Yes, several

Superscripts: a: information not available, b: only partial information available, c: likely under reporting of current situation, d: links to supporting information/documents needed, e: little international collaboration has occurred, f: data have not been compiled.

### 3.3 Analysis and Use of Data to Improve Conservation Practices

Identifying the priorities for conservation action is a difficult process because much information is needed before decisions can be made. Unfortunately the threats to species often require that decisions be made on less than perfect datasets. Sharing information among the BOBLME nations would assist each nation in its prioritization of issues impacting the conservation of marine turtles. Although the use of existing documents (MTSG 1995, 1996, 2001) can complement

IOSEA's framework for regional development of priorities for marine turtle conservation, the use of local and regional data is essential for prioritizing research projects.

### 3.3.1 Priority Marine Turtle Populations

The ranking of marine turtle populations in the BOBLME area reflects both the distribution of nesting by the species and the threats they face in the area. Most countries were able to rank the species but did not comment on their general population status (Table 38a). However, Myanmar reported being in the process of analyzing the data on their populations and the Maldives noted that green turtle population of the atoll nation is in decline. Sri Lanka was the only country to rank all five species of marine turtles. This reflects the distribution and occurrence of nesting by loggerhead turtles because few or no loggerhead turtles nest in the majority of BOBLME countries.

Six countries ranked green turtles, hawksbill turtles, and olive ridley turtles as being the highest in conservation need (Table 38b). Only Malaysia ranked the leatherback turtle as being in the highest category. No country ranked the loggerhead as the highest category; Sri Lanka ranked it as

3.

Table 38. Priority ranking of marine turtle populations requiring conservation action in BOBLME countries.

#### A. Species ranked by country

	Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
Green turtles	2	4	1	3	1, declining		4	3
Hawksbill turtles	1	3		4			1	2
Olive ridley	3	1		2			5	1
Leatherback turtles		2	2	1			2	
Loggerhead turtles							3	

#### B. Country ranking of species\*

Rank	1	2	3	4	5
Green turtles	Indonesia, Maldives	Bangladesh	Malaysia, Thailand.	India, Sri Lanka	
Hawksbill turtles	Bangladesh, Sri Lanka	Thailand	India,	Malaysia	
Olive ridley	India, Thailand	Malaysia	Bangladesh		Sri Lanka
Leatherback turtles	Malaysia	India, Indonesia, Sri Lanka			
Loggerhead turtles			Sri Lanka		

\*All countries did not rank all species because all species do not occur in all countries.

### 3.3.2 & 3.3.3 Review and Practical Application of Research and Monitoring

Half of the BOBLME countries review research and monitoring results periodically (Table 39), usually this is done within the projects. In contrast, all BOBLME countries reported that the results of research and monitoring contribute to conservation decision making, management practices, and mitigation of threats.

Most countries provided short comments that provided some detail concerning how results were incorporated into decision making, management practices, and/or mitigation of threats. India has off-shore and nesting monitoring projects at Orissa. However, only Indonesia and Thailand provided exemplary comments to explain how reviews improve research and monitoring programmes. Indonesia has used its research and monitoring results in developing a national turtle conservation management programme. Indonesia also noted that more needs to be done to encourage field workers to use and to apply available results.

All research and monitoring programmes should have documented goals and methods so that the results can be evaluated. This also facilitates sharing information, skills, and outcomes among projects.

**Table 39. Review and Practical Application of Research and Monitoring Results**

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
No	No	Yes, annually	Unsure	Unsure	Yes	Yes, usually within projects	Yes, annual review
Yes, not extensive area	Yes, comment	Yes, comment	Stopped leatherback decline at Terengganu	Feed into decision making	Yes	Yes	Yes, but information is lacking

### 3.4 Standardisation of Data Collection and Exchange of Information

Standardization of methods used to collect and analyze data, and the exchange of information among governments and NGOs is essential to developing a coordinated regional management program for marine turtles.

#### 3.4.1 Standardisation of Data Collection

Five BOBLME countries have taken steps to standardize methods of data collection (Table 40), one is planning to standardize, and two are unsure of the situation. Thailand noted that difficulties occur when trying to standardize methods and data collection, but these can be overcome. India, Indonesia, and Myanmar provided additional comments. India noted that GOI-UNDP sea turtle project has published three methods manuals that are available on-line (Shanker et al., 2003a, b, c)

Indonesia has standardized the computer database used by field workers. Thailand reported that data are collected on standardized datasheets within projects but that no national standardization has been initiated. Other countries are likely to be considering standardizing methods but did not make comments.

**Table 40. Initiatives (nationally or through collaboration with other Range States) to standardize methods and levels of data collection.**

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
No, use published methods	Yes, comment	Yes, comment	Unsure	Unsure	Yes	No, but planned	Yes, but difficulties occur

### 3.4.2 & 3.4.3 Scientific and Technical Exchanges

Scientific and technical exchanges occur ‘occasionally’ among the BOBLME countries and with the larger scientific community (Table 41). Improved sharing of information and expertise would help all countries. This could be facilitated through the IOSEA on-line reporting system and bibliography resource.

Commonly, information exchanged is through publications (scientific and technical reports, websites, brochures, newsletters, etc). Regional and international meetings, workshops and training courses are also used to share information. However, the success of exchanges occurs more on the level of personal development than on the country level. Ideally, personal development contributes to the project level and, eventually, the country level of research and conservation action, but this takes time. All BOBLME countries would benefit by sharing information on what methods have worked and which have been less effective. Reporting could also be improved. The IOSEA Bibliography Resource can assist with the centralization of information and ease its dissemination. All that is required is that BOBLME countries contribute reports and other information to the IOSEA Secretariat.

**Table 41. Exchange of scientific and technical information and expertise with other Range States.**

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
Occasionally	Occasionally	Rarely	Occasionally	Unsure; no summary report available	Occasionally	Occasionally	Occasionally
Yes, through workshops & publications	Yes, comment	None	Symposia, Papers	NA	Somewhat	BOBLME	Yes, seminars, Papers, Meetings

### 3.4.4 Compile and Make Available to Other Countries Data on Marine Turtle Populations of a Regional Interest.

There is very little sharing of information or data on marine turtle populations of a regional interest among the BOBLME countries (Table 42). Most reported that they were 'unsure' of the situation. However, as indicated by a few, exchanges of information can occur 'upon request'. This general situation needs to be addressed in order that efforts to develop national and regional mapping systems and exchange of scientific information (e.g., tag returns, foraging areas) can be facilitated. The IOSEA on-line system is available to accept information and facilitate exchange among interested parties.

**Table 42. Information exchange among BOBLME countries**

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
No	Future collaboration	No	Unsure	Unsure	Yes, Incomplete	Unsure	Yes, on request

## OBJECTIVE IV: INCREASING PUBLIC AWARENESS AND ENHANCING PUBLIC PARTICIPATION

General tendency: Very Good Progress; Average 3

Notable responses: Bangladesh, India, Indonesia, Sri Lanka

For conservation and management efforts to be effective, local people who are likely to be impacted by changes in laws must be informed and be part of the process of deciding what must be done. Identifying the problems/issues and how best to address them are important steps in developing education programmes. To be effective, education and awareness programs must have the support and participation of the communities in which they function. The BOBLME states have improved their local participation and public awareness programmes (Table 43).

Table 43. Summary of efforts to increase public awareness and participation

Programme	Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
4.1 Education, information programmes implemented	5	5	4	2.5 <sup>a, c</sup>	3	4	5	4
4.2 Alternative livelihood opportunities developed	4	4	3	0 <sup>a</sup>	2	1 <sup>c</sup>	1 <sup>c</sup>	1 <sup>c</sup>
4.3 Public / private sector involvement encouraged	4	4	4	0 <sup>a</sup>	2.5 <sup>c</sup>	2	3	3

Superscripts: a: information not available, b: only partial information available, c: likely under reporting of current situation, d: links to supporting information/documents needed, e: little international collaboration has occurred, f: data have not been compiled.

### 4.1 Establishment of education and information programmes

Education programmes should have goals, methods, and measurable outcomes identified before being imposed on a target audience. Without these components, educational programmes may well seem to succeed but in reality there is no way of assessing them.

#### 4.1.1 Education and Awareness materials

All BOBLME countries have developed and used an array of educational materials (Table 44). Some countries have been more active than others. India, Indonesia, Myanmar, and Sri Lanka have been particularly active in developing educational materials. Malaysia and Thailand appear to be less active in producing educational materials, although this may simply be a case of under reporting. By adopting a practice of communication among the BOBLME countries, existing materials (or their ideas) might be modified for use in other countries. This may be particularly relevant in the case of costly undertakings, such as videos, which might have wider application. IOSEA can assist in this matter, if countries are willing to share information and provide copies of materials to the IOSEA Secretariat.

Table 44. Educational materials, including mass media information programmes developed and/or disseminated.

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
Comment	14 in list	Comment	Some to tourists, fishermen	Island based	Comment	Gov & NGO, Good comment	General materials & presentations to schools etc.

#### 4.1.2 Target Groups

Educational materials have been developed to target various groups: local/fishing communities, tourists, the media teachers, and students (Table 45). Other potential target groups have received some attention. Although some attention has been given to the fishing community, more effort is needed to change behavior, such as using different configurations of fishing gear to reduce incidental capture of marine turtles. Indonesia and Myanmar provided details of their training and educational activities.

One part of the educational process is to develop and use educational materials, and another to determine if they are working. All BOBLME countries should evaluate their educational programmes to determine if alterations and improvements are warranted. Given the number of educational programs in place in the BOBLME region, sharing information on what has been successful and what has not worked should be a priority. IOSEA can facilitate this exchange both by making materials available through its web site and by providing time at regional and international meetings for discussion and exchange.

Table 45. Targets groups have been the of these focused education and awareness programmes described in above in Section 4.1.1

	Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
Policy makers	Yes	Yes						
Fishing industry		Yes	Yes, comment	Yes		Yes		
Local/Fishing communities	Yes	Yes	Yes, comment		Yes	Yes	Yes	Yes
Indigenous groups		Yes				Yes	Yes	
Tourists	Yes	Yes	Yes, comment	Yes	Yes		Yes	Yes
Media	Yes	Yes	Yes, comment		Yes	Yes	Yes	Yes
Teachers	Yes	Yes		Yes		Yes	Yes	Yes

	Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
Students	Yes	Yes	Yes, comment		Yes	Yes	Yes	Yes
Military, Navy, Police	Yes					Yes	Yes	
Scientists	Yes	Yes						Yes
Other (describe):	Yes, comment		Yes, comment			Yes		
None of the above						Comment	Yes	

#### 4.1.3 Community Learning Establishments

Most BOBLME countries have one or more community teaching establishments (Table 46). Thailand reported that it has several; whereas, Bangladesh stated that its number has been reduced. Myanmar commented that its facility at Kadonkani (Bogalaay Township, Ayeyarwaddy Division) had been destroyed by Cyclone Nargis in 2008.

Because efforts represent a substantial initial investment of people power, time, and money, as well as requiring continuous investment, their effectiveness should be evaluated. In addition, programmes that are successful should be shared among other centres so that all can benefit. The BOBLME countries that have education centres can assist the process by providing information about their centres (e.g., frequency of use, staffing pattern) and whether the programmes have been evaluated for effectiveness. IOSEA can assist in collecting and disseminating information as well as making connections among the people involved in the centres.

Table 46. Community teaching / learning / information centres in BOBLME countries.

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
now reduced number	Yes	Yes, but not in BOBLME area	Unknown	No	Yes, comment	Yes	Yes, several at various places

#### 4.2 Development of Alternative Livelihood Opportunities

Bangladesh, India and Indonesia provided detailed comments on their programmes to facilitate alternative livelihoods for communities that have traditionally impacted turtles (Table 47). These are typically on a small scale involving one or two communities, although the project in

Indonesia dealt with seven communities. Typically, the projects focus on skill development and include activities such as guarding beaches, acting as guides for ecotourism activities, and use of different fishing gear. Unfortunately the comments indicate that the success of the projects has not been very good, partly because the projects tend to be temporary and the cost of living keeps increasing.

Clearly, there are no ‘easy fixes’ to the local situations; nor will the adoption of livelihood change be quick. Any programme that wishes to change long established social and economic behaviours must include long-term incentives and must incorporate local ideas. Again, ideas that have worked should be shared among countries. IOSEA can collect and disseminate information as well as making connections among the people involved developing alternative livelihoods.

**Table 47. Initiatives to identify and facilitate alternative livelihoods for local communities in the BOBLME area.**

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
Comment	Comment	Comment	Unknown	None, limited to traditional use	None	Yes, planned	None

### 4.3 Promotion of Public Participation

The involvement of stakeholders is essential to the success of education and awareness programmes. Without local involvement from the beginning, projects seldom succeed.

#### 4.3.1 Stakeholder Involvement

Almost all BOBLME countries report involving stakeholders in the conservation and management measures of marine turtles (Table 48). Bangladesh, India, Indonesia, and Sri Lanka provided brief descriptions of their efforts. For example, Indonesia is using a co-management business model to develop stakeholder involvement in turtle conservation. The other nations are using different methods to gain stakeholder involvement. However, documentation of when projects started, manpower used, cost, methods employed, and outcomes are generally lacking in the responses. In addition, sharing the outcomes, successful or otherwise, would help all the BOBLME nations to better interact with stakeholders and to fine tune their programmes.

**Table 48. Initiatives to involve local communities in the planning and implementation of marine turtle conservation programmes.**

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
Local village action	Comment	Comment	Unknown	NA	Some	Plan developed with locals	Local volunteers

#### 4.3.2 Government, NGO, Private Sector Involvement

Conservation requires an integration of the efforts of government institutions, NGOs, and the private sector to be successful. These bodies provide funding and manpower, host workshops, and support a wide range of conservation activities. Conservation in the BOBLME countries is not an exception.

Most BOBLME countries have support from government agencies and NGOs (Table 49). Bangladesh and Sri Lanka have constituted national committees that are intended provide oversight to turtle conservation efforts, however their effectiveness is unclear. Myanmar relies on university research to collect data. India, Indonesia and the Maldives explained that they use a mixture of Government agencies and NGOs to monitor nesting populations. Bangladesh and Thailand use a mixture as well but reported limited success.

**Table 49. Initiatives to involve Government institutions, NGOs and the private sector in marine turtle conservation programmes.**

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
Limited success	Comment	Comment	Unknown	3 good description	Universities	Local & regional involvement	Some efforts, not strong

## OBJECTIVE V: ENHANCING NATIONAL, REGIONAL AND INTERNATIONAL COOPERATION

**General tendency:** Very Good Progress; Average 3.5

**Notable responses:** Bangladesh, India, Indonesia, Malaysia, Maldives, Myanmar, Sri Lanka, Thailand

Conservation management is based on cooperation. Cooperation is required at all levels (local, regional, national, and international) if success is to be achieved. Part of the cooperation among nations must be the consistency of enforcement of conservation rules and laws across borders. All BOBLME countries have made efforts to improve national, regional, and international cooperation (Table 50).

**Table 50. Summary of efforts to enhance national, regional and international cooperation in the BOBLME area.**

Programme	Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
5.1 Trade regulations cooperatively enforced	4	4	4	4	3	4	4	4
5.2 Mgmt. issues identified; national actions prioritised	4	4	4	3	3	4	4	4
5.3 Cooperative mgmt and information exchange enhanced	4	3	3	2 <sup>c</sup>	3	3	3	3
5.4 Capacity building / training strengthened	3	4	4	2 <sup>c</sup>	3	4	4	4
5.5 Legislation reviewed; enforcement strengthened	3	3	3	3	3	3	3	3

Superscripts: a: information not available, b: only partial information available, c: likely under reporting of current situation, d: links to supporting information/documents needed, e: little international collaboration has occurred, f: data have not been compiled.

### 5.1 Cooperative Enforcement of Trade Regulations

Cooperative enforcement of trade regulations is an important component of conservation efforts at all levels. Cooperation among government agencies and NGOs as well as regional and international bodies helps to enforce trade regulations.

#### 5.1.1 Has Your Country Undertaken a National Review of its Compliance with Convention on International Trade in Endangered Species (CITES) Obligations in Relation to Marine Turtles?

Six BOBLME countries have reviewed their compliance with CITES (Table 51). India and Indonesia stated that their national legislation is in balance with CITES. Malaysia was unsure if a review had been conducted and the Maldives said 'No'. Given the international value of marine turtle products, periodic reviews of national legislation would be good.

**Table 51. National review of compliance with Convention on International Trade in Endangered Species (CITES) in relation to marine turtles.**

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
Yes, info not available	Yes, comment	Yes, comment	Unknown	No	Yes	Yes, FPPA	Yes, CITES

### 5.1.2 Participation in CITES Training Programmes for Relevant Authorities

Six BOBLME countries reported that government personnel have been trained in the administration of CITES (Table 52). India and Indonesia indicated that they participate in CITES training programmes and that participants come from multiple agencies. The Maldives and Thailand indicated that they had received no training.

**Table 52. Participation in CITES training programmes for relevant authorities.**

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
Yes, info not available	Yes, comment	Yes, comment	Yes	No	Yes	Yes	No

### 5.1.3 Illegal International Trade

Five BOBLME countries indicated that they have mechanisms in place to identify illegal international trade in marine turtle products (Table 53). Four countries added additional comments to explain their situation. Bangladesh, India, Indonesia, and Thailand provided informative comments.

They indicated that a range of national and international organisations are available to assist BOBLME countries in dealing with international illegal trade. The names of national and organisations vary among the countries but are typically wildlife and/or law enforcement agencies. International organisations such as CITES Management Authorities/CITES Secretariat, Interpol, and various concerned NGOs (such as TRAFFIC) assist with between country monitoring and enforcement. The most commonly used agencies appear to be domestic and foreign customs services at airports. In addition coast guard authorities police ports.

Table 53. Mechanisms to Identify international illegal trade routes (for marine turtle products etc.)

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
No, CG & Navy + Customs	Yes, comment	Yes, comment	Yes	No	No	Yes	Yes, laws & enforcement

#### 5.1.4 Information Exchange on Compliance/illegal Trade Issues

None of the BOBLME countries have exchanged information or raised compliance and/or trade issues (Table 54). The information provided is almost uniformly reported as 'None' or 'NA', suggesting the issues are under-reported.

Table 54. International compliance and trade issues raised for discussion.

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
None, info not available	NA	No	Unknown	NA	None	None	None

#### 5.1.5 Illegal Domestic Trade

The BOBLME countries reported that measures are in place to prevent, deter, and eliminate illegal domestic trade in marine turtle products (Table 55). Four countries mentioned that enforcement issues prevent stopping the trade, particularly in remote areas (Myanmar), and where subsistence egg harvests occur (Indonesia). India and Indonesia cited existing legislation in their comments. This implies that enforcement mechanisms are in place.

Table 55. Describe measures in place to prevent, deter and eliminate domestic illegal trade in marine turtle products, particularly with a view to enforcing the legislation identified in Section 1.5.1.

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
Limited DOF enforces	Comment	Comment	Unknown	Display, sell, & consume prohibited by law	Difficult to enforce	Enforcement awareness training	Improve enforcement

## 5.2 Management Issues Identified; National Actions Prioritised

Identification and prioritization of issues and actions are essential parts of conservation management. Development of national plans aids local and regional planning and facilitates international cooperation.

### 5.2.1 Key Management Measures / National Action Plans

All BOBLME countries have developed (or are in an advanced stage of development) national actions plans for the conservation and management of marine turtles in their jurisdiction (Table 56). Comments made by India, Indonesia, and Myanmar reinforced the presence of legislation supporting their National Action Plans. In most cases components of the IOSEA Conservation and Management Plan have been incorporated into the objectives at the national levels. Most plans are available on the Web. As well, ideas and objectives from the MTSG conservation strategies (1995, 1996, 2001) have been included. Unfortunately, copies of all of the nation action plans have not been filed with the IOSEA Secretariat.

Table 56. Development of a National Action Plan for Marine Turtles.

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
Yes, details available on web	Yes, comment	Yes, comment	Unknown	Yes	Yes, comment	Yes, action plan	Yes, national plan

### 5.2.2 Highest Priorities for Conservation and Management Action

Identification of high priority conservation and management actions is an important activity because helps to determine the distribution of limited financial and human resources within each country. Identification of priorities also helps to define where regional action is needed.

The highest priority based on the number of countries that identified it was 3.1 *Conduct targeted studies on marine turtles / habitats* (5 countries, Table 57). Given the number and distribution of known nesting sites, higher priority should probably be assigned to defining the location and extent of foraging habitats and determining the threats that impinge on these areas. That does not remove the need to conduct research on the nesting biology of marine turtles.

The next highest priorities based on the number of countries were 1.4 *Reduce incidental capture and mortality*, 2.1 *Establish habitat protection/conservation measures*, 4.1 *Establish / strengthen education, information programmes*, 5.3 *Enhance cooperation, information exchange mechanisms*, and 5.4 *Capacity building, training, partnerships* (3 countries, Table 57). Although these priorities reflect the specific needs identified by individual countries, they also indicate a more general need in the BOBLME region.

Of the 24 programmes, six were not selected by any country (Table 57). Only Indonesia identified priorities in Objective 6. This does not mean that the programmes are unimportant; it means that from the perspective of each country, those programmes were not as high on the priority list as others.

**Table 57. Signatory States' Highest Conservation and Management Priorities**

	Programme (from the CMP)	Signatory States attaching high priority to the programme
1.1	Identify and document threats	Indonesia, Myanmar,
1.2	Identify/apply best practices	Bangladesh, Indonesia
1.3	Conduct studies to correct adverse incentives	Bangladesh, Myanmar
1.4	Reduce incidental capture and mortality	India, Myanmar, Thailand,
1.5	Prohibit direct harvest/ domestic trade, except for traditional use	Indonesia
1.6	Develop nesting beach management programmes	Indonesia, Sri Lanka
2.1	Establish habitat protection/conservation measures	Bangladesh, Indonesia, Thailand,
2.2	Rehabilitate degraded habitats	Indonesia, Myanmar,
3.1	Conduct targeted studies on marine turtles / habitats	Bangladesh, Indonesia, Myanmar, Sri Lanka, Thailand
3.2	Conduct collaborative research / monitoring	
3.3	Analyse/use data to improve conservation practices	
3.4	Standardise data collection / exchange information	Sri Lanka, Thailand
4.1	Establish / strengthen education, information programmes	Bangladesh, Indonesia, Myanmar,
4.2	Develop alternative livelihood opportunities	
4.3	Enhance public participation	Myanmar, Thailand
5.1	Cooperate to enforce trade regulations	Myanmar
5.2	Develop/implement action plans	
5.3	Enhance cooperation, information exchange mechanisms	Bangladesh, Myanmar, Sri Lanka
5.4	Capacity building, training, partnerships	Bangladesh, Myanmar, Sri Lanka
5.5	Review legislation / strengthen enforcement	Bangladesh, Indonesia,
6.1	Broaden MoU membership	
6.2	Support Secretariat, Advisory Committee	
6.3	Seek additional resources to support implementation	Indonesia
6.4	Improve government coordination	Indonesia

### 5.2.3 Local Management Issues Requiring International Cooperation

The BOBLME countries ranked training and capacity building and habitat studies as the two issues most needing international assistance (6 ranked as ‘essential’) (Table 58). The next most important issue with which they required assistance was illegal fishing in territorial waters (5 ranked as ‘essential’), followed by poaching, illegal trade in turtle products (4 ranked as ‘essential’). Only one issue (oil spills, pollution, marine debris) did not receive a ranking of ‘essential’. Sri Lanka was the only country that did not rate any issue as requiring international assistance as ‘essential’.

Table 58. Local management issues that require international cooperation in order to achieve progress.

	Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
Illegal fishing in territorial waters	Important	Important	Essential	Essential	Essential	Essential	Important	Essential
Incidental capture by foreign fleets	Limited	Important	Important	Essential	Not at all	Important	Blank	Important
Enforcement & patrolling of territorial waters	Essential	Important	Essential	Important	Essential	Important	Important	Blank
Hunting/harvest by neighboring countries	Important	Important	Essential	important	Not at all	Important	Important	Blank
Poaching, illegal trade in turtle products	Limited	Essential	Essential	Essential	Not at all	Important	Important	Essential
Development of gear technology	Limited	Essential	Important	Important	Important	Important	Limited	Blank
Oil spills, pollution, marine debris	Important	Important	Important	Important	Limited	Limited	Limited	Blank
Training / capacity-building	Essential	Essential	Essential	Essential	Essential	Important	Important	Essential
Alternative livelihood development	Essential	Essential	Important	important	Important	Essential	Important	Blank
Identification of turtle populations	Important	Essential	Essential	important	Essential	Important	Important	Important

	Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
Identification of migration routes	Important	Essential	Essential	Important	Essential	Important	Important	Important
Tagging / satellite tracking	Important	Essential	Essential	important	Important	Important	Important	Important
Habitat studies	Essential	Essential	Essential	Essential	Essential	Important	Important	Essential

### 5.3 Enhancement of Information Exchange and Cooperative Management

The BOBLME countries recognize that cooperation in relation to marine turtle conservation and management at the sub-regional level are essential for conservation. They cooperate through several different regional and international organizations.

#### 5.3.1 Other Mechanisms for Sub-regional Cooperation

Cooperation among BOBLME countries is improving. Both international and regional organizations operate in the BOBLME area (Table 59), such as the Association of South East Asian Nations (ASEAN), the South Asian Association for Regional Co-operation (SAARC), the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), the South Asian Co-operative Environment Programme (SACEP), the UNEP Regional Coordinating Unit for East Asian Seas, and the Indian Ocean Marine Affairs Co-operation (IOMAC).

India referred to SAARC as a source of training and possible support for regional initiatives on sea turtle conservation. Indonesia has bi-lateral and tri-lateral agreements with neighboring countries. Myanmar mentioned that ASEAN-SEAFDEC was a potential source of training.

Table 59. Existing Organisations that are Useful Mechanisms for Cooperating in Marine Turtle Conservation at the Sub-regional Level.

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
Promotes interactions at all levels	Comment	Comment	Unknown	Blank	Comment	Action plan in place	CITES, TEDs, IOSEA, ASIAN

### 5.3.2 Networks for Cooperative Management

The network for cooperation in the BOBLME area is patchy (Table 60). Although four countries indicated that they did not have cooperative management arrangements with other BOBLME countries, three did and a fourth indicated that they expect cooperation to increase. There is certainly a role for IOSEA to help build the network for cooperative management in the region.

Table 60. Networks for cooperative management of shared turtle populations in the BOBLME area.

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
No	No	No	Working with BOBLME	No	Yes	Yes BOBLME	No, BOBLME will increase

### 5.3.3 Regional Fishery Bodies

Five of the BOBLME countries reported that they have not taken an active role to encourage Regional Fishery Bodies (RFBs) to adopt marine turtle conservation measures within Exclusive Economic Zones (EEZs) and on the high seas (Table 61). However, the Maldives indicated that it is regionally involved in the process.

Table 61. Steps to encourage Regional Fishery Bodies (RFBs) to adopt marine turtle conservation measures within Exclusive Economic Zones (EEZs) and on the high seas.

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
None	None	Blank	Unknown	Involved regionally	None	None	None

## 5.4 Capacity Building / Strengthening of Training Programmes, Partnerships

Capacity building and training are tightly linked aspects of conservation management. Goals and outcomes cannot be achieved without both.

### 5.4.1 Capacity-building and Resource Needs

The two greatest capacity-building needs identified by the BOBLME countries were equipment and trained personnel (Table 62). Patrol boats are expensive, as are most pieces of equipment (e.g., radios, telephones, field equipment). Training and support of enforcement

personnel in the field are expensive also. Obtaining external funding emerges as a need in the region.

Law enforcement was another area of ‘need’ identified in the region because of the lack of equipment and trained personnel. Indonesia specifically identified enforcement as a problem caused, in part, by a lack of equipment and training and, in part, by the context of the very large areas of jurisdiction. India commented that managerial capacity was adequate but the orientation of the coastal states was generally toward the terrestrial environment rather than the marine environment.

The need for technical assistance to train trainers in marine turtle biology, conservation of resources, and law enforcement is an obvious extension of ‘need’ in capacity building. Training trainers helps to spread the information rapidly.

**Table 62. Capacity-building and resource needs of BOBLME countries**

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
Training	Comment	Comment	Within & among country cooperation	Funding & technical assistance	Comment	Information training tech support	Patrol boats

#### 5.4.2 Training

Within country training for marine turtle conservation and management techniques occurs in the majority of BOBLME countries (Table 63). India, Indonesia, and Myanmar described extensive training activities, including training workshops, provision of funds to regional conservation groups, development of a code of conduct for tourist operators, and production of training manuals. This expertise that has developed could (and should) be shared and coordinated within the region.

The need for training from external sources was broken into categories such as sea turtle biology, ecology, and necropsy techniques. Monitoring and surveys design and data analysis were mentioned in comments. The IOSEA advisory group can provide training in these areas, if requested.

Training must be delivered at the local community level because local people must embrace not only the methods but also the reasons for turtle conservation. Being involved helps the local people to find alternative sources of income, as well.

Table 63. Describe your country's needs, in terms of human resources, knowledge and facilities, in order to build capacity to strengthen marine turtle conservation measures.

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
Limited	Comment	Comment	Blank	Developing management plan	Comment	Continuing training	Training & resources

### 5.4.3 Partnerships

Partnerships involving government, community groups, NGOs, researchers, indigenous communities, and universities have been developed within the BOBLME countries to help build capacity (Table 64). Bangladesh reported that it is developing partnerships. India, Indonesia, Myanmar, Sri Lanka and Thailand have local NGOs, community groups, universities, and others helping with marine turtle conservation efforts. The Maldives reported that it had none in place but was willing to develop relationships with other institutions.

Table 64. Partnerships developed with universities, research institutions, training bodies and other relevant organisations to build capacity

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
Planning for change	Comment	Comment	Blank	None but willing	Universities & local authorities	Training enforcement	Several sources contribute to capacity building

## 5.5 Review of Legislation / Strengthening of Enforcement

All BOBLME countries have legislation aimed at protecting marine turtles and their habitat, but enforcement is seen as a problem.

### 5.5.1 Effectiveness of National Policies and Laws

All BOBLME countries reported that they have laws and regulations that help to protect marine turtles and their habitat (Table 65). However, in virtually all BOBLME countries the lack of sufficient trained staff and equipment, coupled with the large areas to monitor, reduce the effectiveness of enforcement efforts. The only exception is Sri Lanka, which reported that enforcement is effective. India, Indonesia, and Myanmar provided explanatory comments. Indonesia and Myanmar noted that although national legislation is in place, enforcement is a problem and illegal trade does occur (at an unspecified level). This may be the case in India as well.

**Table 65. Effectiveness of National policies and laws concerning the conservation of marine turtles and their habitats**

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
Laws exist, enforcement is poor	Yes, comment	Comment	Varies locally	Lack of enforcement	Comment	Effective	Enforcement is difficult

### 5.5.2 Policy and Legislative Reviews

Four of the BOBLME countries reported that they have conducted a review of policies and laws to address any gaps, inconsistencies or impediments in relation to marine turtle conservation (Table 66). Malaysia stated that it conducted a review ‘occasionally’. Bangladesh, the Maldives and Myanmar said that they have not conducted a review.

A review of the existing laws and regulations would benefit all countries, especially if they assess the effectiveness of the rules and enforcement practices first. Any review should also include an attempt make laws reciprocal and enforceable, especially in border areas.

**Table 66. Review of Policies and Laws to Address Any Gaps, Inconsistencies, or Impediments in Relation to Marine Turtle Conservation.**

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
No 1.5	Yes	Yes, comment	Occasionally	No review	No	Yes, training by IUCN	Yes, Laws in place

### 5.5.3 Enforcement Cooperation Issues

Four of the BOBLME countries reported having difficulties in achieving cooperation to ensure compatible application of laws across and between jurisdictions (Table 67). Malaysia provided a succinct comment that sums up the general situation: ‘varies with issue & boundary’.

Achieving trans-boundary compatible rules and regulations is not as easy as it may seem. However, in the areas of marine turtle conservation and resource utilization, it is very important to all parties.

**Table 67. Difficulties in Achieving Cooperation to Ensure Compatible Application of Laws Across and Between Jurisdictions**

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
Yes	Yes	Blank	Varies with issue & boundary	No	Yes	No	Unsure

## OBJECTIVE VI: PROMOTING AND SUPPORTING IMPLEMENTATION

General tendency: Limited Progress; Average 1.3

Notable responses: None

The IOSEA MoU is designed to facilitate communication among member nations, to help identify the needs, and to help find solutions to the problems encountered by member nations in their efforts to conserve marine turtles. Promoting and supporting the IOSEA MoU requires more than signing the documents and filling out the forms. Active participation is needed to achieve the goals of the MoU (Table 68).

Table 68. Synopsis of efforts to promoting and support the IOSEA MoU.

Programme	Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
6.1 New members solicited; MoU status considered	1	2	2	0 <sup>a</sup>	1	1	1	1
6.2 Secretariat / Advisory Committee supported	2	0 <sup>a</sup>						
6.3 Resources sought for domestic implementation	2	2	3	0 <sup>a</sup>	0 <sup>a</sup>	2	2	2
6.4 Government coordination / cooperation improved	3	3	3	0 <sup>a</sup>	2	2	2	2

Superscripts: a: information not available, b: only partial information available, c: likely under reporting of current situation, d: links to supporting information/documents needed, e: little international collaboration has occurred, f: data have not been compiled.

### 6.1 Institution Strengthening

Communication is one of the key elements of a strong institution. Communication among signatory nations is essential to developing programmes that contribute to marine turtle conservation. All nations are helped by sharing information and expertise.

#### 6.1.1 Broadening MoU Membership

Most BOBLME countries reported little or no direct action to encourage other States to sign the IOSEA MoU (Table 69). Bangladesh, India and Indonesia have made overtures toward other countries through improving awareness and demonstrating that signing the IOSEA MoU has benefits. However, the other countries did not report their efforts.

**Table 69. Actions Taken to Encourage Other States to Sign the IOSEA MoU.**

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
Improving awareness and application	Comment	Comment	Blank	Blank	None	Nothing	Nothing

### 6.1.2 Amending the Memorandum of Understanding

At present three countries are, in principle, in favor of making the IOSEA MoU legally binding and three are not (Table 70). One Country left the answer space blank and another stated that it had no view. There seems to be only modest support for the idea.

**Table 70. Country Attitude Toward Amending the MoU to Make It a Legally Binding Instrument**

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
Yes	No View	No	Blank	Yes	No	Yes	No

### 6.1.3 Legally Binding Memorandum of Understanding

When responding to the same question with a longer time view attached, one country said 'Yes', three countries left the answer space blank, three stated that they had 'No View', and one said 'No' (Table 71).

These two questions can only be answered by the political members of governments, not by members of conservation agencies. As a result, the responses may not represent the view of the governments that must sign and support the IOSEA MoU.

**Table 71. Over a longer time horizon country attitudes toward amending the MoU to make it a legally binding.**

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
Yes	No View, comment	No, comment	Blank	No view	Blank	No View	Blank

## 6.2 Support for Secretariat / Advisory Committee and IOSEA implementation

The majority of the answer spaces were left blank (Table 72). Bangladesh indicated that it could provide a share of support. Whereas, Myanmar said it was unable to provide support and Thailand had not considered the question, yet. In actual practice, India and Thailand have made voluntary contributions to the IOSEA Trust Fund in the past, consistent with international norms.

Table 72. Efforts made to secure funding to support the core operations of the IOSEA MoU (Secretariat and Advisory Committee, and related activities).

Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
Money is available	Blank	Blank	Blank	Blank	Unable	None	Not considered yet

## 6.3 Resources for Domestic Implementation

This question has three sub-questions that deal with financial arrangements which are dealt with together: 6.3.1 Domestic Sources of Funding, 6.3.2 Non-domestic Solicitation of Funds, and 6.3.3 Use of Economic Instruments (Table 73).

The BOBLME countries reported mixed sources for funding for conservation projects from domestic sources (Table 73). In Bangladesh, in-kind and cash have been used to generate more funds. In Myanmar and Sri Lanka, Government sources seem to provide the majority of funds.

Other than Governments, major donors, industry, and private sector sponsors for marine turtle conservation activities include: UNDP, World Bank, GEF, SEAFDEC, SWIOFP, WWF, WCS, Conservation International, and various other corporate donors and private foundations, including petroleum and gas industries, hotels, private companies. As with soliciting funds from government agencies, non-government sources require proposals and applications that usually must include measurable outcomes.

The promotion of eco-tourism is a developing source of funding. Local people can use the funds generated via tourism to reduce pressure on turtle populations and gain alternate income.

Table 73. Sources of financial support for implementation of the MoU: Domestic, Non-domestic, and from Economic Arrangements.

	Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
Domestic Funds	In-kind & cash	Comment	Comment	Blank	Blank	Gov Budget	Gov only	Not at present
Non-domestic Funds	Yes, previously	No, comment	Yes, comment	Blank	Blank	No	Yes, comment	Yes
Use of Economic Instruments	Not yet	Blank	None	Blank	NA	None	None	None

#### 6.4 Government Coordination/Cooperation

Governments play a key role in conservation through their various agencies and departments. One of the major roles is coordination within government bodies and among government bodies and NGOs in order to achieve conservation goals.

##### 6.4.1 Lead and Supporting Agencies

Lead supporting agencies have been identified for the majority of BOBLME countries. In addition to the lead agencies, other government agencies and NGOs are consulted in the majority of countries (Table 74A). This indicates a more collaborative process in developing the Country Reports.

##### 6.4.2 Clarification of Roles and Responsibilities

The clarification of roles and responsibilities facilitates communication and cooperation among agencies. In addition, clarification of roles and responsibilities improves public access and helps to reduce interagency duplication. Six countries indicated that roles and responsibilities have been defined (Table 74B). Sri Lanka answered 'No' to the question but has designated a lead agency that is working with other agencies, institutions and NGOs to achieve its conservation goals.

##### 6.4.3 Review of Roles and Responsibilities

Two countries have conducted reviews of the roles and responsibilities of their government agencies (Table 74C). Unfortunately, few details are provided, although Bangladesh reported that as a result of the review changes have been made. Such an activity helps to clarify roles, goals, and desired outcomes. In all countries, review and clarification of roles would be of benefit.

Table 74. Coordination among government agencies

	Bangladesh	India	Indonesia	Malaysia	Maldives	Myanmar	Sri Lanka	Thailand
A Lead and supporting agencies	Yes	Yes, comment	Yes, comment	Blank	Yes	Yes	Yes	Yes
B Clarification of roles and responsibilities	Yes	Yes, comment	Yes, comment	Blank	Yes	Yes	No	Yes
C Review of roles and responsibilities	Yes, new processes in place	No	No	Blank	No	No	No	Yes, National action plan under development

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## PART III DETAILED REVIEW OF IOSEA SITE DATASHEETS

### Introduction

IOSEA maintains an on-line database of sites and areas of importance to marine turtles for the countries bordering the Indian Ocean region. The IOSEA Site Database contains detailed information in support of the IOSEA on-line Country Reports, including location, species present, type of use (i.e., nesting, foraging), threatening processes, and remedial actions. The IOSEA MoU Signatory countries provide and periodically up-date the information. The on-line Site Database is searchable using a set of selection criteria and provides easy access to information relevant to the IOSEA countries. The database may be accessed by anyone seeking information about marine turtles in the region.

The Site Database consists of individual Datasheets that are divided into four sections (Annex 5). Specific information contained in the first section of each Datasheet includes: place name, location (latitude, longitude), date of information, source of information, and an indication of the research being conducted at the site. The second section identifies the species utilizing the site and their approximate numbers. The third section contains a list of threatening processes and series of check-boxes that indicate the severity of the threat(s), plus room for additional comments. The fourth section provides a list of measures that may be used to reduce/remove threats to marine turtles at the site, with expandable boxes for additional comments.

The current review has three goals: (1) to review (with a view to up-dating) data on the nesting sites in the countries of the Bay of Bengal Large Marine Ecosystem (BOBLME), (2) to obtain additional nest site records for the BOBLME countries, and (3) to analyze the contents of the data sheets, highlighting noteworthy findings and possible issues.

### Methods

Site data records for the eight BOBLME region countries were obtained from the on-line IOSEA Site Database and other sources. The data contained in the IOSEA files were checked against other sources, including the primary literature assembled in the bibliography (Part IV) and the on-line SWOT database ([seamap.env.duke.edu/SWOT](http://seamap.env.duke.edu/SWOT)). Whenever possible, entries with missing location data were corrected based on the country gazetteers and published information. Records not contained in the IOSEA Site Database were integrated into the database. In addition, associated information (e.g. local name, species present) in new records was checked against a primary source.

Country gazetteers were used to standardize spelling for several sites. Suspected duplicate names that could not be resolved were maintained in the database with one name in parentheses. Tabulated Site Data were coded by text color and amalgamated into a single table. After being assembled into an Excel™ spreadsheet for each country, the files were sent to in-country collaborators for editing (changes, deletions, and/or additions).

The Latitude and Longitude values given in the IOSEA site data base are in degrees, minutes and seconds. Other sources provide geocoordinates in other formats (e.g., decimal minutes). Both of these were converted to decimal degrees for plotting (Annex 6). Regardless of source, location

data were plotted using ArcMap 9.3.1<sup>™</sup> (ESRI) based on the Geographic Coordinate System (GCS-WGS-1984).

The threatening processes and measures being used to reduce or remediate threats to marine turtles were tabulated for each site and amalgamated by country based on information in the IOSEA Site database plus primary sources. Data were tallied and converted to a relative index based on the number of sites. If the response was “Unknown”, it was not included. The use of a relative index allows the three highest values to be identified for each country.

A Google Earth image was obtained for each nesting site that had latitude and longitude coordinates in the records. The view captured by the images was standardized between 30,000 and 35,000 feet of altitude. The site coordinates were positioned near the center of the image so that the images provided a view of the coastal margin, the near shore water, and the hinterland.

Although most of the BOBLME countries are completely contained within the sub-region, India, Malaysia, and Indonesia are not (Fig 1). The western side of India is not within the defined sub-region and the eastern sides of Thailand, Malaysia, and Indonesia are not within the BOBLME boundaries. Site Datasheets from areas outside the BOBLME area were not considered in the present analysis.

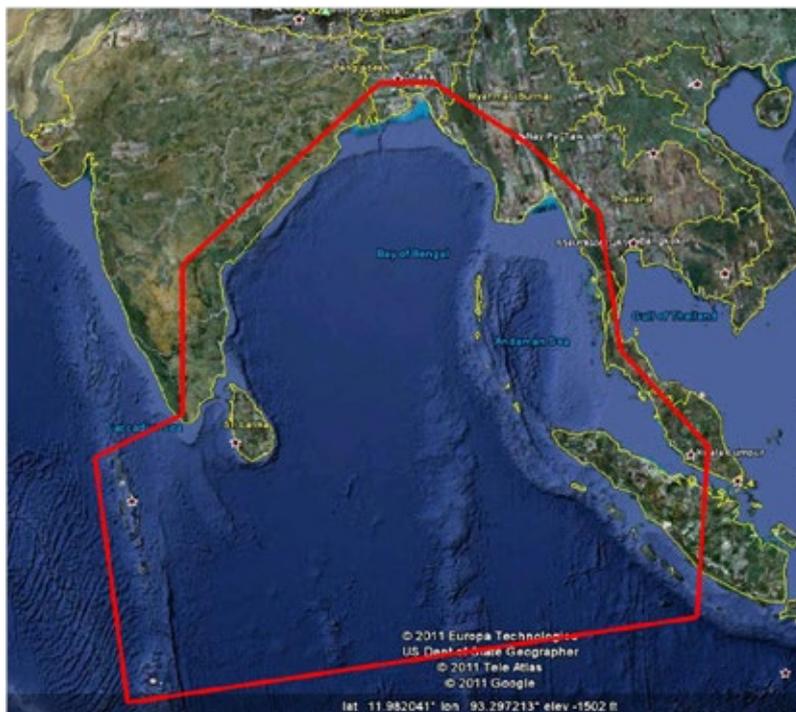


Fig. 1. The approximate boundary of the BOBLME sub-region overlaid on a Google Earth image of the area.

## Results and Discussion

The Results and Discussion section is divided into two sections. Section 1 provides an overview of the Site Datasheets for all the countries in the BOBLME sub-region. Section 2 provides a country by country analysis of the information available.

### Section 1: Overview

Five of the eight BOBLME countries were well represented in the IOSEA Site Database (Bangladesh, Indonesia, Myanmar, Sri Lanka, Thailand). In contrast, although records exist for Indonesia in the IOSEA Site Database, few were on the BOBLME side of the country. At the outset, there were no records in the IOSEA Site Database for India, Malaysia, and the Maldives (Table 74).

The IOSEA on-line Site Database contained between 0 and 133 records per country. In total, the eight countries contributed 128 nest site records with geocoordinates within the BOBLME sub-region (Table 74). In some cases, (e.g., Thailand) all of the sites contained geocoordinates. In others (e.g., Indonesia), most site listings did not include geocoordinates and/or were outside the BOBLME sub-region. Records obtained from the primary literature and the SWOT Database contributed an additional 167 records to the total of 316 (Table 74).

Table 74. The Nest Site records in the IOSEA Site Database, records with and without coordinates, and records in the BOBLME sub-region.

Country	Total Site Records in IOSEA Database	Number of BOBLME Records with Coordinates	Number of BOBLME Records without Coordinates	BOBLME Records Only in IOSEA Site Database	Additional BOBLME Records *	Total BOBLME Records
Bangladesh	19	18	1	12	2	14
India	0	-	-	0	114	114
Indonesia	133	29	104	1	5	6
Malaysia	0	-	-	0	12	12
Maldives	0	-	-	34	7	41
Myanmar	39	37	2	38	5	44
Sri Lanka	52	32	20	31	14	65
Thailand	8	8	0	5	3	8
<b>TOTAL</b>	<b>251</b>	<b>124</b>	<b>127</b>	<b>128</b>	<b>167</b>	<b>316</b>

\* Sources cited in Bibliography

Obvious duplicate records were identified and deleted. Some of the discrepancies were presumed to be typographical and easily corrected (e.g., Bordal vs Bordail; Gayetgyi Beach vs Gayi Gyi Beach) based on the geocoordinates. Others could not be resolved based on available information because the spelling and location of the sites were very close but different enough not to be considered duplicates. For example, several sites (e.g., in the Maldives) have alternative English spellings of the names based on local pronunciation. Unfortunately, the national gazetteer for the Maldives did not clarify the problem because most beach names were not in the gazetteer.

As a result, where alternate names could be determined, the two names are presented together. Otherwise the sites are listed separately until the time when a person with local knowledge is able to sort out the duplicate names.

### **Definition of the Site/Area**

Descriptions of the physical characteristics of the beaches are, mostly, missing from the IOSEA Site Database. While some do have physical descriptions, the majority do not. As a result, the details of the beach (e.g., length, width, slope, height of dunes, presence of trees) are not contained in the database. Other characteristics, such as shading during part of the day or seasonally during egg incubation, are not easily observed in the images (see Google Site Maps below). Because this information is helpful, adding prompts and tick boxes in the “Short description of the site” is important. The prompts could include phrases such as: Beach Length, Beach Width, Height of Dunes, Nesting Area Shaded [Y/N], Morning/Afternoon, Beach Slope: Gradual, Moderate, Steep.

In the IOSEA Database a person is listed as the source of the information rather than a published paper or report. Most other databases refer to a primary source document that contains information about the site and/or the turtles present. The use of a person’s name (and institutional affiliation) is a valid way of capturing personal experience and knowledge that has not been published. However, it would be better to encourage the IOSEA Country Focal Points to go through sites and provide the reference(s) to the literature on the Site Datasheet so that the source is linked to a document. Such a linkage allows change to be measured at the site over time.

The revised IOSEA Site Database datasheet lists five types of monitoring and research activity that may occur at the site in a set of check-boxes. The on-line form should be revised to include the monitoring option. The IOSEA Site Database is not intended – at this initial phase, at least – to capture very detailed monitoring data. Obtaining even the most basic of information has been a challenge. However, the inclusion of other, more detailed data collection options (e.g., morphometrics of nesting turtles and/or their eggs, records of emergence success, temperature and moisture records) should be considered in future, once users have met the basic threshold, to better define what has occurred and is happening at the site. Each option should have a place for the citation if the work has been published or the option of ‘on-going’ if the work is continuing.

### **Species Present**

The IOSEA Site Database facilitates the presentation of data on the species and numbers of turtles in utilizing the site either by inserting a check in the appropriate column for that species and inserting a letter code to indicate the relative importance of the site for that species (Annex 5). The instructions for coding are clear and concise. The instructions also request an estimate of the annual number of nests of a particular species at the site. The scale used for this purpose is straight forward (0-10, 11-100, 101-500, 501-1000, 1001 – 50000, >50000) and follows other examples from the literature (e.g., Limpus, C.J. 2009. A Biological Review of Australian Marine Turtles. Queensland Environmental Protection Agency. Available on line at: <http://www.derm.qld.gov.au/register/p02835aa.pdf>). This scale is not logarithmic but is useful in defining the estimated range in numbers of nesting or foraging turtles at a particular site.

Because many nesting populations are rather small but have greater than 10 individuals nesting, the 11-100 category could be split to be 11-50 and 51-100 to better represent the size of the

nesting population. Similarly, the 1,001-50,000 categories is very large and could be split into 1,001-25,000 and 25,001-50,000 categories to better characterize the numbers of turtles nesting at the site. A more accurate estimation of the population leads to a smaller error with a better ability to detect change over time. When an estimation of the population has been made using a defined methodology, the value and the associated error should be recorded instead of a broad range. Regardless of the process used to estimate the population, the method used to make the estimate (e.g., direct count, track count, area sample, aerial survey) should be indicated.

In a few cases the IOSEA Site Database contained reference to three or more species as nesting but other sources listed fewer. However, for the most part, there was good agreement in the estimated numbers of marine turtles using the site as reported by the IOSEA database compared to other sources of information. It is clear that resolution of the contradictions in the records is needed through additional information either from independent sources or, ideally, checking on-ground. This situation reinforces the idea that all records should be linked to a published source. Because the IOSEA Site Database is used as a summary source of information that helps conservation and management efforts throughout the Indian Ocean region, the use of dated citations allows the assessment of the currency of the information.

The BOBLME area is host to five species of marine turtles: Loggerhead, *Caretta caretta*; Green turtle, *Chelonia mydas*; Olive Ridley, *Lepidochelys olivacea*; Hawksbill turtle, *Eretmochelys imbricata*; Leatherback, *Dermochelys coriacea*. Based on the current information, when the records for the species nesting at a specific site in a country were amalgamated, green and olive ridley turtles were the most represented species in the BOBLME region (Table 75). Hawksbill turtles were the next most common across the region. The leatherback turtle and loggerhead turtle were the least represented species in the region. These numbers are likely to change when more current surveys are available, especially for the 41.

Table 75. The Nest Site records presented by country and by species based on available information.

Country	Total Nesting Site Records	Caretta	Chelonia	Lepidochelys	Eretmochelys	Dermochelys	Number of Species Records
Bangladesh	21	0	17	22	1	1	41
India	172	0	107	61	63	27	261
Indonesia	7	0	4	0	4	1	9
Malaysia	12	3	0	3	7	2	13
Maldives	41	0	32	0	12	0	44
Myanmar	44	2	29	36	12	0	80
Sri Lanka	66	13	55	50	20	41	182
Thailand	11	1	7	7	2	6	23
<b>TOTAL</b>	<b>386</b>	<b>19</b>	<b>246</b>	<b>179</b>	<b>120</b>	<b>78</b>	<b>647</b>

Each country in the BOBLME sub-region hosts one or more very important nesting sites for at least one of the five species of marine turtles inhabiting the area (Table 76). Although estimated numbers of nesting turtles vary, important nesting sites for the green and hawksbill turtles occur in every country of the BOBLME sub-region. For green turtles, the major nesting sites in Malaysia and Indonesia are distributed further to the East. Green turtle nesting in Thailand is lower compared to nesting in the other BOBLME countries but contributes to the regional population. Both species exhibit widespread nesting the Andaman and Nicobar Islands of India. Although Olive ridley turtles nest in most BOBLME countries (except for the Maldives), the most important nesting sites for the species are in India, where large *arribadas* (mass nesting) still occur. Reduced levels of Olive ridley nesting occur in Indonesia, Malaysia, and Thailand. The leatherback turtle uses multiple sites in the Andaman and Nicobar Islands of India; but the number of nesting sites is much lower in Sri Lanka and Thailand. In the BOBLME sub-region, the loggerhead turtle nests mainly in Sri Lanka.

Because the BOBLME sub-regional countries host important nesting sites (and presumably important foraging areas) each country has a responsibility to conserve and manage the populations within their boundaries. At the same time, because the turtles move across borders, the countries share the responsibility for the conservation and management of marine turtles in the sub-region.

**Table 76. Examples of important nesting sites in the BOBLME sub-region of the Indian Ocean.** Selected on both the number of species nesting and the number of individuals nesting; other sites may have similar numbers. See individual country accounts in Section II for details.

Country	Site	NOTES	Caretta	Chelonia	Lepidochelys	Eretmochelys	Dermochelys
<b>Bangladesh</b>							
	St. Martins Island	1		11-100	101-500	?	1-10
	Hiron Point, Katka Beach, Sonadia Island	2			101-500		
<b>India</b>							
	Devi River mouth	2			1.5x10 <sup>6</sup> ?		
	Teressa Island	1				10-100	10-100
	Ross Island	2		10-100			
<b>Indonesia</b>							
	Amandangan	1		10-100		1-10	1-10
<b>Malaysia</b>							
	Multiple sites (unquantified)	1	??	??	??	??	??
<b>Maldives</b>							
	Most Atolls (unquantified)			??		??	
<b>Myanmar</b>							
	Thamihla Kyun (Thameehla Island ?)	2		101-500			
	Gayet Gyi Island (Gayetgyi Kyun	2	1-10				
	Tin Pann Kyun (Oyster) Island (Tin ban Kyun Island ?)	2				1-10	
	Kwin Bout Village (Amatt Gyi and Amattkalay Beach)	2			11-100		

Country	Site	NOTES	Caretta	Chelonia	Lepidochelys	Eretmochelys	Dermochelys
<b>Sri Lanka</b>							
	Rekawa	1	1-10	501-1000	11-100	1-10	
	Mapalana	2					10-100
<b>Thailand</b>							
	Khram Island (Ko Khram)	1		101-500		11-100	
	Khorkhao Island (Andaman Sea)	2					1-10
	Huyong Island	2	1-10				
	Maikhaw Beach (Mai Khao beach)	2			1-10		

NOTES: 1. One of several sites where multiple species nest.  
2. Example of site where single species nests.

### Threatening Processes

The third section of the IOSEA Site Database template concerns the threatening processes occurring at or in the vicinity of the site. To facilitate obtaining information, threatening processes were identified in a list and their severity was indicated in check-boxes (Annex 5). Given that the threatening processes varied among sites within a country and that the number of sites per country also varied, the amalgamation of the data to a relative index at the country level allows quick comparison and ranking of importance. Although the same set of threatening processes occurred in the eight BOBLME countries, the same threats were not equally important in each (Table 77). For example, at the country level in Sri Lanka, *egg collection* was the most important threatening process; whereas in Thailand, *Agricultural/urban/tourism development* was the most important threatening process. This highlights the need for each country to assess and to act locally but also to communicate and coordinate conservation efforts among the BOBLME sub-region countries. Because there was initially little or no data in the IOSEA Site Database for three countries (India, Malaysia, Maldives), no assessment of the threatening processes was made for these countries.

Table 77. Threatening processes affecting marine turtles by country in the BOBLME sub-region. Categories were assessed on a numerical scale (None = 0, Low = 1, Moderate = 2, High = 3, ? = Unknown). Rank key: A = 1<sup>st</sup> Rank, B = 2<sup>nd</sup> Rank, C = 3<sup>rd</sup> Rank.

	Exploitation of nesting females	Direct harvest of animals in water	Egg collection	Incidental capture in coastal fisheries	Boat strikes	Marine debris	Industrial effluent	Inshore oil pollution	Agricultural/urban/tourism development	Artificial lighting on land or near shore	Habitat degradation	Vehicles	Sand mining / removal	Natural threats, disease, predation
<b>Bangladesh</b>														
Index	1.62	1.64	2.76	2.87	1.94	2.00	1.06	1.24	1.71	1.89	2.39	1.83	0.63	2.06
Count	13	11	17	15	16	16	16	17	17	18	18	18	16	16
Rank			B	A							C			
<b>India</b>														
Index	?	?	?	?	?	?	?	?	?	?	?	?	?	?
Count	114	114	114	114	114	114	114	114	114	114	114	114	114	114
Rank		?	?	?					?		?		?	
<b>Indonesia</b>														
Index	1.00	3.00	2.50	1.75	0.20	0.33	0.00	0.00	0.50	0.40	2.20	0.00	0.00	1.50
Count	7	5	7	4	8	5	5	7	7	8	8	8	8	6
Rank		A	B								C			
<b>Malaysia</b>														
Index	?	?	?	?	?	?	?	?	?	?	?	?	?	?
Count	11	11	11	11	11	11	11	11	11	11	11	11	11	11
Rank		?	?	?					?		?		?	
<b>Maldives</b>														
Index		?	?	?					?		?		?	
Count	53	53	53	53	53	53	53	53	53	53	53	53	53	53
Rank		?	?	?					?		?		?	
<b>Myanmar</b>														
Index	0.16	0.57	0.92	1.56	1.00	0.08	1.00	0.00	1.03	0.71	1.06	0.00	0.00	1.81
Count	19	7	26	32	28	13	1	1	33	34	35	32	27	36
Rank				B							C			A
<b>Sri Lanka</b>														
Index	0.71	0.64	2.42	1.26	0.80	1.02	0.43	0.70	1.09	1.39	1.10	0.71	0.56	1.39
Count	48	47	48	47	45	47	42	47	46	46	42	39	34	47
Rank			A	C						B				

	Exploitation of nesting females	Direct harvest of animals in water	Egg collection	Incidental capture in coastal fisheries	Boat strikes	Marine debris	Industrial effluent	Inshore oil pollution	Agricultural/urban/tourism development	Artificial lighting on land or near shore	Habitat degradation	Vehicles	Sand mining / removal	Natural threats, disease, predation
<b>Thailand</b>														
Index	0.13	0.00	0.63	1.38	0.71	0.86	0.25	0.50	1.38	1.13	0.63	0.50	0.00	1.00
Count	8	8	8	8	7	7	8	8	8	8	8	8	8	7
Rank	C			A					A	B				

## Remedial Measures

The fourth section of the Site Database template concerns the measures being used to reduce or remediate threats to marine turtles. These were tabulated by site and amalgamated by country (Table 78). Given that the remedial action varied among sites within a country and that the number of sites per country also varied, the amalgamation of the data to a relative index at the country level allows quick comparison and ranking of importance. For example, in Bangladesh, Myanmar, and Sri Lanka, *Education* was the most important remedial action undertaken; whereas in Indonesia, *Monitoring/protection Programmes* was the most important. Most countries indicated that they had remedial programs in the category of *Designation and Management of Protected Areas, Sanctuaries, Exclusion Zones* to help reduce threats to marine turtles. The ranking of the tabulated remedial actions indicates that most of the five BOBLME countries represented in the IOSEA Database use three or more approaches to reduce the impact of the threatening processes. This highlights the need for each country to act locally to address the local threatening processes but also to communicate and coordinate conservation efforts, particularly in training, sharing information, and enforcement of regulations. Marine turtle populations using habitats in protected areas near borders would benefit from coordinated management.

Although the IOSEA Site Database template does not have specific provisions to quickly indicate the success of remedial measures, there is an expandable box that allows entering of the results of remedial measures. This information was not entered for any of the sites in any of the BOBLME countries. Assessment of the effectiveness of remedial measures is an essential part of conservation and management actions. Ideally, each of the threatening processes should be paired with a remedial action. At some sites, little or no remedial action is required because the impact of the threatening processes is minor; however, at other sites a range of remedial actions is required. Although no information has been provided, it is likely that assessments of remedial actions have been made and adjustments to the program of remediation made accordingly. It is important to

share the details of successful and not so successful remedial actions so that better programmes can be developed within and among sites and countries.

Because there was initially little or no data in the IOSEA Site Database for three countries (India, Malaysia, Maldives),, no assessment of the remedial actions processes was made.

**Table 78. Remedial conservation actions undertaken to protect marine turtles in the BOBLME sub-region.** Categories were assessed on a numerical scale (None = 0, Low = 1, Moderate = 2, High = 3, ? = Unknown) Rank key: A = 1<sup>st</sup> Rank, B = 2<sup>nd</sup> Rank, C = 3<sup>rd</sup> Rank.

	Monitoring / protection programmes	Education / awareness programmes	Egg relocation / hatcheries	Require modification of fishing gear or fishing practices	Designation / management of protected areas, sanctuaries,	Regulations on building location / design	Regulations on artificial lighting	Vehicle / access restrictions	Removal of debris / beach clean-up	Predator control
<b>Bangladesh</b>										
Index	50	78	44	6	61	33	11	28	33	22
Count	8	14	8	1	11	6	2	5	6	4
Rank	C	A			B					
<b>India</b>										
Index	?	?	?	?	?	?	?	?	?	?
Count	114	114	114	114	114	114	114	114	114	114
Rank										
<b>Indonesia</b>										
Index	67	78	33	22	56	11	0	0	11	22
Count	6	7	3	2	5	1	0	0	1	2
Rank	A	B			C					
<b>Malaysia</b>										
Index	?	?	?	?	?	?	?	?	?	?
Count	11	11	11	11	11	11	11	11	11	11
Rank										
<b>Maldives</b>										
Index	?	?	?	?	?	?	?	?	?	?
Count	53	53	53	53	53	53	53	53	53	53
Rank										
<b>Myanmar</b>										
Index	.79	.87	.79	0	.85	.67	.38	.03	.56	.82
Count	31	34	31	0	33	26	15	1	22	32
Rank	C	A	C		B					C

	Monitoring / protection programmes	Education / awareness programmes	Egg relocation / hatcheries	Require modification of fishing gear or fishing practices	Designation / management of protected areas, sanctuaries,	Regulations on building location / design	Regulations on artificial lighting	Vehicle / access restrictions	Removal of debris / beach clean-up	Predator control
<b>Sri Lanka</b>										
Index	.02	.73	.13	.06	.17	0	0	.02	.02	0
Count	1	36	6	3	8	0	0	1	1	0
Rank		A	C		B					
<b>Thailand</b>										
Index	.75	1.0	.75	.13	.88	.50	.50	.50	.38	0
Count	6	8	6	1	7	4	4	4	3	0
Rank	B		B		A	C	C	C		

### Summary of responses in the IOSEA Site Database

The overall completeness/quality of responses in the IOSEA Site Database form was tallied by site within each country. The results from each country were then summarized to provide an overview of the quality of the reporting (Table 79). Based on the scale of 0-3, Bangladesh and Indonesia provided the most complete descriptions of the nesting sites. Site descriptions were lacking in the database responses by the other three countries. The identification of threatening processes is far more important to managing sites, conducting research, and achieving conservation and management goals than simple site descriptions. All five BOBLME countries identified threatening processes very well. In addition, all countries have taken action to address the threatening processes occurring at the nesting sites.

The threatening processes have been operating for decades and remediation will not be achieved in a short time. To achieve successful remediation of threatening processes and recovery of depleted populations requires information and commitment. Research is needed on the species and their numbers using the nesting sites, as well as on the population structure using the near shore habitats. Continued governmental support of research and education projects is needed within each of the BOBLME countries. Also there is a need for between country communication and cooperation in support of marine turtles in the BOBLME sub-region.

**Table 79. Summary Assessment of the IOSEA Site Database.** Categories were assessed for completeness/quality of entry on a numerical scale (None = 0, Low = 1, Moderate = 2, High = 3, Unknown = not included in assessment).

	Site Description	Threats ID	Remediation	Additional Information
<b>Bangladesh</b>				
Index	2.78	2.94	2.33	1.78
Count	18	18	18	18
<b>India</b>				
Index	0	0	0	0
Count	114	114	114	114
<b>Indonesia</b>				
Index	2.11	2.67	2.00	0.22
Count	9	9	9	9
<b>Malaysia</b>				
Index	0	0	0	0
Count	11	11	11	11
<b>Maldives</b>				
Index	0	0	0	0
Count	53	53	53	53
<b>Myanmar</b>				
Index	0.00	3.00	2.62	0.85
Count	39	39	39	39
<b>Sri Lanka</b>				
Index	0.00	2.82	1.12	0.14
Count	50	50	50	50
<b>Thailand</b>				
Index	0.00	3.00	2.50	0.63
Count	8	8	8	8

Although research activity is low based on the number of sites (n= 23) from which it was reported (Table 80), research is critical to the recovery of population in the sub-region. However, the low number of research projects does not account for the contribution of the research information makes to the conservation management of marine turtles in each country or the entire BOBLME sub-region. It must be remembered that not every type of study needs to be replicated at each site to obtain relevant information to manage threatening processes on the country and sub-regional scales. Given the low number of studies and the large area of the sub-region, a more coordinated research effort is needed to provide the necessary data for conservation-management.

Tagging has been done, at least at a limited level, in all countries; so too has genetic sampling been done. Tagging (and subsequent recovery) and satellite tracking contribute directly to understanding habitat use, reproductive periodicity, and general biology. Genetic sampling helps to define the interrelatedness of populations using foraging and nesting sites scattered throughout the sub-region.

Foraging area population assessment is the one type of study that is lacking in the region. Because the foraging areas provide essential nutrition and safe habitat for marine turtles and

because different size classes utilize different habitats, understanding marine turtle populations in foraging areas is essential for conservation management in the BOBLME sub-region. The first step is the determination of the bathometric structure in the BOBLME, followed by the delineation of the distribution of specific habitats (e.g., coral reefs, sea grass meadows, mixed algal turf) that are used by marine turtles. This could be accomplished in conjunction with fisheries assessment in the sub-region because these habitats also support fishing activities and are important to the local economies. Healthy habitats for marine turtles are also healthy habitats for many juvenile and adult fish species.

**Table 80. Summary of categories of research projects reported by the BOBLME sub-region countries. X = at least one study that has produced relevant results in the country. Blank = no information.**

Country	Research / Number of sites	Tagging	Genetic Sampling	Satellite Tracking	Foraging Surveys
Bangladesh	1/18	X	X		
India					
Indonesia	6/9	X	X	X	X
Malaysia					
Maldives					
Myanmar	9/39	X	X		
Sri Lanka	2/50	X	X	X	
Thailand	5/8	X	X	X	X

### Google Site Maps

A total of 280 Google Earth images were obtained for the 316 nesting sites based on their latitude and longitude coordinates; the remaining sites did not have coordinates or the listed coordinates located a place that was not a beach (i.e., open water, inland site) such that the position could not be determined with confidence. Each image contains the coordinates of the location and the altitude, as well as other information about the image (Fig. 2). Images were standardized at an altitude between 30,000 and 35,000 feet with the nesting site coordinates positioned near the center to show the surrounding area (coastal, near shore water, hinterland) at each site.

Not only do these images provide a view of the current context of the nesting site, in many cases, they can be compared to older aerial photographs to provide a documentation of changes in the hinterland and near shore area. However, because these are static JPG images, they show only one nesting site and the format does not allow for dynamic movement among sites.

It would be helpful if the images could be linked to the Site Database so that users could select to open the image and view the nesting site. This requires modification of the existing database (adding a button that links to the image) but the visual information captured by the images is of high value. As additional nesting sites are added to the database, Google Earth images should be supplied along with the geocoordinates and other required information. Existing images need to

be checked by local researchers and/or managers to ensure that the geocoordinates listed in the database refer to the proper location.

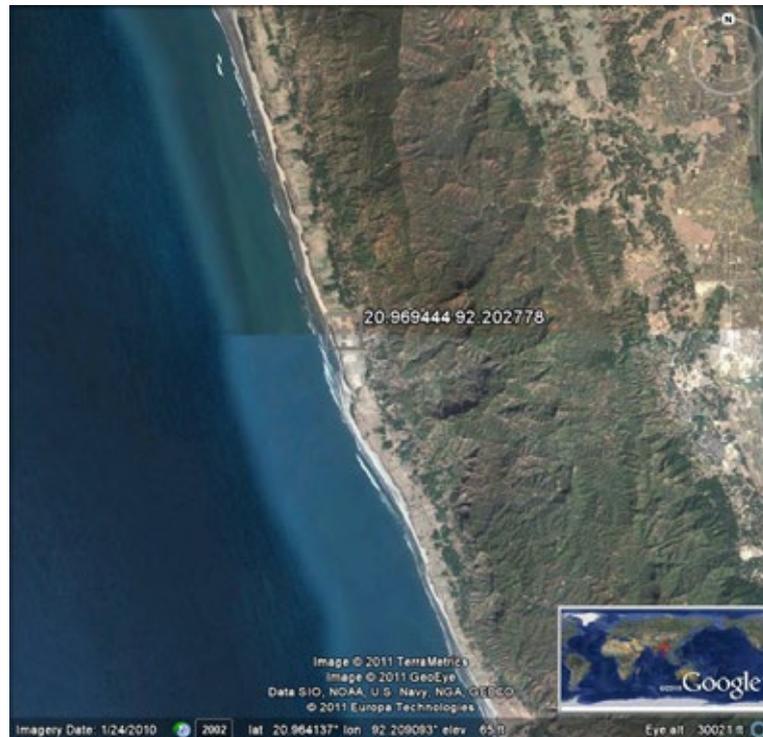


Figure 2. Example of a Google Earth image of a nesting site in Bangladesh.

### Summary (Section 1)

The IOSEA Nest Site Database constitutes a significant on-line resource of information about the distribution of nesting by five species of sea turtles in the Indian Ocean region. The information has been assembled from official contributions from BOBLME countries, the widely scattered literature, local knowledge, and other information about the BOBLME area.

Existing data from five countries (Bangladesh, Indonesia, Myanmar, Sri Lanka, Thailand) were checked plus additional nesting sites added. Nesting site data were added for three countries (India, Malaysia, Maldives) which had no records in the IOSEA database. Although greatly improved, many Site Datasheets are still incomplete because of the lack of available information.

Marine turtles utilizing nesting beaches and near-shore habitats face a similar set of threatening processes in the BOBLME region. Most of these are being addressed, at least in part, at the local level. Signatory countries are using a variety of remedial measures to address the threatening processes occurring within their jurisdictions. However, more communication and cooperation, particularly in border areas, is needed to augment the current efforts.

The over arching conservation management issues that impact marine turtle conservation and management in the BOBLME are the adoption of (1) standardized methods to facilitate collection of data and (2) the standardization of regulations concerning beach development and

fishing practices. Comparison among sites within and between countries is essential for sub-regional coordination of conservation and management efforts. Several field manuals have been written to address the standardized of methods issue (Table 81). Standardization of research methods, in turn, support both localized and sub-regional conservation and management efforts by providing comparable data for analysis at the sub-regional and larger scales. Additionally, the standardization (coordination) of regulations concerning beach development and fishing practices is an essential part of conservation management. For example, fishing gear regulations could be standardized, particularly in border areas where the resources are being harvested under two sets of country regulations.

**Table 81. Partial list of manuals that provide clear and concise descriptions of research methods and access to other related information.**

1	Eckert, K. L., Bjorndal, K. A., Abreu-Grobois, F. A., & Donnelly, M. (1999). <i>Research and Management Techniques for the Conservation of Sea Turtles</i> . IUCN/SSC Marine Turtle Specialist Group Publication No. 4.
2	Shanker, K., Pardav, B., & Andrews, H. (2003). <i>Sea turtle conservation: Research and Management Techniques</i> . A GOI-UNDP Project manual. Centre for Herpetology / Madras Crocodile Bank trust, Tamil Nadu, India.
3	Shanker, K., Choudhury, B. C., & Andrews, H. (2003). <i>Sea turtle conservation: beach management and hatchery programmes</i> . A GOI-UNDP Project manual. Centre for Herpetology / Madras Crocodile Bank Trust, Mamallapuram, Tamil Nadu, India.
4	Shanker, K., Choudhury, B. C., & Kar, C. (2007, reprinted in 2010.). <i>Census technique for arribadas Monitoring olive ridley sea turtles in Orissa</i> . Ecotone.
5	Shanker, K., Pandav, B., & Choudhury, B.C. (2003). <i>Sea turtle conservation: population census and monitoring</i> . A GOI-UNDP Project manual. Centre for Herpetology / Madras crocodile bank trust, Mamallapuram, Tamil Nadu, India.
6	PERSGA/GEF (2004). <i>Standard Survey Methods for Key Habitats and Key Species in the Red Sea and Gulf of Aden</i> . PERSGA Technical Series No. 10. PERSGA, Jeddah.
7	Work, T. M. (2000). <i>Sea turtle necropsy manual for biologists in remote refuges</i> . U.S. Geological Survey National Wildlife Health Center, Hawaii Field Station,
8	Phelan, S. & Eckert, K. (2006). <i>Marine turtle trauma response procedures: a field guide</i> . Wider Caribbean Sea Turtle conservation Network (WIDECAST) Technical Report No. 4. Beaubort, North Carolina.
9	FAO (2009). <i>Guidelines to reduce sea turtle mortality in fishing operation</i> . FAO, Rome.

### Recommendations (Section 1)

Country representatives (IOSEA Country Focal Points and other interested parties) should be encouraged to check all existing data in the IOSEA Site Database relevant to their country to ensure that it is accurate and up to date.

This includes review of the Google Earth image, physical description of each site, and species utilizing the area, plus the threatening processes and remedial actions for each site. Geocoordinates of many sites should be checked and edited as necessary. Once this process is complete, editing and adding information should be a relatively easy process. The application of local knowledge is essential to ensure accuracy of the information.

Because of the dynamic nature of conservation management, a bi-annual review of threatening processes and remedial actions is encouraged.

Whenever possible, nest site surveys should be conducted over the BOBLME to bring all the data to currency (e.g., in the Maldives, the distribution of nesting by species is based on very old surveys; new surveys need to be conducted to support management decisions).

IOSEA should improve the directions supplied and the training of country representatives concerning the completing of the Site Datasheets, the review process, and the on-line up-dating process. For example, the use of citations documenting published scientific papers and reports is preferred. The use of a person's name should be discouraged because it constitutes a personal communication and the information supporting the opinion cannot be evaluated independently nor can change be monitored.

IOSEA should develop and supply to the Country Representatives standards for obtaining and displaying geocoordinate information for the Site Database. Ensuring that GPS devices and projections are standardized on WGS-84 is recommended. This will reduce perceived error in displaying images based on the data.

## SECTION 2: COUNTRY BY COUNTRY ASSESSMENT

Data presented in this section are the result of amalgamation from all sources. Primary sources are identified for each country.

### BANGLADESH

#### Site Database Section 1: Definition of the Site/Area

A total of 19 nesting sites have been identified in Bangladesh; 18 have sufficient data to analyze. One site (Monkhali) does not have supporting data (Table 82).

Based on the present data, no active research projects are being conducted in Bangladesh except at St. Martins Island where tagging studies are in progress and genetic samples have been collected. In the future, assessment of the foraging area in the vicinity of each of the nesting sites should be conducted to identify (1) extent and quality of the area, and (2) areas of potential conflict with fisheries and other human activities. Satellite tracking of post-nesting females could be considered, especially if the genetic studies in the foraging areas do not provide links among the nesting populations.

The site descriptions are adequate for the majority of sites; however, Mandarbaria and Dubla island (Dublar Island) need to be improved (Table 82). All sites have latitude and longitude coordinates. Google Map images based on the coordinates of the nesting sites have been downloaded from the web to show the beach area, as well as the near shore and hinterland.

**Table 82. Summary of the sections of the site datasheets in the IOSEA Database for Bangladesh.**  
 Research: 0= none; 1= Tagging; 2= Genetic Samples; 3= Satellite tracking; 4= Foraging Surveys  
 Values: 0= none; 1= low or little; 2= medium, adequate; 3=high, complete; Blank= not reported.

Site Name	Research	Site Description	Threats ID	Remediation	Additional Information
Bordal (Bordail)	0	3	3	3	3
Cox's Bazar-Teknaf Peninsula	0	3	3	2	1
Dubla Island (Dublar Char)	0	2	3	3	0
Egg Island (Dimer Char)	0	3	3	2	1
Hiron Point	0	3	3	3	3
Inani	0	3	3	3	3
Katka Beach	0	3	3	3	1
Kochopia (Kocchopia)	0	3	3	3	3
Kutubdia Island	0	3	3	3	1
Mandarbaria	0	0	2	0	0
Moheskhal Island	0	3	3	2	1

Site Name	Research	Site Description	Threats ID	Remediation	Additional Information
Monkhali	No data available				
Najiretek	0	3	3	2	1
Nijhum Dwip	0	3	3	0	1
Sandweep Island	0	3	3	1	1
Shahporir Dweep	0	3	3	3	3
Sonadia Island	0	3	3	3	3
St. Martins Island	1, 2	3	3	3	3
Teknaf	0	3	3	3	3
<b>Count</b>		<b>18</b>	<b>18</b>	<b>18</b>	<b>18</b>
<b>Index</b>		<b>2.78</b>	<b>2.94</b>	<b>2.33</b>	<b>1.78</b>

A reference to the source of information was provided for 15 sites while 4 did not provide a reference. Primarily, the information about the nesting sites in Bangladesh was obtained from:

Rashid, S. M. A. and Islam M. Z. (2006). Status and conservation of marine turtles in Bangladesh. Marine Turtles of the Indian Subcontinent. K. Shanker and B. C. Choudhury. Hyderguda, Universities Press, India: 200-216.

Islam, M. Z. (2010). Final Report: Bangladesh Sea Turtle Project, 2008-09 Nesting Season. Marinelife Alliance, Bangladesh

## Site Database Section 2: Species Present

The majority of nesting in Bangladesh is by green and olive ridley turtles. Hawksbill and leatherback turtles nest in low numbers at St Martin's Island. Nesting by loggerhead turtles has not been reported in Bangladesh (Table 83). Green turtle nesting occurs throughout the area in low (1-10) numbers; whereas, olive ridley turtles nesting tends to be an order of magnitude higher.

**Table 83. Nesting sites in Bangladesh with an estimated number of turtles nesting arranged by site and species. Codes: CC= *C. caretta*, CM= *C. mydas*, LO= *L. olivacea*, EI= *E. imbricata*, DC= *D. coriacea*, UQ= Unquantified, ??= Unknown**

Prov./State	Site/Area	CC	CM	LO	EI	DC
Teknaf, Cox Bazar	Bordail (Bordal)		1-10	11-100		
Cox Bazar	Cox's Bazar-Teknaf Peninsula		1-10	1-10		
Sundarban West Sanctuary	Dimer Char (Egg Island)		1-10	11-100		
Moheskhal, Cox's Bazar	Dolghata			UQ		
Sundarbans, Bagerhat	Dubla Island (Dublar Char)		UQ	11-100		

Prov./State	Site/Area	CC	CM	LO	EI	DC
Sundarban South Sanctuary	Hiron Point		11-100	101-500		
Ukhia, Cox Bazar	Inani Beach (Inoni)		1-10	11-100		
Sundarban East Sanctuary	Katka Beach		UQ	101-500		
Teknaf, Cox Bazaar	Kocchopia (Kochopia)		1-10	11-100		
Cox Bazaar	Kutubdia Island		??	11-100		
Sundarbans, Bagerhat	Mandarbaria			UQ		
Cox Bazaar	Moheskhal Island		1-10	11-100		
Ukhia, Cox Bazar	Monkhali		1-10	1-10		
Cox Bazar Sadar	Najirertek		UQ	11-100		
Noakhali	Nijhum Dwip			11-100		
Chittagong	Parkir Char/Gohira			UQ		
Chittagong	Sandweep Island		1-10	11-100		
Teknaf, Cox Bazar	Shahporir Dweep		1-10	11-100		
Cox Bazaar	Sonadia Island		1-10	101-500		
Teknaf, Cox Bazar	St. Martins Island		11-100	101-500	?	1-10
Teknaf, Cox Bazar	Teknaf Beach		1-10	11-100		

The primary sources of this information are:

Rashid, S. M. A. and M. Z. Islam (2006). Status and conservation of marine turtles in Bangladesh. Marine Turtles of the Indian Subcontinent. K. Shanker and B. C. Choudhury, eds. Hyderabad, Universities Press, India: 200-216.

Islam, M. Zahirul (2010). Final Report: Bangladesh Sea Turtle Project, 2008-09 Nesting Season. Marinelife Alliance, Bangladesh.

### Site Database Section 3: Threatening Processes

All 18 sites with data have identified threatening processes. The most common threatening process is the *incidental capture in coastal fisheries* (Table 84). This widespread issue needs to be addressed at each nesting beach with local fishermen and at a national level with the regulatory agency. The second most widespread threatening process is *egg collection*; this needs to be dealt with at the local level through education and other social interactions. *Habitat degradation* is the third highest rank threatening process. It needs to be addressed at the local and regional levels through enforcement of existing regulations and through government channels to develop regulations that limit the negative impact of development. *Natural threats* (e.g., depredation, disease erosion) ranks fourth in the list of threatening processes. The impact of depredation on the eggs and hatchlings should be assessed and wherever possible reduced. This might include control of predators or enforcement of regulations on coastal development that affect the erosion of the beach. The assessment should be done on a beach by beach basis with a view to amalgamating the information into an education and training program at each local site. The amount of marine debris is also a problem that needs to be addressed at the local, regional and national levels through education and enforcement of regulations.

**Table 84. Summary of Threatening Processes identified at nesting sites in Bangladesh.**

Values: 0= none; 1= low or little; 2= medium, adequate; 3= high, complete; U= Unknown; Blank= Not reported. Other codes: cd= Coastal Development, f= fishing, t= Tourism, sm= special Management, h= Human Disturbance.

Site Name	Exploitation of nesting females	Direct harvest of animals in water	Egg collection	Incidental capture in coastal fisheries	Boat strikes	Marine debris	Industrial effluent	Inshore oil pollution	Agricultural/urban/ tourism development	Artificial lighting on land or near shore	Habitat degradation	Vehicles	Sand mining / removal	Natural threats, disease, predation	Other	Index
<i>Bordal (Bordail)</i>	1	1	3	3	2	2	1	1	2	2	3	3	3	3	cd	0.71
<i>Cox's Bazar-Teknaf Peninsula</i>	2	u	3	u	2	3	2	2	2	3	2	2	0	2	3t	0.60
<i>Dubla Island (Dublar Char)</i>	1	2	3	3	2	2	1	2	2	3	2	2	0	2		0.64
<i>Egg Island (Dimer Char)</i>	U	3	u	u	0	0	0	0	0	0	2	0	0	u		0.12
<i>Hiron Point</i>	U	u	1	3	1	2	1	1	1	1	2	1	0	2	3f	0.38
<i>Inani</i>	2	2	3	2	2	2	2	1	2	3	2	3	2	2	2t	0.71
<i>Katka Beach</i>	1	u	3	3	2	2	u	1	2	1	2	2	0	2		0.50
<i>Kochopia (Kocchopia)</i>	2	1	3	2	2	2	0	1	3	2	3	3	2	2	3sm	0.67
<i>Kutubdia Island</i>	2	3	3	3	2	2	1	2	2	2	3	2	u	2	2t	0.69
<i>Mandarbaria</i>	U	u	2				1	1		1	2	0	0	u		0.17
<i>Moheskhalia Island</i>	2	2	3	3	2	2	1	1	1	1	3	2	0	2	2t	0.60
<i>Monkhali</i>																0.00
<i>Najirertek</i>	3	u	3	3	3	3	2	2	1	2	3	3	u	3		0.74
<i>Nijhum Dwip</i>	U	u	3	3	3		1	1	2	2	2	2	1	3		0.55
<i>Sandweep Island</i>	U	u	3	3	u	2	u	u	1	2	3	0	0	0	3f	0.33
<i>Shahporir Dweep</i>	2	2	3	3	2	2	1	1	2	2	2	2	0	2	2t	0.62
<i>Sonadia Island</i>	1	0	3	3	2	1	0	1	1	1	2	2	2	2	3hd	0.50
<i>St. Martins Island</i>	0	1	2	3	2	3	1	1	3	3	3	2	0	2	3t	0.62
<i>Teknaf</i>	2	1	3	3	2	2	2	2	2	3	2	2	0	2	2t	0.67
<b>Index</b>	1.6	1.6	2.7	2.8	1.9	2.0	1.0	1.2	1.7	1.8	2.4	1.8	0.6	2.0		
<b>Rank</b>			B	A		D					C					

#### Site Database Section 4: Remedial Measures

Remediation measures are active at all sites, except Mandarbaria, Moonkhali, and Nijhum Dwip (Table 85). Most sites have more than one remediation action occurring as part of an integrated process to reduce the impact of threats (mean = 3.25). The most common approach to reducing and/or controlling the threatening processes is *education and awareness* programs (occurring at 14 sites). The next most common approach is the active *management of protected* areas (11 sites). Monitoring and protection programs are in place at 8 sites. St Martin's Island is using eight different approaches to address the local issues; seven different approaches are used at Bardal, Kocchopia and Teknaf.

**Table 85. Summary of remediating programmes implemented at nesting sites in Bangladesh.** Codes: X = Reported; Blank = Not Reported. Counts across columns exclude "Other"

	Monitoring / protection programmes	Education / awareness programmes	Egg relocation / hatcheries	Require modification of fishing gear or fishing practices	Designation / management of protected areas, sanctuaries, exclusion zones etc.	Regulations on building location / design	Regulations on artificial lighting	Vehicle / access restrictions	Removal of debris / beach clean-up	Predator control	Other	Count	Rank
Bordal (Bordail)	x	x	x		x	x		x		x		7	B
Cox's Bazar-Teknaf Peninsula		x							x			2	
Dubla Island (Dublar Char)		x			x			x				3	
Egg Island (Dimer Char)					x	x						2	
Hiron Point		x			x	x		x				4	
Inani	x	x	x		x				x			5	
Katka Beach		x		X	x			x			ft	4	
Kochopia (Kocchopia)	x	x	x		x	x	x	x				7	B
Kutubdia Island	x	x	x									3	
Mandarbaria												0	
Moheskhalia Island		x										1	
Monkhali												0	
Najirertek		x										1	
Nijhum Dwip												0	
Sandweep Island												0	
Shahporir Dweep	x	x	x		x				x		p	5	
Sonadia Island	x	x	x		x				x	x		6	C
St. Martins Island	x	x	x		x	x	x		x	x	xp	8	A
Teknaf	x	x	x		x	x			x	x		7	B
<b>Count</b>	<b>8</b>	<b>14</b>	<b>8</b>	<b>1</b>	<b>11</b>	<b>6</b>	<b>2</b>	<b>5</b>	<b>6</b>	<b>4</b>			
<b>Rank</b>	<b>C</b>	<b>A</b>	<b>D</b>		<b>B</b>								

## Recommendations for Issues Arising

Data for all sites should be reviewed, corrected as necessary, and linked to a primary source. A copy of all source material should be filed with IOSEA and an appropriate government agency.

The remedial actions should be paired with threatening processes to achieve a focused effort. Also a methodology should be established so that the effectiveness can be assessed.

If they do not exist, documents should be prepared to describe the remediation actions and how they address the threatening processes. If they exist, copies should be filed with IOSEA and with relevant government agencies.

If at all possible, off-shore habitat assessment should be conducted to delineate and define the habitats used by the foraging populations

Communication among the various local projects should be established to develop effective, wide-scale programs as quickly as possible.

## INDIA

Prior to the present exercise, no IOSEA Site Datasheets were filled in for any of the sites in India. The information about the nesting sites in India was obtained from:

- Bhupathy, S. and S. Saravanan (2006). Marine turtles of Tamil Nadu. Marine Turtles of the Indian Subcontinent. K. Shanker and B. C. Choudhury. Hyderguda, Universities Press, India: 58-67.
- Chowdhury, B. C., S. K. Das, and P.S. Ghose. (2006). Marine turtles of West Bengal. Marine Turtles of the Indian Subcontinent. (K. Shanker and B. C. Choudhury, Eds.). Hyderguda, Universities Press, India: 107-116.
- Shanker, K., J. Ramadevi, B. C. Choudhury, L. Singh, and R. K. Aggarwal. (2004). Phylogeography of olive ridley turtles (*Lepidochelys olivacea*) on the east coast of India: implications for conservation theory. *Molecular Ecology* 13: 1899-1909.
- Tripathy, B., K. Shanker, and B. C. Choudhury. (2003). Important nesting habitats of olive ridley turtles *Lepidochelys olivacea* along the Andhra Pradesh coast of eastern India. *Oryx* 37(4): 454-463.

### Site Database Section 1: Definition of the Site/Area

A total of one hundred fourteen nesting sites have been identified in India, including the coast of the mainland and the Andaman and Nicobar Islands. More will probably be identified.

Although active research projects are in progress along much of the Indian coast, the locations and activities have not been identified in the IOSEA Site Database for any project.

### Site Database Section 2: Species Present

Because Site Datasheets were not prepared for any nesting site in India, descriptions were not recorded for any of the sites. The primary literature was used to identify 114 sites for which latitude and longitude coordinates could be found (Table 86). The species and the estimated number of nesting turtles at each site were classified according to the IOSEA scale. The numbers of nesting turtles of all species were generally in the 10-100 range, with the exception of the olive ridley. In most cases the actual number of nesting turtles is toward the lower end of the range given in the table.

The green turtle is the most widely distributed nesting species but the olive ridley is the most numerous nesting species because of the *arribada* nesting aggregations. Hawksbill turtles and leatherback turtles nest at multiple locations in the Andaman and Nicobar Islands rather than along the mainland coast. Loggerhead turtles are not known to nest in India.

**Table 86. Species present at nesting sites in India with an estimated number of turtles nesting arranged by site. Codes: CC= *C. caretta*, CM= *C. mydas*, LO= *L. olivacea*, EI= *E. imbricata*, DC= *D. coriacea*, UQ= Unquantified, ??= Unknown**

General location	Locality	CC	CM	LO	EI	DC
Andaman (Middle) - Coastal Locations	Cuthbert Bay		10-100	10-100		10-100
Andaman (Middle) - Coastal Locations	Karmatang		10-100			
Andaman (Middle) - Coastal Locations	Paikat Bay		10-100	10-100		
Andaman (Middle) - Coastal Locations	Robert Bay		10-100		10-100	
Andaman (Middle) - Coastal Locations	Woteng		10-100			
Andaman (Middle) - Eastern Coast	Baratang Island		10-100	10-100	10-100	
Andaman (Middle) - Eastern Coast	East coast of Baratang		10-100		1-10	
Andaman (Middle) - Eastern Coast	Long Island		10-100			
Andaman (Middle) - Eastern Coast	North Passage Island				10-100	
Andaman (Middle) - Western Coast	Anderson Island				1-10	
Andaman (Middle) - Western Coast	Flat Island		10-100		10-100	
Andaman (Middle) - Western Coast	Hump Island		10-100		1-10	
Andaman (Middle) - Western Coast	Interview Island		10-100		1-10	
Andaman (Middle) - Western Coast	South Reef Island		10-100		1-10	
Andaman (Middle) - Western Coast	Tuft Island		10-100		10-100	
Andaman (North) - Coastal Locations along North Andaman Is	Beale Bay		10-100			
Andaman (North) - Coastal Locations along North Andaman Is	Casuarina Bay					
Andaman (North) - Coastal Locations along North Andaman Is	Coffee Dera		10-100			1-10
Andaman (North) - Coastal Locations along North Andaman Is	Lamia Bay (Lamyia ?)		10-100			
Andaman (North) - Coastal Locations along North Andaman Is	Pine Bay		10-100			
Andaman (North) - Coastal Locations along North Andaman Is	Ramnagar Beach (Ram Nagar Beach ?)		10-100	10-100		
Andaman (North) - Coastal Locations along North Andaman Is	Taralait Bay		10-100	10-100		1-10
Andaman (North) - Eastern Coast	Craggy Island		10-100		10-100	
Andaman (North) - Eastern Coast	Delgarno					
Andaman (North) - Eastern Coast	East Island		10-100		1-10	
Andaman (North) - Eastern Coast	East Turtle		10-100			
Andaman (North) - Eastern Coast	Excelsior Island		10-100	10-100	1-10	
Andaman (North) - Eastern Coast	Pocock Point		10-100			
Andaman (North) - Eastern Coast	Rose Island		10-100		1-10	
Andaman (North) - Eastern Coast	Ross Island		10-100		10-100	
Andaman (North) - Eastern Coast	Smith Island		10-100	10-100	10-100	

General location	Locality	CC	CM	LO	EI	DC
Andaman (North) - Eastern Coast	Sound Island		10-100		10-100	
Andaman (North) - Eastern Coast	Tage		10-100			
Andaman (North) - Eastern Coast	Temple Island		10-100		10-100	
Andaman (North) - Eastern Coast	Trilby Island		10-100	10-100	10-100	
Andaman (North) - Western Coast	Kwangtung Point		10-100			1-10
Andaman (North) - Western Coast	Landfall Island		10-100		1-10	
Andaman (North) - Western Coast	Latouche Island		10-100		1-10	
Andaman (North) - Western Coast	North Reef Island		10-100		1-10	
Andaman (North) - Western Coast	Paget Island		10-100			
Andaman (North) - Western Coast	Point Island		10-100		1-10	
Andaman (North) - Western Coast	Reef		10-100			
Andaman (North) - Western Coast	Snark Islands		10-100		10-100	
Andaman (North) - Western Coast	West		10-100			
Andaman (North) - Western Coast	WhiteCliff		10-100			
Andaman (Ritchie's Archipelago) -	North Passage Island		10-100			
Andaman (Ritchie's Archipelago) -	Outram Island		10-100			
Andaman (Ritchie's Archipelago) -	South Button Island		10-100		1-10	
Andaman (Ritchie's Archipelago) -	Sir Hugh Rose Island		10-100		10-100	
Andaman (Ritchie's Archipelago) -	Neil Island		10-100		10-100	
Andaman (Ritchie's Archipelago) -	Middle Button Island		10-100	10-100	10-100	
Andaman (Ritchie's Archipelago) -	North Button Island		10-100		10-100	
Andaman (Ritchie's Archipelago) -	Inglish Island		10-100		10-100	
Andaman (Ritchie's Archipelago) -	Havelock Island		10-100			
Andaman (South) - Little Andaman Is	beaches between Ekiti Bay and Jackson Creek					10-100
Andaman (South) - Little Andaman Is	beaches south of Dugong Creek				10-100	
Andaman (South) - Little Andaman Is	Butler Bay		10-100	10-100	10-100	
Andaman (South) - Little Andaman Is	Hut Bay			10-100		
Andaman (South) - Little Andaman Is	Jackson Creek		10-100			
Andaman (South) - Little Andaman Is	Little Andaman Island		10-100			
Andaman (South) - Little Andaman Is	North of Hut Bay		10-100	10-100		
Andaman (South) - Little Andaman Is	South Bay			10-100		1-10
Andaman (South) - Little Andaman Is	South of Bumila creek		10-100			
Andaman (South) - Little Andaman Is	West Bay		10-100			10-100
Andaman (South) - Other areas along South Andaman Is	beaches between Ekiti Bay and Jackson Creek				10-100	
Andaman (South) - Other areas along South Andaman Is	Corbyn Cove		10-100			
Andaman (South) - Other areas along South Andaman Is	Iki Bay		10-100			

General location	Locality	CC	CM	LO	EI	DC
Andaman (South) - Other areas along South Andaman Is	Madhuban		10-100	10-100	10-25	
Andaman (South) - Rutland Is	Jahiji Beach					10-100
Andaman (South) - Tarmugli Is	Mahatma Ghandi Marine National Park				10-25	
Andaman (South) - Western Coast	Beele (Bele ? )		10-100			
Andaman (South) - Western Coast	Bluff Island		10-100		10-25	
Andaman (South) - Western Coast	Boat		10-100		10-100	
Andaman (South) - Western Coast	East Twin Island		10-100			
Andaman (South) - Western Coast	Grub		10-100		10-100	
Andaman (South) - Western Coast	Jolly Buoy		10-100		10-100	
Andaman (South) - Western Coast	North Brother Island		10-100		10-100	
Andaman (South) - Western Coast	North Cinque Island		10-100			
Andaman (South) - Western Coast	North Sisters		10-100			
Andaman (South) - Western Coast	northeast of Egu Belong Creek				10-25	
Andaman (South) - Western Coast	Passage Island		10-100			
Andaman (South) - Western Coast	Petrie Island (Petri ?)		10-100		10-100	
Andaman (South) - Western Coast	Red Skin Island		10-100			
Andaman (South) - Western Coast	Rutland Island		10-100	10-100		1-10
Andaman (South) - Western Coast	South Brother Island		10-100			
Andaman (South) - Western Coast	South Cinque Island		10-100			10-100
Andaman (South) - Western Coast	South Sister		10-100			
Andaman (South) - Western Coast	Spike Island		1-10			
Andaman (South) - Western Coast	Tarmugli		10-100		10-100	
Andaman (South) - Western Coast	West Twin Island		1-10			
Andhra Pradesh - (Zone A ), Sector I	Bahuda - Vamsadhara (100 km)			100-1000		
Andhra Pradesh - (Zone A ), Sector II	Vamsadhara - Nagavali (28 km)			100-1000		
Andhra Pradesh - (Zone A ), Sector III	Nagavali - Sarada (135 km)			100-1000		
Andhra Pradesh - (Zone A ), Sector IV	Sarada - Goutami (65 km)			100-1000		
Andhra Pradesh - (Zone B ), Sector VI	Vasosta - Krishna (160 km)			100-1000		
Andhra Pradesh - (Zone B ), Sector V	Goutami - Vasosta (25 km)			100-1000		
Andhra Pradesh - (Zone C ), Sector IX	Pennaru - Swarnamuki (80 km)			10-100		
Andhra Pradesh - (Zone C ), Sector VII	Krishna - Musi (130 km)			10-100		
Andhra Pradesh - (Zone C ), Sector VIII	Musi - Pennaru (100 km)			10-100		
Andhra Pradesh - (Zone C ), Sector X	Swarnamuki - Pulicat (50 km)			10-100		
Andhra Pradesh - Eastern Coast	Kalingapatnam			100-1000		
Andhra Pradesh - Eastern Coast	Srikurmam			10-100		
Minicoy Island group - Minicoy group	Minicoy group			10-100		

General location	Locality	CC	CM	LO	EI	DC
Nicobar (Great) - Eastern coast	Laful Anch Creek		1-10			1-10
Nicobar (Great) - Eastern coast	Navy Dhara		1-10			1-10
Nicobar (Great) - Eastern coast	Saphed Balu beach		1-10		1-10	10-100
Nicobar (Great) - Eastern coast	South Bay			10-100		10-100
Nicobar (Great) - Eastern coast	South East Great Nicobar		1-10			1-10
Nicobar (Great) - Western coast	Alexandria River mouth		1-10	10-100		10-100
Nicobar (Great) - Western coast	Casuarina Bay		1-10	10-100		1-10
Nicobar (Great) - Western coast	Galathea Beach			10-100		10-100
Nicobar (Great) - Western coast	Great Nicobar Island				1-10	
Nicobar (Great) - Western coast	Pulo Bahi		1-10			
Nicobar (Great) - Western coast	Pulo Kunji beach		1-10			10-100
Nicobar (Great) - Western coast	Renhong beach		1-10			10-100
Nicobar (Great) - Western coast	Rokoret beach		1-10			10-100
Nicobar (Little) -	Beaches of the Nicobar Islands				1-10	
Nicobar (Little) - Eastern Coast	Bivaye		1-10			
Nicobar (Little) - Eastern Coast	Kabra Island				10-100	
Nicobar (Little) - Eastern coast	Pulo Pahan		1-10			
Nicobar (Little) - Eastern coast	Pulo Ulan		1-10			
Nicobar (Little) - Western coast	Akupa beach and Maka Chua		1-10		1-10	10-100
Nicobar (Little) - Western coast	Dahvu beach		1-10		1-10	1-10
Nicobar (Little) - Western coast	Delgarno		1-10		1-10	
Nicobar (Little) - Western coast	Gota Bay		1-10		1-10	
Nicobar (Little) - Western coast	Maka Chua beach				1-10	
Nicobar (Little) - Western coast	Pulo Baha beach		1-10		1-10	10-100
Nicobar (Little) - Western coast	Pulo Kiyang beach		1-10			
Nicobar (Little) - Western coast	Pulo Kiyang beach					10-100
Nicobar (Little) - Western coast	Pulo Kiyang beach				1-10	
Nicobar - Eastern coast	Trinket Island				1-10	
Nicobar -	Car Nicobar Island		1-10			
Nicobar -	Katchal Island		1-10	10-100	10-100	10-100
Nicobar -	Meroe Island		1-10		10-100	
Nicobar -	Pulo Milo Island				10-100	
Nicobar -	Teressa Island		1-10	10-100	10-100	10-100
Nicobar -	Tillanchong Island				1-10	

General location	Locality	CC	CM	LO	EI	DC
Nicobar -	Trak Island		1-10		10-100	
Nicobar -	Treis Island		1-10		10-100	
Orissa - Eastern Coast	Akashdia Island			15K - 20K		
Orissa - Eastern Coast	Balasore coast (130 km)					
Orissa - Eastern Coast	Chilika coast (70 km)			10-100		
Orissa - Eastern Coast	Devi coast (30 km)			100-1000		
Orissa - Eastern Coast	Devi River mouth			1.5x10 <sup>6</sup>		
Orissa - Eastern Coast	Gahirmatha coast (35 km)			1x10 <sup>5</sup>		
Orissa - Eastern Coast	Ganjam coast (60 km)			100-1000		
Orissa - Eastern Coast	Kujang coast (30 km)			100-1000		
Orissa - Eastern Coast	Pardeep coast (55 km)			10-100		
Orissa - Eastern Coast	Puri coast (55 km)			10-100		
Orissa - Eastern Coast	Sahana Nasi (3 km)			100-1000		
Tamil Nadu - Eastern Coast	Chennai – Madras			10-100		
Tamil Nadu - Eastern Coast	Kanniyakumari to Tiruchendur (80 km)			10-100		
Tamil Nadu - Eastern Coast	Mamallapuram - Pondi (30 km)			10-100		
Tamil Nadu - Eastern Coast	Mamallapuram - Chennai (40 km)			10-100		
Tamil Nadu - Eastern Coast	Nagapattinam			100-1000		
Tamil Nadu - Eastern Coast	Point Calimere - Nagapattinam (30 km)			10-100		
Tamil Nadu - Eastern Coast	Pondicherry - Mamallapuram (60 km)			10-100		
Tamil Nadu - Eastern Coast	Rameswaram (15 km)		1-10	10-100		
Tamil Nadu - Eastern Coast	Tiruchendur to Mandapam (60 km)			10-100		
Tamil Nadu - Eastern Coast	Tranquebar to Pazhaiyar (50 km)			10-100		
West Bengal - Coastal Location	Digha / Dadanpatrabar Medinipore			10-100		
West Bengal - Eastern Coast	Pocock Sand		1-10			
West Bengal - Sunderban Biosphere Reserve	Bijeera			10-100		
West Bengal - Sunderban Biosphere Reserve	Jambudwip Is			10-100		
West Bengal - Sunderban Biosphere Reserve	Kalash Is			10-100		
West Bengal - Sunderban Tiger Reserve	Chaimari Is			10-100		
West Bengal - Sunderban Tiger Reserve	Mandarbaria Is		1-10	10-100		
West Bengal - Sunderban Tiger Reserve	Mechua Is			100-1000		

### Site Database Section 3: Threatening Processes

Although many coastal areas, like Orissa, are undergoing development or are locations where multiple threatening processes occur, none have been identified in the IOSEA database or from the primary literature in a manner that allows classification on the 0-3 scale (Table 87). At the present time, *Incidental capture, depredation, together with Agriculture/urban/tourism development and Artificial lighting* appear to be the main threatening processes. Although, threatening processes have not been associated with the majority of nesting sites, they are likely to be occurring at most sites. Further information is required to clarify the situation at each site and to provide a basis on which remedial actions can be conducted.

**Table 87. Matrix of threatening processes occurring at marine turtle nesting sites in India.** Because no data are available to indicate the scale (0-3) of the threat, an 'X' has been used to indicate that it is occurring at the site. ? = Possible/Probable

Local	Exploitation of nesting females	Direct harvest of animals in	Egg collection	Incidental capture in coastal fisheries	Boat strikes	Marine debris	Industrial effluent	Inshore oil pollution	Agricultural/urban/tourism development	Artificial lighting on land or near shore	Habitat degradation	Vehicles	Sand mining / removal	Natural threats, disease, predation	Other (0-3 = Code)
Akashdia Island				x										x	
Akupa beach and Maka Chua															
Alexandria River mouth		?	?											?	
Anderson Island															
Bahuda - Vamsadhara (100 km)				x					x	x				x	
Balasore coast (130 km)		?	?											?	
Baratang Island															
beaches between Ekiti Bay and Jackson Creek		?	?											?	
Beaches of the Nicobar Islands		?	?											?	
beaches south of Dugong Creek		?	?											?	
Beale Bay															
Beele (Bele ?)															
Bijeara		x		x					x					x	
Bivaye															
Bluff Island															

Local	Exploitation of nesting females	Direct harvest of animals in	Egg collection	Incidental capture in coastal fisheries	Boat strikes	Marine debris	Industrial effluent	Inshore oil pollution	Agricultural/urban/tourism development	Artificial lighting on land or near shore	Habitat degradation	Vehicles	Sand mining / removal	Natural threats, disease, predation	Other (0-3 = Code)
Boat															
Butler Bay															
Car Nicobar Island		?	?	?					?					?	
Casuarina Bay															
Casuarina Bay															
Chaimari Is		x		x					x					x	
Chennai - Madras	x			x											
Chilika coast (70 km)		?		x										x	
Coffree Dera															
Corbyn Cove															
Craggy Island															
Cuthbert Bay		x	x											x	
Dahvu beach															
Delgarno															
Devi coast (30 km)		?	?	x										?	
Devi River mouth				x										x	
Digha / Dadanpatrabar Medinipore		x		x										x	
East coast of Baratang		?	?											?	
East Island															
East Turtle															
East Twin Island															
Excelsior Island															
Flat Island															
Gahirmatha coast (35 km)				x										x	
Galathea Beach														x	
Ganjam coast (60 km)		?	?	x										x	
Gota Bay															
Goutami - Vasosta (25 km)				x					x	x				x	
Great Nicobar Island		?	?											?	
Grub															
Havelock Island															

Local	Exploitation of nesting females	Direct harvest of animals in	Egg collection	Incidental capture in coastal fisheries	Boat strikes	Marine debris	Industrial effluent	Inshore oil pollution	Agricultural/urban/tourism development	Artificial lighting on land or near shore	Habitat degradation	Vehicles	Sand mining / removal	Natural threats, disease, predation	Other (0-3 = Code)
Hump Island															
Hut Bay															
Iki Bay															
Inglish Island															
Interview Island															
Jackson Creek		?	?											?	
Jahiji Beach														x	
Jambudwip Is		x		x					x					x	
Jolly Buoy															
Kabra Island															
Kalash Is		x		x					x					x	
Kalingapatnam															
Kanniyakumari to Tiruchendur (80 km)	x			x										?	
Karmatang															
Katchal Island															
Krishna - Musi (130 km)				x					x	x				x	
Kujang coast (30 km)				x										x	
Kwangtung Point															
Laful Anch Creek															
Lamia Bay (Lamiya Bay)			?											?	
Landfall Island															
Latouche Island															
Little Andaman Island			?											?	
Long Island									x				x		
Madhuban													x	x	
Mahatma Ghandi Marine National Park			?											?	
Maka Chua beach															
Mamallapuram - Pondi (30 km)	x		?	x										?	
Mamallapuram - Chennai (40 km)	x			x											
Manda - Thondi (30 km)			?											?	

Local	Exploitation of nesting females	Direct harvest of animals in	Egg collection	Incidental capture in coastal fisheries	Boat strikes	Marine debris	Industrial effluent	Inshore oil pollution	Agricultural/urban/tourism development	Artificial lighting on land or near shore	Habitat degradation	Vehicles	Sand mining / removal	Natural threats, disease, predation	Other (0-3 = Code)
Mandarbaria Is		x		x										x	
Mechua Is		x		x					x					x	
Meroe Island															
Middle Button Island															
Minicoy group															
Musi-Pennaru (100 km)			?	x					x	x				x	
Nagapattinam	x			x											
Nagapattinam (50 km)			?											?	
Nagavali-Sarada (135 km)				x					x	x				x	
Navy Dhara															
Neil Island															
North Brother Island															
North Button Island															
North Cinque Island													x		
North Hut Bay															
North Passage Island															
North Reef Island															
North Sisters northeast of Egu Belong Creek			?											?	
Outram Island															
Paget Island															
Paikat Bay															
Pardeep coast (55 km)				x										x	
Passage Island															
Pennaru - Swarnamuki (80 km)				x					x	x				x	
Petrie Island															
Pine Bay															
Pocock Point															
Pocock Sand		x		x										x	
Point Calimere - Nagapattinam (30 km)	x			x											

Local	Exploitation of nesting females	Direct harvest of animals in	Egg collection	Incidental capture in coastal fisheries	Boat strikes	Marine debris	Industrial effluent	Inshore oil pollution	Agricultural/urban/tourism development	Artificial lighting on land or near shore	Habitat degradation	Vehicles	Sand mining / removal	Natural threats, disease, predation	Other (0-3 = Code)
Point Island															
Pondicherry - Mamallapuram (60 km)	x		?	x										?	
Pulo Baha beach															
Pulo Bahi															
Pulo Kiyang beach															
Pulo Kunji beach															
Pulo Milo Island															
Pulo Pahan															
Pulo Ulan															
Puri coast (55 km)				x										x	
Rameswaram (15 km)	x			x										?	
Ramnagar Beach (Ram Nagar Beach )													x	?	
Red Skin Island															
Reef															
Renhong beach															
Robert Bay															
Rokoret beach															
Rose Island															
Ross Island										x				x	
Rutland Island													x	x	
Sahana Nasi (3 km)				x										x	
Saphed Balu beach															
Sarada - Goutami (65 km)				x					x	x				x	
Sir Hugh Rose Island															
Smith Island			x						x					x	
Snark Islands															
Sound Island															
South Bay															
South Bay															
South Brother Island															
South Button Island															

Local	Exploitation of nesting females	Direct harvest of animals in	Egg collection	Incidental capture in coastal fisheries	Boat strikes	Marine debris	Industrial effluent	Inshore oil pollution	Agricultural/urban/tourism development	Artificial lighting on land or near shore	Habitat degradation	Vehicles	Sand mining / removal	Natural threats, disease, predation	Other (0-3 = Code)
South Cinque Island															
South East Great Nichobar			?											?	
south of Bumila creek															
South Reef Island															
South Sister															
Spike Island															
Srikurmam															
Swarnamuki - Pulicat (50 km)			?	x					x	x				x	
Tage															
Taralait Bay															
Tarmugli															
Temple Island															
Teressa Island															
Tillanchong Island															
Tiruchendur to Mandapam (60 km)	x		?	x										?	
Trak Island															
Tranquebar to Pazhaiyar (50 km)	x			x										?	
Treis Island															
Trilby Island															
Trinket Island															
Tuft Island															
Vamsadhara - Nagavali (28 km)				x					x	x				x	
Vasosta - Krishna (160 km)				x					x	x				x	
West															
West Bay															
West Twin Island															
WhiteCliff															
Woteng															
<b>Count</b>	<b>10</b>	<b>9</b>	<b>2</b>	<b>38</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>17</b>	<b>11</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>34</b>	<b>0</b>
<b>Rank</b>				<b>A</b>					<b>C</b>	<b>D</b>				<b>B</b>	

#### Site Database Section 4: Remedial Measures

Although it is likely that many coastal areas have remediation projects in place, none have been identified in the IOSEA database or from the primary literature in a manner that allows classification on the 0-3 scale (Table 88). Remediation projects may be associated with several nesting site, but details are generally lacking. At present, *Monitoring / protection programmes, Egg relocation / hatcheries, and Designation / management of protected areas, sanctuaries, exclusion zones etc.* appear to be the most common approaches to remediation. Given the level of coastal fisheries occurring in the near and off-shore areas, the modification of fishing gear or fishing practices to reduce incidental capture of marine turtles should be high on the list of priority for needed actions.

**Table 88. Summary of Remediating Programs implemented at nesting sites.**

Codes: X = Reported; Blank = Not Reported.

Local	Monitoring / protection programmes	Education / awareness programmes	Egg relocation / hatcheries	Require modification of fishing gear or fishing practices	Designation / management of protected areas, sanctuaries, exclusion zones etc.	Regulations on building location / design	Regulations on artificial lighting	Vehicle / access restrictions	Removal of debris / beach clean-up	Predator control	Other
Akashdia Island					x						
Akupa beach and Maka Chua											
Alexandria River mouth											
Anderson Island											
Bahuda - Vamsadhara (100 km)											
Balasore coast (130 km)											
Baratang Island											
beaches between Ekiti Bay and Jackson Creek											
Beaches of the Nicobar Islands											
beaches south of Dugong Creek											
Beale Bay											
Beele (Bele ? )											
Bijeara											
Bivaye											

Local	Monitoring / protection programmes	Education / awareness programmes	Egg relocation / hatcheries	Require modification of fishing gear or fishing practices	Designation / management of protected areas, sanctuaries, exclusion zones etc.	Regulations on building location / design	Regulations on artificial lighting	Vehicle / access restrictions	Removal of debris / beach clean-up	Predator control	Other
Bluff Island											
Boat											
Butler Bay											
Car Nicobar Island											
Casuarina Bay											
Casuarina Bay											
Chaimari Is											
Chennai - Madras											
Chilika coast (70 km)					x						
Coffree Dera											
Corbyn Cove											
Craggy Island											
Cuthbert Bay	x		x								
Dahvu beach											
Delgarno											
Devi coast (30 km)					x						
Devi River mouth					x						
Digha / Dadanpatrabar Medinipore											
East coast of Baratang											
East Island											
East Turtle											
East Twin Island											
Excelsior Island											
Flat Island											
Gahirmatha coast (35 km)					x						
Galathea Beach	x		x								
Ganjam coast (60 km)					x						
Gota Bay											
Goutami - Vasosta (25 km)											

Local	Monitoring / protection programmes	Education / awareness programmes	Egg relocation / hatcheries	Require modification of fishing gear or fishing practices	Designation / management of protected areas, sanctuaries, exclusion zones etc.	Regulations on building location / design	Regulations on artificial lighting	Vehicle / access restrictions	Removal of debris / beach clean-up	Predator control	Other
Great Nicobar Island											
Grub											
Havelock Island											
Hump Island											
Hut Bay											
Iki Bay											
Inglish Island											
Interview Island											
Jackson Creek											
Jahiji Beach											
Jambudwip Is											
Jolly Buoy											
Kabra Island											
Kalash Is											
Kalingapatnam											
Kanniyakumari to Tiruchendur (80 km)											
Karmatang											
Katchal Island											
Krishna - Musi (130 km)											
Kujang coast (30 km)					x						
Kwangtung Point											
Laful Anch Creek											
Lamia Bay (Lamiya Bay ?)											
Landfall Island											
Latouche Island											
Little Andaman Island											
Long Island											
Madhuban											
Mahatma Ghandi Marine National Park											

Local	Monitoring / protection programmes	Education / awareness programmes	Egg relocation / hatcheries	Require modification of fishing gear or fishing practices	Designation / management of protected areas, sanctuaries, exclusion zones etc.	Regulations on building location / design	Regulations on artificial lighting	Vehicle / access restrictions	Removal of debris / beach clean-up	Predator control	Other
Maka Chua beach											
Mamallapuram - Pondi (30 km)	x				x						
Mamallapuram - Chennai (40 km)	x				x						
Manda - Thondi (30 km)											
Mandarbaria Is											
Mechua Is											
Meroe Island											
Middle Button Island											
Minicoy group											
Musi - Pennaru (100 km)											
Nagapattinam											
Nagapattinam (50 km)											
Nagavali - Sarada (135 km)											
Navy Dhara											
Neil Island											
North Brother Island											
North Button Island											
North Cinque Island											
North Hut Bay											
North Passage Island											
North Reef Island											
North Sisters											
northeast of Egu Belong Creek											
Outram Island											
Paget Island											
Paikat Bay											
Pardeep coast (55 km)					x						
Passage Island											
Pennaru - Swarnamuki (80 km)											

Local	Monitoring / protection programmes	Education / awareness programmes	Egg relocation / hatcheries	Require modification of fishing gear or fishing practices	Designation / management of protected areas, sanctuaries, exclusion zones etc.	Regulations on building location / design	Regulations on artificial lighting	Vehicle / access restrictions	Removal of debris / beach clean-up	Predator control	Other
Petrie Island											
Pine Bay											
Pocock Point											
Pocock Sand											
Point Calimere - Nagapattinam (30 km)											
Point Island											
Pondicherry - Mamallapuram (60 km)											
Pulo Baha beach											
Pulo Bahi											
Pulo Kiyang beach											
Pulo Kunji beach											
Pulo Milo Island											
Pulo Pahan											
Pulo Ulan											
Puri coast (55 km)					x						
Rameswaram (15 km)											
Ramnagar Beach (Ram Nagar Beach )	x		x								
Red Skin Island											
Reef											
Renhong beach											
Robert Bay											
Rokoret beach											
Rose Island											
Ross Island											
Rutland Island	x		x								
Sahana Nasi (3 km)					x						
Saphed Balu beach											
Sarada - Goutami (65 km)											
Sir Hugh Rose Island											

Local	Monitoring / protection programmes	Education / awareness programmes	Egg relocation / hatcheries	Require modification of fishing gear or fishing practices	Designation / management of protected areas, sanctuaries, exclusion zones etc.	Regulations on building location / design	Regulations on artificial lighting	Vehicle / access restrictions	Removal of debris / beach clean-up	Predator control	Other
Smith Island	x		x								
Snark Islands											
Sound Island											
South Bay											
South Bay											
South Brother Island											
South Button Island											
South Cinque Island											
South East Great Nichobar											
south of Bumila creek											
South Reef Island											
South Sister											
Spike Island											
Srikurmam											
Swarnamuki - Pulicat (50 km)											
Tage											
Taralait Bay											
Tarmugli											
Temple Island											
Teressa Island											
Tillanchong Island											
Tiruchendur to Mandapam (60 km)											
Trak Island											
Tranquebar to Pazhaiyar (50 km)											
Treis Island											
Trilby Island											
Trinket Island											
Tuft Island											
Vamsadhara - Nagavali (28 km)											

	Monitoring / protection programmes	Education / awareness programmes	Egg relocation / hatcheries	Require modification of fishing gear or fishing practices	Designation / management of protected areas, sanctuaries, exclusion zones etc.	Regulations on building location / design	Regulations on artificial lighting	Vehicle / access restrictions	Removal of debris / beach clean-up	Predator control	Other
Local											
Vasosta - Krishna (160 km)											
West											
West Bay											
West Twin Island											
WhiteCliff											
Woteng											
<b>Count</b>	7	0	5	0	12	0	0	0	0	0	0
<b>Rank</b>	B		C		A						

### Recommendations for Issues Arising

Data for all sites should be reviewed, corrected as necessary, and linked to a primary source. A list and a copy of all source material should be filed with IOSEA and an appropriate government agency.

Research projects should be documented. Projects should have identified goals and methods available in summary documents.

The threatening processes need to be identified and evaluated for potential impact at the majority of sites.

The remedial actions should be paired with threatening processes to achieve a focused effort and a methodology should be established so that the effectiveness can be assessed.

If they do not exist, documents should be prepared to describe the remediation actions and how they address the threatening processes. If they exist, copies should be filed with IOSEA and with relevant government agencies.

Communication among the various local projects should be established to develop effective, wide-scale programs as quickly as possible.

If at all possible, off-shore habitat assessment should be conducted to delineate and define the habitats used by the foraging populations

Fishing practices and gear should be reviewed at local and national levels with a view to reducing incidental capture of marine turtles by introducing modifications to the gear used and/or fishing practices, especially in areas of special concern (e.g., internesting areas, foraging areas).

## INDONESIA

### Site Database Section 1: Definition of the Site/Area

A total of 15 nesting sites have been identified in the BOBLME sub-region of Indonesia. Several sites have no supporting data (Amandangan, Bangkaru, Bantul, Kepulauan Riau (Riau Islands), Kepulauan Lingga (Lingga Islands), Nusa Barung, Rantau Salang, and Segama Besar Island); whereas, eight have supporting data available.

Active research projects appear to be happening at six of the eight sites (Table 89). The Derawan Island complex has the most complete research information; tagging, genetic sampling, satellite tracking and foraging area surveys. Genetic sampling and satellite tracking have been conducted at Kepulauan Raja Ampat. Additional tagging studies have been carried out at Alas Purwo NP and Sukamade; additional satellite tracking has been conducted at SW Sumbawa. No formal research projects have been reported from the other nesting sites.

Adequate site descriptions were supplied for six of the nine sites. One site (Pangumbahan) has only a brief description; the others have no description at all. In contrast, all sites have latitude and longitude coordinates.

**Table 89. Summary of the sections of the site datasheets in the IOSEA Database.**

Research= 0= none; 1= Tagging; 2= Genetic Samples; 3= Satellite Tracking; 4= Foraging Surveys  
Values= 0= none; 1= low or little; 2= medium, adequate; 3= high, complete; Blank= not reported.

Site Name	Research	Site Description	Threats ID	Remediation	Additional Information
Alas Purwo National Park	1	3	3	3	0
Amandangan					
Anano Is	4	3	3	3	0
Bangkaru					
Bantul					
Binongko	0	0	3	0	0
Derawan Is Complex	1,2,3,4	3	3	3	1
Kepulauan Raja Ampat	2,3	3	3	3	0
Kepulauan Riau (Riau Islands), Kepulauan Lingga (Lingga Islands)					
Nusa Barung (No Data)					
Pangumbahan	0	1	3	1	0
Rantau Salang					
Segama Besar Island					
Sukamade	1	3	3	3	0
SW Sumbawa	3	3	3	2	1
<b>Count</b>		<b>8</b>	<b>8</b>	<b>8</b>	<b>8</b>
<b>Index</b>		<b>2.38</b>	<b>3.00</b>	<b>2.25</b>	<b>0.25</b>

## Site Database Section 2: Species Present

Green turtles, hawksbill turtles, and leatherback turtles nest within the BOBLME area of Indonesia (Table 90). While the extent of nesting in some areas remains unquantified, in others the level of nesting is low, with the exception of green turtles nesting at Amandagan. Loggerhead turtles and olive ridley turtles are not known to nest in the BOBLME area of Indonesia.

**Table 90. Species present at nesting sites in Indonesia including an estimated number of turtles nesting arranged by site.** Codes: CC= *C. caretta*, CM= *C. mydas*, LO= *L. olivacea*, EI= *E. imbricata*, DC= *D. coriacea*, UQ= Unquantified, ??= Unknown.

Site/Area	CC	CM	LO	EI	DC
Amandagan		100-500		10-100	10-100
Bangkaru		10-100			
Bantul				10-100	
Kepulauan Riau (Riau Islands), Kepulauan Lingga (Lingga Islands)		UQ		UQ	
Rantau Salang		UQ			
Segama Besar Island				UQ	
Nusa Barung (No Data)					

## Site Database Section 3: Threatening Processes

Threatening processes occur at all sites with data (Table 91). The two most critical threatening processes are *Direct harvest of animals in the water* and *Egg collection*; these are followed closely by *Habitat degradation*. Other important threatening processes occurring at (or near) the nesting sites include *Incidental capture in coastal fisheries* and *Natural threats* (e.g., depredation, erosion). Unfortunately, because of a lack of information, many nesting sites have been coded “unknown”. The situation at each nesting site should be re-evaluated so that appropriate remedial actions can be implemented.

**Table 91. Summary of Threatening Processes identified at nesting sites.**

Values= 0= none, 1= low or little, 2= medium, adequate, 3= high, complete; U= Unknown; Blank= Not Reported. Other codes= cd= Coastal Development, f= Fishing, t= Tourism, h= Human Disturbance.

Site Name	Exploitation of nesting females	Direct harvest of animals in water	Egg collection	Incidental capture in coastal fisheries	Boat strikes	Marine debris	Industrial effluent	Inshore oil pollution	Agricultural/urban/tourism development	Artificial lighting on land or near shore	Habitat degradation	Vehicles	Sand mining / removal	Natural threats, disease, predation	Other	Relative index
Alas Purwo National Park	0	3	3	u	0	1	0	0	0	0	3	0	0	3		0.31
Amandangan																
Anano Is	1	3	1	1	0	u	0	0	0	0	2	0	0	0		0.19
Bangkaru																
Bantul																
Binongko	u	u	u	0	0	0	0	0	0	0	1	0	0	u		0.02
Derawan Is Complex	0	3	3	3	1	u	u	u	2	2	3	0	0	2		0.45
Kepulauan Raja Ampat	3	u	3	3	0	0	u	0	u	0	2	0	0	1		0.29
Kepulauan Riau (Riau Islands), Kepulauan Lingga (Lingga Islands)																
Nusa Barung	B															
Pangumbahan	0	u	3	u	0	u	0	0	0	1	3	0	0	u		0.17
Rantau Salang																
Segama Besar Island																
Sukamade	0	3	3	u	0	1	0	0	0	0	3	0	0	3		0.31
SW Sumbawa	0	3	3	u	0	0	u	0	3	3	2	0	0	1		0.36
<b>Count</b>	<b>7</b>	<b>5</b>	<b>7</b>	<b>4</b>	<b>8</b>	<b>5</b>	<b>5</b>	<b>7</b>	<b>7</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>6</b>		
<b>Index</b>	<b>0.57</b>	<b>3.00</b>	<b>2.71</b>	<b>1.75</b>	<b>0.13</b>	<b>0.40</b>	<b>0.00</b>	<b>0.00</b>	<b>0.71</b>	<b>0.75</b>	<b>2.38</b>	<b>0.00</b>	<b>0.00</b>	<b>1.67</b>		
<b>Rank</b>		<b>A</b>	<b>B</b>	<b>D</b>							<b>C</b>					

#### Site Database Section 4: Remedial Measures

Remediation measures are occurring at seven sites (Table 92); mitigation measures have not been identified at seven sites. The implementation of *Education and awareness programmes* is the most commonly used method (7 sites), closely followed by *Monitoring and protection programmes* (6 sites) and *Designation /management of protected areas* (5 sites). Several sites use more than one

approach to help mitigate the threatening processes. Six different approaches are used in the Derwin Island complex, five approaches are used in Alas Purwo NP and Sukamade, and four are used at Anano Island and Kepulauan Raja Ampat. The use of multiple approaches reflects the complexity of the threatening processes occurring at the site as well as human and other resources available.

**Table 92. Summary of remediating programs implemented at nesting sites.**

Codes: X = Reported; Blank = Not Reported. Counts across columns exclude "Other".

Site Name	Monitoring / protection programmes	Education / awareness programmes	Egg relocation / hatcheries	Require modification of fishing gear or fishing practices	Designation / management of protected areas, sanctuaries, exclusion zones etc.	Regulations on building location / design	Regulations on artificial lighting	Vehicle / access restrictions	Removal of debris / beach clean-up	Predator control	Other	Count
Alas Purwo National Park	x	x	x		x				x			5
Amandangan												0
Anano Is	x	x			x	x						4
Bangkaru												0
Bantul												0
Binongko												0
Derawan Is Complex	x	x	x	x	x					x	t	6
Kepulauan Raja Ampat	x	x		x	x							4
Kepulauan Riau (Riau Islands), Kepulauan Lingga (Lingga Islands)												0
Nusa Barung (No Data)												0
Pangumbahan		x										1
Rantau Salang												0
Segama Besar Island												0
Sukamade	x	x	x		x					x		5
SW Sumbawa	x	x										2
<b>Count</b>	<b>6</b>	<b>7</b>	<b>3</b>	<b>2</b>	<b>5</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>2</b>		
<b>Index</b>	<b>0.67</b>	<b>0.78</b>	<b>0.33</b>	<b>0.22</b>	<b>0.56</b>	<b>0.11</b>	<b>0.0</b>	<b>0.0</b>	<b>0.11</b>	<b>0.22</b>		
<b>Rank</b>	<b>B</b>	<b>A</b>	<b>D</b>		<b>C</b>							

Little additional information was supplied with the site datasheets except for the Derawan Island complex and southwest Sumbawa. A reference to the source of information was provided for

eight of the nine sites; only Nusa Barung is lacking source information. The information about the nesting sites in Indonesia was obtained from:

- Muurmans, M. 2009. Personal Communication. In State of the World's Sea Turtles - Vol. 5. 2010.
- Putra, K. S. 2005. Brief Overview of Turtle Conservation in Indonesia (May 2005). Unpublished report.
- Stringell, T., M. Bangkaru, A. P.J.M. Steeman & L. Bateman. (2000). "Green Turtle Nesting at Pulau Banyak (Sumatra, Indonesia)." Marine Turtle Newsletter 90: 6-8.

### **Recommendations for Issues Arising**

Data for all sites should be reviewed, corrected as necessary, and linked to a primary source. A list and a copy of all source material should be filed with IOSEA and an appropriate government agency.

Research projects should be documented. Project leaders should identify the goals and methods being used so that efforts can be coordinated and evaluation of the results can occur.

The threatening processes need to be identified and evaluated for potential impact, especially at Amandangan, Bangkaru, Bantul, Binongko, Kepulauan Riau (Riau Islands), Kepulauan Lingga (Lingga Islands), Nusa Barung, Rantau Salang, and Segama Besar Island.

If they do not exist, documents should be prepared to describe the remediation actions and how they address the threatening processes; if they exist, copies should be filed with IOSEA and with relevant government agencies.

The remedial actions should be paired with threatening processes to achieve a focused effort and a methodology should be established so that the effectiveness can be assessed.

Communication among the various local projects should be established to develop effective, wide-scale programs.

If at all possible, off-shore habitat assessment should be conducted to delineate and define the habitats used by the foraging populations

Fishing practices and gear should be reviewed at local and national levels with a view to reducing incidental capture of marine turtles by introducing modifications to the gear used and/or fishing practices especially in areas of special concern (e.g., internesting areas, foraging areas).

## MALAYSIA

### Site Database Section 1: Definition of the Site/Area

It must be remembered that at the time of draft this section of the report (September 2011), Malaysia was not yet a signatory to the IOSEA Memorandum of Understanding.

A total of eleven nesting sites that are within the BOBLME sub-region (or very close to the boundary) have been identified in Malaysia (Table 93). No site datasheets have been filled in for any of the sites. Although active research projects are in progress along much of the BOBLME sub-regional coast of Malaysia, the locations and activities have not been identified for any project in the country.

Because Site Datasheets have not been prepared for any nesting site in Malaysia, descriptions have not been recorded for any of the sites. However, all 11 sites have latitude and longitude coordinates. Some of these sites may be determined to be in error; others will probably be added when the material is reviewed.

**Table 93. Summary of the sections of the site datasheets in the IOSEA Database.**

Research= 0= none, 1= Tagging, 2= Genetic Samples, 3= Satellite Tracking, 4= Foraging Surveys.

Values= 0= none; 1= low or little; 2= medium, adequate; 3= high, complete; Blank= not reported.

Site/Area	Research	Site Description	Threats ID	Remediation	Additional Information
Beaches of Malacca state					
Cherating					
Dungun beaches					
Kijal					
Mak Kepit Beach and Mak Simpan Beach, Pulau Redang					
Mentawak					
Mersing Islands					
Paka					
Palau Redang					
Penut					
Saing					

## Site Database Section 2: Species Present

All five species of marine turtles are known to nest in the BOBLME sub-regional portion of Malaysia, although the numbers of nesting turtles have not been estimated (Table 94). The hawksbill turtle and the loggerhead turtle seem to be the most wide-spread. The distribution of nesting by the other species may reflect the lack of available information. No estimate of the size of the nesting population is available for any site; all are believed to be low (1-10).

**Table 94.** Species nesting in the BOBLME sub-regional portion of Malaysia arranged by site. No estimation of the numbers of nesting turtles is available for any site; all are believed to be low (1-10). Codes: CC= *C. caretta*, CM= *C. mydas*, LO= *L. olivacea*, EI= *E. imbricata*, DC= *D. coriacea*, UQ= Unquantified.

Site/Area	CC	CM	LO	EI	DC
Beaches of Malacca state				1-10	
Cherating				1-10	
Dungun beaches					1-10
Kijal			1-10		
Mak Kepit Beach and Mak Simpan Beach, Pulau Redang		1-10		1-10	
Mentawak	1-10				
Mersing Islands				1-10	
Paka			1-10		
Palau Redang	1-10				
Penut	1-10			1-10	
Saing				1-10	

## Site Database Section 3: Threatening Processes

Although many coastal areas are undergoing development or are locations where multiple threatening processes occur, none have been identified in the IOSEA database or from other sources in a manner that can be classified in the 0-3 scale (Table 95). In addition, it is presumed that local fishing activities either catch turtles incidentally or directly target them, albeit at unquantified levels. Egg collection may be occurring at different intensities at different sites. Also, coastal development is probably altering habitat at specific sites. Other threatening processes may well be occurring at nesting sites, but assessment is lacking. Identification and quantification of threatening processes is needed to form a basis for remedial actions.

**Table 95. Summary of Threatening Processes identified at nesting sites.**

Values= 0= none, 1= low or little, 2= medium, adequate, 3= high, complete; U= Unknown; Blank= Not Reported. ?= Possible/Probable.

Site/Area	Exploitation of nesting females	Direct harvest of animals in water	Egg collection	Incidental capture in coastal fisheries	Boat strikes	Marine debris	Industrial effluent	Inshore oil pollution	Agricultural/urban/tourism development	Artificial lighting on land or near shore	Habitat degradation	Vehicles	Sand mining / removal	Natural threats, disease, predation	Other
Beaches of Malacca state		?	?	?					?		?			?	
Cherating		?	?	?					?		?			?	
Dungun beaches		?	?	?					?		?			?	
Kijal		?	?	?					?		?			?	
Mak Kepit Beach and Mak Simpan Beach, Pulau Redang		?	?	?					?		?			?	
Mentawak		?	?	?					?		?			?	
Mersing Islands		?	?	?					?		?			?	
Paka		?	?	?					?		?			?	
Palau Redang		?	?	?					?		?			?	
Penut		?	?	?					?		?			?	
Saing		?	?	?					?		?			?	
<b>Count</b>		<b>11</b>	<b>11</b>	<b>11</b>					<b>11</b>		<b>11</b>			<b>11</b>	
<b>Index</b>		<b>??</b>	<b>??</b>	<b>??</b>					<b>??</b>		<b>??</b>			<b>??</b>	

#### Site Database Section 4: Remedial Measures

Remediation programs must be built on information about specific threatening processes. Because such information is lacking for the nesting sites in Malaysia (Table 96), the priorities must be to identify the threatening processes and to determine the severity of the threats. The first step in this process is to monitor the nesting beaches to determine what is happening. It is presumed that locally based conservation actions are occurring at many locations and that at least a few go beyond basic monitoring and education programmes. Some nesting sites may be afforded protection by virtue of being within designated protected areas, sanctuaries, and exclusion zones, or by regulations on building and lighting in the vicinity of a nesting beach.

Table 96. Summary of Remediating Programs implemented at nesting sites.

Codes: X = Reported; Blank = Not Reported. ?= Possible

Site/Area	Monitoring / protection programmes	Education / awareness programmes	Egg relocation / hatcheries	Require modification of fishing gear or fishing practices	Designation / management of protected areas, sanctuaries, exclusion zones etc.	Regulations on building location / design	Regulations on artificial lighting	Vehicle / access restrictions	Removal of debris / beach clean-up	Predator control	Other
Beaches of Malacca state	?	?			?	?	?				
Cherating	?	?			?	?	?				
Dungun beaches	?	?			?	?	?				
Kijal	?	?			?	?	?				
Mak Kepit Beach and Mak Simpan Beach, Pulau Redang	?	?			?	?	?				
Mentawak	?	?			?	?	?				
Mersing Islands	?	?			?	?	?				
Paka	?	?			?	?	?				
Palau Redang	?	?			?	?	?				
Penut	?	?			?	?	?				
Saing	?	?			?	?	?				
<b>Count</b>	<b>11</b>	<b>11</b>			<b>11</b>	<b>11</b>	<b>11</b>				
<b>Index</b>	<b>??</b>	<b>??</b>			<b>??</b>	<b>??</b>	<b>??</b>				

The information about the nesting sites in Malaysia was obtained from:

Dethmers, K. E., D. Broderick, C. Moritz, N. Fitzsimmons, C. Limpus, S. Lavery, S. Whiting, t M. Guinea, R. Prince, R. Kennett. (2006). "The genetic structure of Australasian green turtles (*Chelonia mydas*): exploring the geographical scale of genetic exchange." *Molecular Ecology* 15: 3931-3946.

Fisheries Department of Malaysia. 2006. Report on the marine turtle management program in Terengganu for 2005. Presented at the Meeting of the Turtle Sanctuary Advisory Council, Meeting No. 1/2006, 12 August 2006. Economic Planning Unit, State Secretary.

Wagiman, S., Malaysia Fisheries Department. (2008). Hawksbill nesting in Johor, Malacca, Pahang, and Terengganu, Malaysia. In *SWOT Report—The State of the World's Sea Turtles*, vol. 3 (2008).

## Recommendations for Issues Arising

Data for all sites should be reviewed, corrected as necessary, and linked to primary documents. A list and a copy of all source material should be filed with IOSEA and an appropriate government agency.

Research projects should be documented. Projects should identify the goals and methods being used.

The threatening processes need to be identified and evaluated for potential impact, especially at nesting site in the Malacca Straits and the islands on the western side of the country.

The remedial actions should be paired with threatening processes at these sites to achieve a focused effort and a methodology should be established so that the effectiveness can be assessed.

If they do not exist, documents should be prepared to describe the remediation actions and how they address the threatening processes. If they exist, copies should be filed with IOSEA and with relevant government agencies.

If at all possible, off-shore habitat assessment should be conducted to delineate and define the habitats used by the foraging populations

Fishing practices and gear should be reviewed at local and national levels with a view to reducing incidental capture of marine turtles. This should be done by involving fishermen in modifying the gear used and/or fishing practices, especially in areas of special concern (e.g., interesting areas, foraging areas).

## MALDIVES

### Site Database Section 1: Definition of the Site/Area

A total of 41 nesting sites have been identified in Maldives (Table 97). Rudimentary site datasheets (with name and geo-location) have been filled in for about 40 of the sites. Although some active research projects may be occurring on some of the islands, the locations and activities have not been identified for any project in the country. Descriptions have not been recorded for any of the sites.

**Table 97. Summary of the sections of the site datasheets in the IOSEA Database.**

Research: 0= none, 1= Tagging, 2= Genetic Samples, 3= Satellite Tracking, 4= Foraging Surveys.

Values: 0= none; 1= low or little; 2= medium, adequate; 3= high, complete; Blank= not reported.

	Atoll	Research	Site Description	Threats ID	Remediation	Additional Information
Bodufinolhu (Thulhaadhoo)	Baa Atoll					
Dehbaidhoo	Dhaalu Atoll					
Dharaboodhoo Island	Faafu Atoll					
Fares	Baa Atoll					
Feevah Island	Shaviyani Atoll					
Finley	Haa Dhaalu Atoll					
Fomaddoo ?	Thaa Atoll					
Furaveri	Raa Atoll					
Gaadhoo	Laamu Atoll					
Gan	Gaafu Dhaalu Atoll					
Hanimaadhoo	Haa Dhaalu Atoll					
Kandoodhoo	Thaa Atoll					
Kanifushi	Baa Atoll					
Kanifushi	Lhaviyani Atoll					
Kanimeedhoo	Thaa Atoll					
Kuburudhoo Island	Alifu Alifu Atoll					
Kudamuraidhoo	Haa Dhaalu Atoll					
Kukulhudhoo	Raa Atoll					
Maaddoo	Baa Atoll					
Maalhoss Island	Alifu Alifu Atoll					
Maamaduvaree	Baa Atoll					
Maarikilu	Baa Atoll					

	Atoll	Research	Site Description	Threats ID	Remediation	Additional Information
Maashigri	Raa Atoll					
Maavah Island	Laamu Atoll					
Maroshi Island	Shaviyani Atoll					
Medhafushi Island	Haa Alifu Atoll					
Medhukunburudhoo	Shaviyani Atoll					
Minimasgali Island	Dhaalu Atoll					
Miriyandhoo	Baa Atoll					
Muiri	Haa Dhaalu Atoll					
Mulhadhoo (Mulidhoo)	Haa Alifu Atoll					
Muthaafushi Island	Baa Atoll					
Olhugri (Maduwari)	Baa Atoll					
Ufuligiri	Baa Atoll					
Utheemu	Haa Atoll					
Vaandhoo (Vandhoo)	Raa Atoll					
Vaikaradhoo	Haa Dhaalu Atoll					
Vaikaramuraidhoo Island	Haa Dhaalu Atoll					
Vakkaru	Baa Atoll					
Valla	Dhaalu Atoll					
Valla-Lhohi	Dhaalu Atoll					

## Site Database Section 2: Species Present

Only two species of marine turtles are known to nest in the Maldives; the green turtle has been recorded from 32 sites and the hawksbill turtle has been recorded from 12 sites (Table 98). It is likely that both species nest in relatively low numbers (<50 per site) throughout the archipelago; however, systematic assessment of nesting has not been conducted in recent years. The numbers of nesting turtles have not been assessed in more than a decade. All sites should be resurveyed.

**Table 98. Species nesting in the Maldives arranged by site.** No estimation of the numbers of nesting turtles is available. Codes: CC= *C. caretta*, CM= *C. mydas*, LO= *L. olivacea*, EI= *E. imbricata*, DC= *D. coriacea*, UQ= Unquantified, ??= Unknown

Site/Area	Prov./State	CC	CM	LO	EI	DC
Bodufinolhu (Thulhaadhoo)	Baa Atoll		1-10		??	

Site/Area	Prov./State	CC	CM	LO	EI	DC
Dehbaidhoo	Dhaalu Atoll		1-10		1-10	
Dharaboodhoo Island	Faafu Atoll		1-10		1-10	
Fares	Baa Atoll		1-10			
Feevah Island	Shaviyani Atoll		1-10		1-10	
Finley	Haa Dhaalu Atoll		1-10			
Fomaddoo ?	Thaa Atoll		1-10		??	
Furaveri	Raa Atoll		>10			
Gaadhoo	Laamu Atoll		> 10			
Gan	Gaafu Dhaalu Atoll		>10			
Hanimaadhoo	Haa Dhaalu Atoll		?		?	
Kandoodhoo	Thaa Atoll		1-10			
Kanifushi	Baa Atoll		1-10		?	
Kanifushi	Lhaviyani Atoll		1-10			
Kanimeedhoo	Thaa Atoll		1-10		?	
Kuburudhoo Island	Alifu Alifu Atoll		1-10		1-10	
Kudamuraidhoo	Haa Dhaalu Atoll		1-10		?	
Kukulhudhoo	Raa Atoll		??			
Maaddoo	Baa Atoll		>10			
Maalhoss Island	Alifu Alifu Atoll		?		1-10	
Maamaduvaree	Baa Atoll		>10			
Maarikilu	Baa Atoll		?		?	
Maashigri	Raa Atoll		>10			
Maavah Island	Laamu Atoll		?		1-10	
Maroshi Island	Shaviyani Atoll		1-10		1-10	
Medhafushi Island	Haa Alifu Atoll		1-10		1-10	
Medhukunburudhoo	Shaviyani Atoll		1-10			
Minimasgali Island	Dhaalu Atoll		??		1-10	
Miriyandhoo	Baa Atoll		>10		??	
Muiri	Haa Dhaalu Atoll		1-10			
Mulhadhoo (Mulidhoo)	Haa Alifu Atoll		1-10			
Muthaafushi Island	Baa Atoll		1-10		1-10	
Olhugri (Maduwari)	Baa Atoll		>10			
Ufuligiri	Baa Atoll		?		?	
Utheemu	Haa Atoll		?		?	
Vaandhoo (Vandhoo)	Raa Atoll		1-10			
Vaikaradhoo	Haa Dhaalu Atoll		1-10			
Vaikaramuraidhoo Island	Haa Dhaalu Atoll		1-10		1-10	
Vakkaru	Baa Atoll		>10			
Valla	Dhaalu Atoll		1-10		1-10	
Valla-Lhohi	Dhaalu Atoll		?		?	

### Site Database Section 3: Threatening Processes

Although many islands are likely to be undergoing development or are locations where several threatening processes occur, none have been identified in the IOSEA database or from other sources that allow recording on the 0-3 scale. The threatening processes likely to be occurring in the Maldives include direct and incidental take of turtles through fishing and on the beaches. Also, it is likely that eggs are being harvested for local consumption. On some islands, development of tourist facilities may disrupt nesting through the presence of buildings and lighting but specific examples are lacking. The situation must be assessed to determine the types and extent of threatening processes.

### Site Database Section 4: Remedial Measures

At present no remediation programs are known to be occurring, although it is likely that some are. Locally based education and monitoring projects may be in place but have not been reported. The situation must be assessed to determine the extent and approach of remediation needed.

The information about the nesting sites in the Maldives was obtained from:

Frazier, J., S. Salas and N. T. Hassan Didi (2000) Marine Turtles in the Maldives Archipelago  
Maldives Marine Research Bulletin 4: 80 pp

### Recommendations for Issues Arising

The spelling of the names of the sites needs to be sorted out to be sure that redundancy is eliminated and that all known sites are represented in the database. The phonetic spelling of place names has resulted in a list of about 40 sites. Although most differences in spellings were resolved, the national gazetteer for the Maldives did not resolve the entire spelling issue because some of the problem names were not listed. The remaining places need to be checked by someone who can standardize the spellings with the national maps and determine the geocoordinates of the nesting sites.

The second issue that needs to be addressed is the lack of current information. The available reference material is scant and does not supply the necessary data in a retrievable format. The most recent reference material is a compilation of information collected more than a decade ago. To gather current information, it is necessary to conduct on ground assessment of the known and suspected turtle nesting sites.

In addition, data for all sites should be reviewed, corrected as necessary, and linked to primary documents. A copy of all source material should be filed with IOSEA and an appropriate government agency.

Research projects should be documented. Each project should have identified the goals and methods so that efforts can be coordinated and evaluation of the results can occur.

Communication among the various local projects at nesting sites on the islands should be established to develop effective, wide-scale programs.

The threatening processes and remedial actions (if any) need to be identified and quantified. Remedial actions should be paired with threatening processes to achieve a focused effort and so that a methodology can be established to improve the effectiveness of the conservation effort.

If they do not exist, documents should be prepared to describe the remediation actions and how they address the threatening processes; if they exist, copies should be filed with IOSEA and with the relevant government agencies.

If at all possible, off-shore habitat assessment should be conducted to delineate and define the habitats used by the foraging populations

Fishing practices and gear should be reviewed at local and national levels with a view to reducing incidental capture of marine turtles by introducing modifications to the gear used and/or fishing practices especially in areas of special concern (e.g., internesting areas, foraging areas).

## MYANMAR

### Site Database Section 1: Definition of the Site/Area

A total of thirty-nine nesting sites have been identified in Myanmar (Table 99). Active research projects based on tagging programs appear to be happening at nine of the thirty-nine sites. Turtles at three sites (Coco Island, Thameehla Island, Tin Pann Kyun (Oyster) Island) have been sampled as part of genetics studies. Tagging programs are being conducted at nine sites. Additional assessment is needed of the foraging area populations through tagging, genetic analysis, and satellite tracking studies.

Site descriptions have not been supplied for any of the sites. With the exception of Pa Nyit Beach and Bawar (Ba War) Beach, all sites have latitude and longitude coordinates. Google Map images based on the coordinates of the nesting sites have been downloaded from the web to show the beach area, as well as the near shore and hinterland.

Threatening processes have been identified at all known nesting sites. Remedial actions are in place at the majority of sites. The information is from reports by the Department of Forestry.

**Table 99. Summary of the sections of the site datasheets in the IOSEA Database.**

Research: 0= none, 1= Tagging, 2= Genetic Samples, 3= Satellite Tracking, 4= Foraging Surveys.

Values: 0= none; 1= low or little; 2= medium, adequate; 3= high, complete; Blank= not reported.

Site Name	Research	Site Description	Threats ID	Remediation	Additional Information
Ashaet Phyar Beach	0	0	3	3	1
Ba War Beach	0	0	3	3	0
Byu Byeik Beach	0	0	3	3	0
Coco Island	1,2	0	3	3	2
Daminseik Beach	0	0	3	3	0
Doon Kyun Island (Rose Island)	0	0	3	1	0
Gayet Gyi Island	1	0	3	3	2
Han Kan Beach	0	0	3	3	0
Hnet U Thaug Beach	0	0	3	3	2
Htaung Gyi Tan Beach	0	0	3	3	2
Kadon Galay Island	1	0	3	3	2
Kai Thaug Beach	0	0	3	1	0
Kan Taung Beach	0	0	3	3	0
Khone Gyi Beach	0	0	3	3	2

Site Name	Research	Site Description	Threats ID	Remediation	Additional Information
Kwin Bout Village (Amatt Gyi and Amattkalay Beach)	1	0	3	3	2
Kyun Mae Gyi Island (Amie Island)	0	0	3	3	0
Lampi Island	0	0	3	3	1
Long Lon Bok Island	1	0	3	3	3
Ma Sein Yon Beach	0	0	3	3	2
Mali Island	0	0	3	3	0
Marn Aung Island	0	0	3	3	0
Maungmakan Island	0	0	3	2	0
Mingalar Thaung Tan Beach	0	0	3	3	2
Nant Thar Kyun Island	0	0	3	2	0
Nga Mun Thaung Beach	1	0	3	3	2
Pa Nyit Beach	0	0	3	3	0
Pidakuk Beach	0	0	3	3	0
Piketaelay Beach	0	0	3	3	0
Pyin Gyi Island (Pyin Kyi Island)	0	0	3	1	0
Pyin Sabu Island	0	0	3	3	0
Pyin Salu Beach	0	0	3	1	0
Shinmaw Beach	0	0	3	3	0
Thameehla Island	1, 2	0	3	3	3
Tin Pann Kyun (Oyster) Island	1, 2	0	3	0	3
War Kyun Island	0	0	3	3	0
Wardawgone Beach (Kai Thaung Island)	1	0	3	2	2
Ye Kyun Island	0	0	3	2	0
Zee Chai	0	0	3	3	0
Zee Phyu Thaung Beach	0	0	3	3	0
<b>Count</b>		39	39	39	39
<b>Index</b>		0.00	3.00	2.62	0.85

## Site Database Section 2: Species Present

The majority of nesting in Myanmar remains unquantified (Table 100). The quantified nesting is typically less than 100 individuals per site. One notable exception is on Thameehla Island (Thamihla Kyun) where more than 100 green turtles are reported to nest annually. The olive ridley appears to be the most widely distributed nesting species, followed by the green turtle. Loggerhead

turtles and hawksbill turtles nest in relatively low numbers and a few sites. The leatherback turtle has not been recorded nesting in Myanmar.

**Table 100. Species nesting in the Myanmar arranged by site.** Codes: CC= *C. caretta*, CM= *C. mydas*, LO= *L. olivacea*, EI= *E. imbricata*, DC= *D. coriacea*, uq= Unquantified.

Site/Area	CC	CM	LO	EI	DC
Ashaet Phyar Beach			1-10		
Bawar Beach (Ba War Beach)		uq	uq		
Beaches of Myanmar	uq				
Bogale river mouth			uq		
Byu Byeik Beach		uq	uq		
Coco Island		uq	1-10	uq	
Daminseik Beach		uq	uq		
Doon Kyun Island (Rose Island)		uq		uq	
Gayet Gyi Island (Gayetgyi Kyun)	1-10		10-100		
Han Kan Beach		uq	uq		
Hnet U Thaug Beach			1-10		
Htaung Gyi Tan Beach			1-10		
Kadon Galay Island (Kadon Kalay Kyun ?)		uq	10-100		
Kai Thaug Beach			uq		
Kaingthaung Kyun	uq				
Kan Taung Beach		uq	uq		
Khone Gyi Beach		uq	uq		
Kwin Bout Village (Amatt Gyi and Amattkalay Beach)			10-100		
Kyun Mae Gyi Island (Amie Island)		uq	uq	uq	
Lampi Island		uq	uq	uq	
Long Lon Bok Island		uq	1-10	uq	
Ma Sein Yon Beach			1-10		
Mali Island		uq	uq		
Marn Aung Island		uq	uq	uq	
Maungmakan Island		uq	uq	uq	
Mingalar Thaug Tan Beach			uq		
Nant Thar Kyun Island		uq	uq	uq	
Nga Mun Thaug Beach			1-10		
Pa Nyit Beach		uq	uq		
Pidakuk Beach		uq	uq		
Piketaelay Beach		uq	uq		
Pyin Gyi Island (Pyin Kyi Island)		uq		uq	
Pyin Sabu Island		uq	uq		
Pyin Salu Beach		uq	uq		
Shinmaw Beach		uq	uq		
Thameehla Island (Thamihla Kyun ?)		100-500	1-10		
Tin Pann Kyun (Oyster) Island (Tin ban Kyun Island ?)		uq	1-10	1-10	
War Kyun Island		uq	uq		

Site/Area	CC	CM	LO	EI	DC
Wardawgone Beach (Kai Thaug Island)			1-10		
Ye Kyun Island		uq	uq	uq	
Zee Phyu Thaug Beach			uq		
Zee Phyu Thaug Beach		uq			

### Site Database Section 3: Threatening Processes

Multiple threatening processes are occurring at all sites (Table 101). However, because highest level was 2 for the entire matrix, the level of threat was rated as being low to medium for all categories. The highest index (1.86) was for *Natural threats* (e.g., depredation, erosion). The next highest index (1.56) was for *Incidental capture in coastal fisheries*. *Habitat destruction* (1.06), *Agricultural/urban/tourism development* (1.03) and *Industrial effluent* (1.00) were the next highest indexes. These categories often have extensive impact on nesting marine turtles and their offspring. The level of impact of these threatening processes needs to be re-evaluated on a regular basis.

Many threatening processes (e.g., *Marine debris*, *Industrial effluent*, *Inshore oil pollution*) remain unquantified and require investigation to determine whether or not the threat is actually present and, if so, at what level. The impact of near shore fisheries through *direct harvest* and *incidental capture* needs to be quantified so that changes to the fishing practices can be implemented, if necessary.

Although the assessment of low to medium threat levels throughout the table (with no level 3) suggests that the situation is not too bad, given the impact multiple threatening processes have on turtle populations, re-evaluation of the threats and the processes in place is warranted

**Table 101. Summary of Threatening Processes identified at nesting sites.**

Values: 0= none; 1= low or little; 2= medium, adequate; 3= high, complete; U= Unknown; Blank= Not Reported.

Site Name	Exploitation of nesting females	Direct harvest of animals in water	Egg collection	Incidental capture in coastal fisheries	Boat strikes	Marine debris	Industrial effluent	Inshore oil pollution	Agricultural/urban/tourism development	Artificial lighting on land or near shore	Habitat degradation	Vehicles	Sand mining / removal	Natural threats, disease, predation	Index
Ashaet Phyar Beach	0	U	0	1	u	u	u	u	1	1	1	0	0	2	0.14
Ba War Beach	u	U	2	2	1	u	u	u	2	1	1	0	0	2	0.26
Bye Byeik Beach	u	U	u	1	1	u	u	u	1	1	1	0	u	2	0.17
Coco Island	0	0	u	u	u	u	u	u	0	0	1	0	u	2	0.07
Daminseik Beach	1	3	u	2	1	u	u	u	2	1	1	u	u	2	0.31
Doon Kyun Island (Rose)	0	U	2	2	1	0	u	u	2	1	1	u	u	2	0.26

Site Name	Exploitation of nesting females	Direct harvest of animals in water	Egg collection	Incidental capture in coastal fisheries	Boat strikes	Marine debris	Industrial effluent	Inshore oil pollution	Agricultural/urban/tourism development	Artificial lighting on land or near shore	Habitat degradation	Vehicles	Sand mining / removal	Natural threats, disease, predation	Index
Island)															
Gayet Gyi Island	0	0	0	1	1	u	u	u	1	1	1	0	0	2	0.17
Han Kan Beach	u	U	1	1	1	u	u	u	1	1	1	0	u	2	0.19
Hnet U Thaug Beach	0	U	0	1	1	u	u	u	1	1	1	0	0	2	0.17
Htaung Gyi Tan Beach	0	0	0	1	u	1	u	u	0	0	0	0	0	0	0.05
Kadon Galay Island	0	U	0	3	1	u	u	u	1	0	1	0	0	2	0.19
Kai Thaug Beach	u	U	u	1	u	u	u	u	1	1	1	u	u	2	0.14
Kan Taung Beach	0	U	2	2	1	u	u	u	2	1	1	0	u	2	0.26
Khone Gyi Beach	1	U	u	2	1	u	u	u	1	1	2	0	0	2	0.24
Kwin Bout Village (Amatt Gyi and Amattkalay Beach)	0	U	0	1	1	u	u	u	1	1	1	0	0	2	0.17
Kyun Mae Gyi Island (Amie Island)	0	U	2	2	1	0	u	u	2	1	1	0	0	2	0.26
Lampi Island	1	1	1	1	1	0	u	u	u	u	u	0	0	1	0.14
Long Lon Bok Island	0	U	0	2	1	0	u	0	0	0	1	0	0	2	0.14
Ma Sein Yon Beach	0	U	0	1	1	u	u	u	1	1	1	0	0	2	0.17
Mali Island	u	U	2	2	1	u	u	u	0	0	1	0	0	2	0.19
Marn Aung Island	u	U	u	u	u	u	u	u	u	u	u	0	0	u	0.00
Maungmakan Island	u	U	0	2	1	0	u	u	0	0	0	0	0	2	0.12
Mingalar Thaug Tan Beach	0	U	0	1	1	u	u	u	2	1	1	0	0	2	0.19
Nant Thar Kyun Island	u	U	u	u	u	0	u	u	1	1	1	0	0	2	0.12
Nga Mun Thaug Beach	0	U	0	1	1	u	u	u	0	0	3	0	0	2	0.17
Pa Nyit Beach	u	U	u	2	1	0	u	u	u	u	1	0	0	2	0.14
Pidakuk Beach	u	U	2	2	1	u	u	u	2	1	1	0	0	2	0.26
Piketaelay Beach	u	U	2	2	1	u	u	u	2	1	1	0	0	2	0.26
Pyin Gyi Island (Pyin Kyi Island)	u	U	2	2	1	0	u	u	0	0	1	u	u	2	0.19
Pyin Sabu Island	u	U	2	2	1	0	u	u	1	1	1	0	0	2	0.24
Pyin Salu Beach	u	U	u	1	u	u	u	u	1	1	1	u	u	2	0.14
Shinmaw Beach	u	U	2	2	1	u	u	u	1	1	1	0	0	2	0.24
Thameehla Island	0	0	0	u	1	u	1	u	0	0	1	0	0	0	0.07
Tin Pann Kyun (Oyster) Island	0	0	u	u	u	0	u	u	0	0	0	0	0	0	0.00
War Kyun Island	u	U	1	1	1	u	u	u	2	1	1	0	u	2	0.21
Wardawgone Beach (Kai Thaug Island)	0	U	0	1	u	u	u	u	2	1	2	0	0	2	0.19
Ye Kyun Island	u	U	u	u	u	0	u	u	u	u	u	0	0	2	0.05
Zee Chai	u	U	u	2	u	0	u	u	u	1	2	0	0	u	0.12
Zee Phyu Thaug Beach	u	U	1	1	1	u	u	u	1	1	1	u	u	2	0.19
Count	19	7	26	32	28	13	1	1	33	34	35	32	27	36	
Index	0.16	0.57	0.92	1.56	1.00	0.08	1.00	0.00	1.03	0.71	1.06	0.00	0.00	1.81	
Rank				B	D		D		D		C			A	

## Site Database Section 4: Remedial Measures

Multifaceted remediation programs are occurring at 30 nesting sites (Table 102). Medium levels of remediation (level 2) are occurring at four sites and low levels of remediation are occurring at four additional sites. Mitigation measures have not been identified at Tin Pann Kyun (Oyster) Island. Eight types of remediation measures are being used at nine sites; seven are being used at twelve additional sites. Six or fewer are being used at the remaining 14 sites.

Although the assessment of low threat level and the extensive remediation measures, at first glance, suggest that the remediation measures are working, there is no indication of the duration of the remediation. Without documentation of the duration of remediation, the success of their implementation cannot be demonstrated. Re-evaluation of the effectiveness of the remediation measures is required.

**Table 102. Summary of remediating programmes implemented at nesting sites.**  
Codes: X = Reported; Blank = Not Reported.

Site Name	Monitoring / protection programmes	Education / awareness programmes	Egg relocation / hatcheries	Require modification of fishing gear or fishing practices	Designation / management of protected areas, sanctuaries, exclusion zones etc.	Regulations on building location / design	Regulations on artificial lighting	Vehicle / access restrictions	Removal of debris / beach clean-up	Predator control	Count
Ashaet Phyar Beach	x	x	x		x	x	x		x	x	8
Ba War Beach	x	x	x		x	x	x		x	x	8
Byu Byeik Beach	x	x	x		x	x			x	x	7
Coco Island	x	x	x		x					x	5
Daminseik Beach	x	x	x		x	x			x	x	7
Doon Kyun Island (Rose Island)		x									1
Gayet Gyi Island	x	x	x		x	x	x		x	x	8
Han Kan Beach	x	x	x		x	x	x		x	x	8
Hnet U Thaug Beach	x	x	x		x	x	x		x	x	8
Htaung Gyi Tan Beach	x				x	x	x				4
Kadon Galay Island	x	x	x		x	x	x			x	7
Kai Thaug Beach		x								x	2
Kan Taung Beach	x	x	x		x	x	x			x	7
Khone Gyi Beach	x	x	x		x	x			x	x	7
Kwin Bout Village (Amatt Gyi and	x	x	x		x	x	x		x	x	8

Site Name	Monitoring / protection programmes	Education / awareness programmes	Egg relocation / hatcheries	Require modification of fishing gear or fishing practices	Designation / management of protected areas, sanctuaries, exclusion zones etc.	Regulations on building location / design	Regulations on artificial lighting	Vehicle / access restrictions	Removal of debris / beach clean-up	Predator control	Count
Amattkalay Beach)											
Kyun Mae Gyi Island (Amie Island)	x	x	x		x	x			x	x	7
Lampi Island	x	x	x		x	x	x	x			7
Long Lon Bok Island			x		x				x	x	4
Ma Sein Yon Beach	x	x	x		x	x	x			x	7
Mali Island	x	x	x		x	x			x	x	7
Marn Aung Island	x	x	x		x					x	5
Maungmakan Island			x							x	2
Mingalar Thaug Tan Beach	x	x	x		x	x			x	x	7
Nant Thar Kyun Island	x	x	x		x						4
Nga Mun Thaug Beach	x	x	x		x	x	x		x	x	8
Pa Nyit Beach	x	x	x		x	x			x	x	7
Pidakuk Beach	x	x	x		x	x			x	x	7
Piketaelay Beach	x	x	x		x	x			x	x	7
Pyin Gyi Island (Pyin Kyi Island)		x								x	2
Pyin Sabu Island	x	x			x	x			x	x	6
Pyin Salu Beach					x						1
Shinmaw Beach	x	x	x		x	x	x		x	x	8
Thameehla Island		x	x		x				x	x	5
Tin Pann Kyun (Oyster) Island											0
War Kyun Island	x	x	x		x	x	x			x	7
Wardawgone Beach (Kai Thaug Island)	x	x			x					x	4
Ye Kyun Island	x	x	x								3
Zee Chai	x	x	x		x	x			x	x	7
Zee Phyu Thaug Beach	x	x	x		x	x	x		x	x	8
<b>Index</b>	0.79	0.87	0.79	0.0	0.85	0.67	0.38	0.03	0.56	0.82	
<b>Rank</b>	C	A	C		B	D				B	

The majority of the information about the nesting sites in Myanmar was supplied to IOSEA by the Department of Forestry. Additional information was obtained from:

Thorbjarnarson, J. B., Platt, S. G., and S. T. Khain. 2000. Sea turtles in Myanmar: Past and present. *Marine Turtle Newsletter* 88:10-11.

### **Recommendations for Issues Arising**

Data for all sites should be reviewed, corrected as necessary, and linked to primary documents. A list and a copy of all source material should be filed with IOSEA and an appropriate government agency.

The extent of nesting should be quantified and the method used to obtain the nesting population estimate should be stated.

Research projects should be documented. Projects should prepare documents that identify the goals and methods being used so that efforts can be coordinated and evaluation of the results can occur.

The threatening processes and remedial actions (if any) need to be identified and quantified. If they do not exist, documents should be prepared to (1) remediation actions and (2) how they address the threatening processes. If they exist, copies should be filed with IOSEA and with the relevant government agencies. Current projects should be evaluated to determine the effectiveness.

If at all possible, off-shore habitat assessment should be conducted to delineate and define the habitats used by the foraging populations

Fishing practices and gear should be reviewed at local and national levels with a view to reducing incidental capture of marine turtles by introducing modifications to the gear used and/or fishing practices especially in areas of special concern (e.g., internesting areas, foraging areas).

## SRI LANKA

### Site Database Section 1: Definition of the Site/Area

A total of fifty-two nesting sites have been identified in Sri Lanka (Table 103).

Active research projects appear to be happening at two of the sites (between Kosgoda and Bandarawatta, Rekawa). Both involve tagging programs. In addition, the turtle population between Kosgoda and Bandarawatta has been sampled for genetic analysis and the project at Rekawa includes satellite tracking. According to existing data, foraging populations within Sri Lanka have not been examined.

Site descriptions have not been supplied for any of the sites. No information is available for five sites (Kaikawala, Kosgoda, Kumana, Mapalana, Okanda). The majority of sites (exceptions: Mirrijawila, Pukkulam, Silawaturei, South Bar, Tibbatuwawa) have latitude and longitude coordinates. Google Map images based on the coordinates of the nesting sites have been downloaded from the web to show the beach area, as well as the near shore and hinterland.

**Table 103. Summary of the sections of the site datasheets in the IOSEA Database.**

Research= 0= none, 1= Tagging, 2= Genetic Samples, 3= Satellite Tracking, 4= Foraging Surveys  
Values= 0= none, 1= low or little, 2= medium, adequate, 3= high, complete; Blank= not reported.

Site Name	Research	Site Description	Threats ID	Remediation	Additional Information
Ahungalla	0	0	3	1	0
Akurala	0	0	3	1	0
Amadoowa	0	0	3	1	0
Ambalangoda	0	0	3	1	0
Arugambay (Arugam Bay?)	0	0	3	1	0
Balpitiya	0	0	3	1	0
Bentota	0	0	3	2	0
Boossa	0	0	3	1	0
Bundala Modara to Kirindi Modara (Bundala NP)	0	0	3	1	0
Butawa to Patanangala, Yala NP	0	0	3	1	0
Doova modara	0	0	3	1	0
Godavaya to Walawa Modara	0	0	3	2	1
Habakkala	0	0	3	1	0
Habaraduva	0	0	3	2	0
Hambantota to Malala Modara	0	0	3	1	0
Hikkaduwa	0	0	3	2	0
Induruwa	0	0	3	2	0
Kahanda Modara	0	0	3	1	0

Site Name	Research	Site Description	Threats ID	Remediation	Additional Information
Kahawa	0	0	3	1	0
Kaikawala (no Data)					
Kaluthara (Kadido Beach)	0	0	3	1	0
Karathivu island (Karathive, Karativu)	0	0	3	1	0
Kirinda/Magama	0	0	3	1	0
Koggala	0	0	3	1	0
Kosgoda					
Kosgoda/Bandarawatta	1, 2	0	3	2	1
Kumana (no Data)					
Lunama (Kalametiya)	0	0	3	1	1
Maawella (Dikwella)	0	0	3	1	0
Maggona	0	0	3	1	0
Malala Modara to Pathiraga (Bundala NP)	0	0	3	1	0
Mapalana (no Data)					
Mirrijawila	0	0	3	1	0
Moratuwa	0	0	3	1	1
Mount Lavinia	0	0	3	1	1
Nagshandiya	0	0	3	1	0
Okanda (no Data)					
Palatupana to Mahaseelawa (Yala NP)	0	0	3	1	0
Panama	0	0	3	2	0
Potuwil	0	0	3	2	0
Pukkulam	0	0	3	0	1
Rekawa	1, 3	0	3	3	1
Seenimodara	0	0	3	1	0
Silawaturei	0	0	3	0	0
South Bar	0	0	3	1	0
Tangalle	0	0	3	1	0
Tibbatuwawa	0	0	3	1	0
Unawatuna	0	0	3	2	0
Ussangoda - Welipatanwila	0	0	3	1	0
Warahena	0	0	3	0	0
Waturegama	0	0	3	2	0
Wellaodae	0	0	3	1	0
<b>Count</b>		47	47	47	48
<b>Index</b>		0.00	3.00	1.19	0.15

## Site Database Section 2: Species Present

All five species of marine turtles known from the BOBLME sub-region nest in Sri Lanka (Table 104). The majority of nesting sites host more than one species. The green turtle is the most widely distributed nesting species, followed by the olive ridley. Based on the number of nesting sites where the species has been recorded, an important number of leatherback turtles nest in Sri Lanka; also, both hawksbill and loggerhead turtles nest widely in Sri Lanka.

Presently the numbers of nesting turtles is poorly known; although the species have been identified for most of the nesting sites, the number of nesting turtles has not been quantified.

**Table 104. Species nesting in the Myanmar arranged by site.**

Codes: CC= *C. caretta*, CM= *C. mydas*, LO= *L. olivacea*, EI= *E. imbricata*, DC= *D. coriacea*, UQ= Unquantified.

Site/Area	CC	CM	LO	EI	DC	Pop Estimate
Ahungalla		1	1	1	1	UQ
Akurala		1				UQ
Amadoowa (Amaduwa)		1	1		1	UQ
Ambalangoda		1	1		1	UQ
Arugambay (Arugam Bay?)		1	1		1	UQ
Balapitiya (Balpitiya ?)	1	1	1	1	1	UQ
Bandarawatta		1	1			UQ
Bentota		1		1	1	UQ
Boossa (Bussa)		1	1			UQ
Bundala	1	1	1	1	1	UQ
Bundala Modara to Kirindi Modara (Bundala NP)	1	1	1			UQ
Butawa to Patanangala, Yala NP	1	1		1		UQ
Buttawa		1	1		1	UQ
Duwemodara (Doova modara)		1	1		1	UQ
Godavaya			1	1	1	UQ
Godavaya to Walawa Modara		1	1		1	UQ
Habakkala (Habbakkala)		1	1			UQ
Habaraduwa (Habaraduva)		1	1		1	UQ
Hambantota to Malala Modara			1			UQ
Hikkaduwa				1		UQ
Induruwa	1	1	1	1	1	UQ
Kahandamodara (Kahanda Modara)	1	1	1		1	UQ
Kahawa		1	1		1	UQ
Kaikawala		1	1	1	1	UQ
Kalametiya	1	1		1	1	UQ
Kaluthara (Kadido Beach)		1	1		1	UQ
Karathivu island		1	1			UQ
Kirinda/Magama		1	1	1		UQ
Koggala	1	1				UQ
Kosgoda	1	1	1	1	1	UQ
Kumana		1	1		1	UQ
Lunama (Kalametiya)		1	1	1		UQ
Maawella (Dikwella)		1	1		1	UQ
Maggona		1	1		1	UQ

Site/Area	CC	CM	LO	EI	DC	Pop Estimate
Mahaseeiawe		1	1		1	UQ
Malala Modara to Pathiraga (Bundala NP)		1	1		1	UQ
Mapalana					1	UQ
Mirrijjawila					1	UQ
Moratuwa		1	1		1	UQ
Mount Lavinia		1	1			UQ
Nagashandiya		1				UQ
Nagashandiya					1	UQ
Okanda			1			UQ
Palatupana	1	1	1		1	UQ
Palatupana to Mahaseelawa (Yala NP)		1	1		1	UQ
Panama			1	1	1	UQ
Patanangala		1	1		1	UQ
Pathiraja		1		1	1	UQ
Potuwil		1	1		1	UQ
Pukkulam, Wilpattu NP			1		1	UQ
Rekawa	1	1	1	1	1	1-10
Seenimodara		1	1		1	UQ
Silawaturei		1	1			UQ
South Bar		1	1			UQ
Tangalle	1	1	1	1	1	UQ
Tibbatuwawa (Thibbattawa)		1	1			UQ
Unawaluna	1	1	1	1		UQ
Uraniya			1			UQ
Ussangoda		1				UQ
Ussangoda – Welipatanwila		1			1	UQ
Warahena			1			UQ
Warahena		1		1		UQ
Walawe-modara						UQ
Waturegama (Wathuregama)		1	1		1	UQ
Welipatanwila		1				UQ
Wellode (Wellaodae) (Wellodaya)		1			1	UQ
Yala	1					UQ

### Site Database Section 3: Threatening Processes

Multiple threatening processes have been identified at all sites (Table 105). *Egg collection* is rated as the greatest threat (2.42). The next highest ranked threat is *natural threats* (1.40); closely followed by *Artificial lighting on land or near shore* (1.39). *Incidental capture in coastal fisheries* ranked next at 1.26. The threat from *egg collection* for 30 sites was level 3. In contrast, the other high ranking threats had 5 or fewer level 3 ratings. Thirteen sites had an index score of threat level of 0.4 or higher, indicating that multiple threats were occurring at the site at relatively high levels. Review of the threatening processes is needed to clarify the situation at each nesting site.

**Table 105. Summary of Threatening Processes identified at nesting sites.**

Values: 0= none, 1= low or little, 2= medium, adequate, 3= high, complete; U= Unknown; Blank= Not Reported. Other codes: cd= Coastal Development, f= Fishing, t= Tourism, ba= Brach Armoring, hd= Human Disturbance.

Site Name	Exploitation of nesting females	Direct harvest of animals in water	Egg collection	Incidental capture in coastal fisheries	Boat strikes	Marine debris	Industrial effluent	Inshore oil pollution	Agricultural/urban/tourism development	Artificial lighting on land or near shore	Habitat degradation	Vehicles (0-3)	Sand mining / removal	Natural threats, disease, predation	Other	Index
Ahungalla	0	1	3	2	2	1	1	1	1	2	2	1	1	1	2t	0.45
Akurala	2	1	2	1	0	0	0	0	1	1	1	2	1	2	2hd	0.33
Amadoowa	0	0	3	2	2	1	0	1	0	0	0	0	0	2		0.26
Ambalangoda	0	1	3	2	2	1	0	1	0	3	1	0	1	1		0.38
Arugambay (Arugam Bay?)	1	1	1	1	1	0	2	1	2	2	0	1	0	3		0.38
Balpitiya	0	0	3	1	1	0	0	0	0	1	3	1	2	1		0.31
Bentota	0	1	3	1	1	2	0	1	1	2	1	0	0	1	3t	0.33
Boossa	0	0	3	1	1	2	2	1	0	2	3	2	1	1		0.45
Bundala Modara to Kirindi Modara (Bundala NP)	0	0	0	1	1	2	0	0	0	0	0	0	0	2		0.14
Butawa to Patanangala, Yala NP	0	0	0	1	1	1	0	0	0	0	0	0	0	2		0.12
Doova modara	3	2	3	1	u	1	0	0	u	0	u	0	0	2		0.29
Godavaya to Walawa Modara	0	0	3	2	1	0	0	0	0	0	1	0	1	1		0.21
Habakkala	2	1	3	0	0	1	0	0	u	1	1	2	1	2	2hd	0.33
Habaraduva	0	0	3	1	1	1	0	1	2	2	u	2	u	1		0.33
Hambantota to Malala Modara	0	0	3	2	1	3	1	1	1	2	1	0	1	1		0.40
Hikkaduwa	0	0	2	1	u	2	1	2	3	3	2	3	0	1		0.48
Induruwa	1	0	3	1	0	0	0	0	1	2	2	1	1	1		0.31
Kahanda Modara	0	0	3	1	0	2	0	0	1	1	1	0	2	1		0.29
Kahawa	0	0	3	0	1	1	0	0	1	2	2	0	0	1		0.26
Kaikawala (no Data)																0.00
Kaluthara (Kadido Beach)	0	0	3	2	1	3	0	0	2	2	1	0	1	1		0.38
Karathivu island (Karathive, Karativu)	2	3	2	3	1	1	u	1	1	1	0	u	u	u		0.36
Kirinda/Magama	0	0	3	1	1	1	0	2	0	0	1	1	0	1		0.26
Koggala	0	0	3	1	1	0	1	0	2	u	1	0	0	1		0.24
Kosgoda	1	1	3	1	1	1	0	1	2	2	1	u	u	2		0.38
Kosgoda/Bandarawatta	1	1	3	1	1	1	0	1	2	2	1	u	u	2		0.38
Kumana (no Data)																0.00

Site Name	Exploitation of nesting females	Direct harvest of animals in water	Egg collection	Incidental capture in coastal fisheries	Boat strikes	Marine debris	Industrial effluent	Inshore oil pollution	Agricultural/urban/tourism development	Artificial lighting on land or near shore	Habitat degradation	Vehicles (0-3)	Sand mining / removal	Natural threats, disease, predation	Other	Index
Lunama (Kalametiya)	0	0	3	1	0	0	0	0	0	2	1	0	1	1		0.21
Maawella (Dikwella)	1	1	2	1	1	1	1	1	0	1	1	u	u	1		0.29
Maggona	1	b	3	2	b	1	0	2	2	2	1	1	1	1		0.40
Malala Modara to Pathiraga (Bundala NP)	0	0	0	0	0	1	0	0	0	0	0	0	0	2		0.07
Mapalana (no Data)																0.00
Mirrijawila	0	0	3	1	1	1	0	0	0	1	1	0	0	2		0.24
Moratuwa	0	0	3	2	1	2	3	2	1	1	3	1	1	0		0.48
Mount Lavinia	0	0	3	1	0	2	2	2	2	3	2	1	0	0	2ba	0.43
Nagshandiya	0	0	3		0	1	0	1	2	2	2	0	0	1		0.29
Okanda (no Data)																0.00
Palatupana to Mahaseelawa (Yala NP)	0	0	0	1	1	1	0	0	0	0	0	0	0	2		0.12
Panama	2	1	2	2	1	u	u	u	1	u	u	u	u	3		0.29
Potuwil	2	1	2	1	0	0	0	1	2	2	0	1	u	2		0.33
Pukkulam	2	3	2	3	1	1	u	1	1	0	u	u	u	3		0.40
Rekawa	0	0	0	1	1	0	0	0	0	1	0	0	0	0	3t	0.07
Seenimodara	1	1	3	1	0	1	u	1	3	2	1	u	u	1		0.36
Silawaturei	2	3	2	3	1	1	u	1	1	1	u	0	u	2		0.40
South Bar	2	3	2	3	1	1	u	2	2	2	u	1	u	2		0.50
Tangalle	0	0	3	1	1	2	1	2	3	3	1	2	1	1		0.50
Tibbatuwawa	2	1	3	0	0	0	0	0	1	1	1	u	u	2		0.26
Unawatuna	2	1	2	0	1	2	1	1	3	3	1	2	u	1		0.48
Ussangoda - Welipatanwila	0	0	3	2	1	0	0	0	0	0	2	0	1	1		0.24
Warahena	2	1	3	1	1	1	1	0	2	2	1	2	u	1		0.43
Waturegama	2	1	2	0	0	1	1	1	1	1	1	u	1	2		0.33
Wellaodae	0	0	3	1	1	0	0	0	0	1	1	0	0	1		0.19
<b>Index</b>	0.71	0.64	2.42	1.26	0.80	1.02	0.43	0.70	1.09	1.39	1.10	0.71	0.56	1.40		
<b>Rank</b>			A	D						C				B		

#### Site Database Section 4: Remedial Measures

Remediation programs are occurring at 44 nesting sites (Table106). Two sites have multifaceted remediation programs in place. Medium levels of remediation are occurring at ten sites and low level projects are occurring at the remaining sites. Mitigation measures have not been identified for three sites. *Education / awareness programmes* are in progress at 36 sites. *Designation/management of protected areas* was rated as important at eight sites; *egg collection*

was identified as important at six sites. A single remediation process was identified at 29 sites. No remediating processes were reported from the remainder of the sites.

**Table 106. Summary of remediating programmes implemented at nesting sites.**

Codes: X = Reported; Blank = Not Reported.

Site Name	Monitoring / protection programmes	Education / awareness programmes	Egg relocation / hatcheries	Require modification of fishing gear or fishing practices	Designation / management of protected areas, sanctuaries, exclusion zones etc.	Regulations on building location / design	Regulations on artificial lighting	Vehicle / access restrictions	Removal of debris / beach clean-up	Predator control	Other	Count
Ahungalla		x										1
Akurala		x										1
Amadoowa		x									ha	1
Ambalangoda		x										1
Arugambay (Arugam Bay?)		x										1
Balpitiya		x										1
Bentota		x	x									2
Boossa		x										1
Bundala Modara to Kirindi Modara (Bundala NP)					x						np	1
Butawa to Patanangala, Yala NP					x						ha	1
Doova modara					x							1
Godavaya to Walawa Modara		x			x							2
Habakkala		x										1
Habaraduva		x	x									2
Hambantota to Malala Modara		x										1
Hikkaduwa		x			x							2
Induruwa		x	x									2
Kahanda Modara		x										1
Kahawa		x										1
Kaikawala (no Data)												0
Kaluthara (Kadido Beach)		x										1
Karathivu island (Karathive, Karativu)				x								1
Kirinda/Magama		x										1

Site Name	Monitoring / protection programmes	Education / awareness programmes	Egg relocation / hatcheries	Require modification of fishing gear or fishing practices	Designation / management of protected areas, sanctuaries, exclusion zones etc.	Regulations on building location / design	Regulations on artificial lighting	Vehicle / access restrictions	Removal of debris / beach clean-up	Predator control	Other	Count
Koggala		x										1
Kosgoda		x	x									2
Kosgoda/Bandarawatta		x	x									2
Kumana (no Data)												0
Lunama (Kalametiya)		x										1
Maawella (Dikwella)		x										1
Maggonna		x										1
Malala Modara to Pathiraga (Bundala NP)											np	0
Mapalana (no Data)												0
Mirrijawila											ha	0
Moratuwa											sm	0
Mount Lavinia											le	0
Nagshandiya		x										1
Okanda (no Data)												0
Palatupana to Mahaseelawa (Yala NP)					x							1
Panama		x		x								2
Potuwil		x		x								2
Pukkulam												0
Rekawa	x	x			x				x			4
Seenimodara		x										1
Silawaturei												0
South Bar		x										1
Tangalle		x										1
Tibbatuwawa		x										1
Unawatuna		x			x			x				3
Ussangoda - Welipatanwila		x										1
Warahena												0
Waturegama		x	x									2
Wellaodae		x										1
<b>Index</b>	0.02	0.75	0.13	0.06	0.17	0.0	0.0	0.02	0.02	0.0		
<b>Rank</b>		A	C		B							

The information about the nesting sites in Sri Lanka was obtained from:

Amarasooriya, K. D. and Jayathilaka M. R. A. (1999). A classification of the sea turtles' nesting beaches of southern Sri Lanka. Paper presented at Second ASEAN Symposium on Sea Turtle Biology and Conservation.

De Silva, A. (2006). Marine turtles of Sri Lanka: A historic account. Pp. 188–199. In: *Marine turtles of Indian sub-continent: status, threats and conservation*. K. S. and B. Choudhury, Universities Press, Hyderabad, India.

Ekanayake, E. M. L., Kapurusinghe, T., Saman, M. M., and M. G. C. Premakumara. (2002). Estimation of the number of leatherback (*Dermochelys coriacea*) nesting at the Godavaya turtle rookery in southern Sri Lanka during the nesting season in the year 2001. *Kachhapa* 6: 13-14.

Kapurusinghe, T. (2006). Status and Conservation of Marine Turtles in Sri Lanka. Pp 174-187. In: *Marine Turtles of the Indian Subcontinent*. (K. Shanker and B. C. Choudhury, Eds.). Hyderabad, Universities Press, India.

Rajakaruna, R. S. D.M. Naveen J. Dissanayake, E.M. Lalith Ekanayake & Kithsiri B. Ranawana (2009). Sea turtle conservation in Sri Lanka: assessment of knowledge, attitude and prevalence of consumptive use of turtle products among coastal communities. *Indian Ocean Turtle Newsletter* 10:1

The Turtle Conservation Project. Turtle nesting beaches in Sri Lanka. [www. tcpsrilanka.org/download/Map.pdf](http://www.tcpsrilanka.org/download/Map.pdf).

## Recommendations for Issues Arising

Data for all sites should be reviewed, corrected as necessary, and linked to primary documents. A copy of all source material should be filed with IOSEA and an appropriate government agency.

The extent of nesting should be quantified and the method used to obtain the nesting population estimate should be stated.

Research projects should be documented. Projects should prepare documents that identify the goals and methods being used so that efforts can be coordinated and evaluation of the results can occur.

Communication among the various local island-based projects should be established to develop effective, wide-scale programs.

The threatening processes and remedial actions (if any) need to be identified and quantified, especially for sites for which little information exists. If they do not exist, documents should be prepared for (1) remediation actions and (2) how they address the threatening processes. If they exist, copies should be filed with IOSEA and with the relevant government agencies. Current projects should be evaluated to determine the effectiveness.

If at all possible, off-shore habitat assessment should be conducted to delineate and define the habitats used by the foraging populations.

Fishing practices and gear should be reviewed at local and national levels with a view to reducing incidental capture of marine turtles by introducing modifications to the gear used and/or fishing practices especially in areas of special concern (e.g., interesting areas, foraging areas).

## THAILAND

### Site Database Section 1: Definition of the Site/Area

A total of eight nesting sites have been identified in Thailand (Table 107).

Active research projects appear to be happening at five of the sites. Tagging and genetic sampling have been conducted at all five sites. Satellite tracking has been carried out at four of the five sites and foraging area studies have been carried out at two of the sites. Given the number of sites reported, marine turtle research is quite active in Thailand.

Although site descriptions have not been supplied for any of the sites, all of the sites have latitude and longitude coordinates. Google Map images based on the coordinates of the nesting sites have been downloaded from the web to show the beach area, as well as the near shore and hinterland. Threatening processes and remedial projects are associated with every site.

**Table 107. Summary of the sections of the site datasheets in the IOSEA Database and other sources.** Research: 0= none, 1= Tagging, 2= Genetic Samples, 3= Satellite tracking, 4= foraging Surveys. Values: 0= none; 1= low or little; 2= medium, adequate; 3= high, complete; Blank= not reported.

Site Name	Research	Site Description	Threats ID	Remediation	Additional Information
Khorkhao Island (Andaman Sea)	0	0	3	2	1
Khram Island (Gulf of Thailand)	1,2,3	0	3	3	1
Kra Island (Gulf of Thailand)	1,2,3,4	0	3	3	0
Maikhaw Beach (Mai Khao) (Andaman Sea)	0	0	3	2	1
Phra Thong Island (Andaman Sea)	1,2,3	0	3	3	1
Prapat Beach, Ban Tale-nok (Andaman Sea)	0	0	3	1	1
Similan Island (Andaman Sea)	1,2,3,4	0	3	3	0
Thaimuang Beach (Andaman Sea)	1,2	0	3	3	0
<b>Count</b>		<b>8</b>	<b>8</b>	<b>8</b>	<b>8</b>
<b>Index</b>		<b>0.00</b>	<b>3.00</b>	<b>2.50</b>	<b>0.63</b>

### Site Database Section 2: Species Present

All five species of marine turtles known to nest in the BOBLME sub-region nest in Thailand (Table 108). The green turtle nests in the greatest numbers and utilizes the greatest number of nesting sites. The leatherback turtle nesting occurs at the majority of Andaman Sea sites, albeit the

species nests in low numbers. Olive ridley turtles also nest in low number at multiple sites. Both hawksbill turtles and loggerhead turtles nest in Thailand at relatively low levels.

**Table 108. Species nesting in the Myanmar arranged by site.** Codes: CC= *C. caretta*, CM= *C. mydas*, LO= *L. olivacea*, EI= *E. imbricata*, DC= *D. coriacea*, UQ= Unquantified, ??= Unknown

Site/Area	CC	CM	LO	EI	DC
Huyong Island	1-10				
Khorkhao Island (Andaman Sea)		1-10	1-10		1-10
Khram Island (Ko Khram)		101-500		11-100	
Kra Island (Gulf of Thailand)		11-100		1-10	
Maikhaw Beach (Mai Khao beach)			1-10		1-10
Phra Thong Island (Andaman Sea)		1-10	1-10		1-10
Prapat Beach, Ban Tale-nok (Andaman Sea)			1-10		1-10
Similan Island (Andaman Sea)		UQ			
South Thailand					1-10
Tarutao National Park		1-10			
Thaimuang Beach (Andaman Sea)		1-10	1-10		1-10

### Site Database Section 3: Threatening Processes

Multiple threatening processes have been identified at all sites (Table 109). Two threatening processes (*Incidental capture in coastal fisheries* and *Agriculture/urban/tourism development*) had the highest ranking (1.40); *Artificial lighting on land of near shore* was ranked second highest (1.10). Two sites (Khorkhao island, Maikhaw Beach) had the highest index scores (0.33) followed by Prapat Beach (0.31). These values indicate that multiple threatening processes are occurring at these sites at important levels.

**Table 109. Summary of Threatening Processes identified at nesting sites.**

Values: 0= none; 1= low or little; 2= medium, adequate; 3= high, complete; U= Unknown; Blank= Not Reported.

Site Name	Exploitation of nesting females	Direct harvest of animals in water	Egg collection	Incidental capture in coastal fisheries	Boat strikes	Marine debris	Industrial effluent	Inshore oil pollution	Agricultural/urban/tourism development	Artificial lighting on land or near shore	Habitat degradation	Vehicles	Sand mining / removal	Natural threats, disease, predation	Index
Khorkhao Island (Andaman Sea)	1	0	1	2	1	1	0	0	3	2	1	1	0	1	0.33
Khram Island (Gulf of Thailand)	0	0	0	1	1	1	1	2	0	0	0	0	0	1	0.17
Kra Island (Gulf of Thailand)	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0.07
Maikhaw Beach (Mai Khao) (Andaman Sea)	0	0	1	2	1	1	0	1	3	3	1	1	0	u	0.33
Phra Thong Island (Andaman Sea)	0	0	0	1	u	1	0	0	1	1	1	0	0	1	0.14
Prapat Beach, Ban Tale-nok (Andaman Sea)	0	0	1	2	1	1	1	1	2	1	1	1	0	1	0.31
Similan Island (Andaman Sea)	0	0	0	0	0	u	0	0	0	0	0	0	0	1	0.02
Thaimuang Beach (Andaman Sea)	0	0	1	2	1	1	0	0	2	2	1	1	0	1	0.29
Count	8	8	8	8	7	7	8	8	8	8	8	8	8	7	
Index	0.1	0.0	0.6	1.4	0.7	0.9	0.3	0.5	1.4	1.1	0.6	0.5	0.0	1.0	
				A		D			A	B				C	

#### Site Database Section 4: Remedial Measures

Remediation programs are occurring at all nesting sites (Table 110). Five sites have multifaceted remediation programs in place. Medium levels of remediation are occurring at two sites and low level projects are occurring at one additional site. The most commonly used remediation action is *Education and awareness programs* (index = 1.00). The second most common remediation measure depends on *Designation / management of protected areas, sanctuaries, exclusion zones*( index = 0.88). Other remedial measures used include *Monitoring / protection programmes* and *Egg relocation / hatcheries*. The least used method is to *Require modification of fishing gear or fishing practices*; predator control is not used at all.

Table 110. Summary of remediating programmes implemented at nesting sites in Thailand.  
Codes: X = Reported; Blank = Not Reported. Other codes: f= Fishing.

Site Name	Monitoring / protection programmes	Education / awareness programmes	Egg relocation / hatcheries	Require modification of fishing gear or fishing practices	Designation / management of protected areas, sanctuaries, exclusion zones etc.	Regulations on building location / design	Regulations on artificial lighting	Vehicle / access restrictions	Removal of debris / beach clean-up	Predator control	Other	Count
Khorkhao Island (Andaman Sea)		x			x							2
Khram Island (Gulf of Thailand)	x	x	x		x	x	x	x	x		f	8
Kra Island (Gulf of Thailand)	x	x	x		x	x	x	x				7
Maikhaw Beach (Mai Khao) (Andaman Sea)	x	x			x						f	3
Phra Thong Island (Andaman Sea)	x	x	x		x	x	x					6
Prapat Beach, Ban Tale-nok (Andaman Sea)		x										1
Similan Island (Andaman Sea)	x	x	x		x	x	x	x	x			8
Thaimuang Beach (Andaman Sea)	x	x	x	x	x			x	x			7
<b>Count</b>	<b>6</b>	<b>8</b>	<b>5</b>	<b>1</b>	<b>7</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>3</b>	<b>0</b>		
<b>Index</b>	<b>.75</b>	<b>1.0</b>	<b>.63</b>	<b>.13</b>	<b>.88</b>	<b>.50</b>	<b>.50</b>	<b>.50</b>	<b>.38</b>	<b>0</b>		
<b>Rank</b>	<b>C</b>	<b>A</b>	<b>D</b>		<b>B</b>							

The information about the nesting sites in Thailand was obtained from:

- Aureggi, M. (2006). Leatherback nesting in Thailand: Personal communication. In: SWOT *The State of the World's Sea Turtles Report*, vol. 2 (2007).
- Charuchinda, M., and S. Monanunsap. 1998. Monitoring survey on sea turtle nesting in the Inner Gulf of Thailand, 1994–1996. *Thailand Marine Fisheries Research Bulletin* 6:17-25.
- Chantrapornsyl, S. (1992). Biology and conservation of olive ridley turtle (*Lepidochelys olivacea*, Eschscholtz) in the Andaman Sea, southern Thailand. *Phuket Marine Biological Center Research Bulletin* 57: 51-66.
- Settle, S. (1995). Status of Nesting Populations of Sea Turtles in Thailand and Their Conservation. *Marine Turtle Newsletter* 68: 8-13.

Yasuda, T., H. Tanaka, K. Kittiwattanawong, H. Mitamura, W. Klom-in, N. Arai, (2006). Do female green turtles (*Chelonia mydas*) exhibit reproductive seasonality in a year-round nesting rookery? *Journal of Zoology* 269: 451-457.

### Recommendations for Issues Arising

Data for all sites should be reviewed, corrected as necessary, and linked to primary documents. A list and a copy of all source material should be filed with IOSEA and the appropriate government agency.

The extent of nesting should be quantified and the method used to obtain the nesting population estimate should be stated.

Research projects should be documented. Projects should prepare documents that identify the goals and methods being used so that efforts can be coordinated and evaluation of the results can occur. Copies of published results should be forwarded to IOSEA and management agencies.

The threatening processes and remedial actions (if any) need to be identified and quantified, especially for sites for which little information exists. If they do not exist, documents should be prepared for (1) remediation actions and (2) how they address the threatening processes. If they exist, copies should be filed with IOSEA and with the relevant government agencies. Current projects should be evaluated to determine the effectiveness of the process.

If at all possible, off-shore habitat assessment should be conducted to delineate and define the habitats used by the foraging populations

Fishing practices and gear should be reviewed at local and national levels with a view to reducing incidental capture of marine turtles. This should be done by involving fishermen in the process of modification to the gear used and/or fishing practices, especially in areas of special concern (e.g., interesting areas, foraging areas).

## **PART IV BIBLIOGRAPHY**

### **Introduction**

The IOSEA Secretariat maintains an on-line bibliography of published scientific papers, and unpublished reports concerning marine turtles in the greater Indian Ocean region (<http://www.ioseaturtles.org/bibliography.php>). Prior to the present undertaking, the IOSEA Bibliography Resource contained approximately 890 references (mostly pertaining to the Western Indian Ocean), many of which are supported by a PDF file of the paper. The Bibliography Resource has advanced search and query functions that add to its versatility. The online library is open for public viewing and querying, but access to and downloading of PDF files is restricted to those researchers who present a valid justification for consulting the resource.

The purpose of the present task was (1) to obtain citations for published scientific papers and unpublished reports concerning the conservation and management of marine turtles in the BOBLME area and (2) to obtain PDF copies of as many as possible.

### **Methods**

All people contacted were asked to provide PDF versions of scientific papers and other documents to which they had access that were relevant to the conservation, management, and status assessment of marine turtles in their country. Each Country Report contained a list of citations used in its preparation; these were assembled into the initial bibliography. On-line bibliographic databases were searched to identify relevant citations using keywords “marine turtle” or “sea turtle” in conjunction with the country name. Google and Google scholar were searched in the same manner as the online bibliographic databases to obtain other citation and PDF files of the papers. The lists of citations in published papers were searched to locate additional references not accessed by other means.

Relevant citations, including the abstracts, were downloaded and stored in the EndNote™ Bibliography program. PDF versions of papers and reports were downloaded and linked to the citation in EndNote™. In some cases, the only copy of a paper available was through the publisher’s web site for a fee. When this occurred, other sources for the paper were sought; typically access to the papers was not purchased.

The IOSEA Secretariat subsequently incorporated all of the new citations in the existing Bibliography Resource and added keywording to facilitate searching, comparable to that available for the existing bibliography records.

### **Results and Discussion**

Only a few additional papers were supplied by the contacts in the various countries; however, several contacts provided lists of publications or web addresses from which PDF versions of their papers could be obtained. The citations in the Country Reports and those listed in their citation lists provided initial access to the literature concerning marine turtles in the region.

In total 1346 citations, most with abstracts, were found. (Some of these are duplicates of entries already included in the online system, thought to number about 350.) Of these, PDF files were obtained for approximately one-third of the citations (n= 467). No PDF files were obtained for the other two-thirds (n= 879), but the majority of the citations are supported by abstracts that provide synopses of the information. Some of these citations

A PDF copy was unavailable for many references because of copyright restrictions or access restrictions. For example, the chapters in the book *Marine turtles of the Indian sub-continent* are unavailable as separate PDF files; however, many of the chapters are available from the websites of the authors. The book is available through retail book sellers. Other PDF copies of papers are available from the publisher's web site; however, access is limited to members of the society or via payment of (typically) \$30 fee per paper. In these cases access to the papers was not purchased and other sources for the paper were sought, sometimes successfully.

The EndNote Bibliography is presented in two parts. The first contains citations that are linked to the PDF files and the second contains the citations that do not have a linked PDF file. The EndNote program allows references to be grouped by a key word such as the country name (Table 111).

Table 111. Number of citations contained in Bibliography

Country	Citations Listed in Country Report	Citations With PDF*	Citations Without PDF*
Bangladesh		21	17
India		202	483
Indonesia		15	47
Malaysia		37	59
Maldives		5	2
Myanmar		16	7
Sri Lanka		27	34
Thailand		18	26
Regional		147	237
TOTAL		488	912

\* Some citations are counted in two categories.

Some of the assembled citations deal with sites outside the boundaries of the BOBLME region, but provide information concerning marine turtles in the Indian Ocean region, or at the country level (e.g. Orissa), or contain information, and/or methods relevant to the study of marine turtles.

## Summary

The IOSEA Bibliography Resource is an on-going project. The goal is to be able to provide access to the primary and relevant literature for the IOSEA region, including the BOBLME. The current project focused on the BOBLME area has contributed 1346 citations to the IOSEA bibliography, most with abstracts, including 467 with linked PDF versions of the papers and reports, and 879 additional citations, most with abstracts.

## **ANNEXES**

## **Annex 1. Country Reports**



## Indian Ocean – South-East Asian Marine Turtle Memorandum of Understanding



### Bangladesh

#### GENERAL INFORMATION

##### Agency or institution primarily responsible for the preparation of this report:

Coastal & Wetland Biodiversity Management Project (CWBMP)  
Department of Environment, Ministry of Environment & Forests

##### Other agencies, institutions, or NGOs that have provided input:

1. Wildlife and Nature Conservation Circle, Forest Department, Ministry of Environment and Forests
2. Dr S. M. A. Rashid, Member, IUCN Species Survival Commission, Marine Turtle Specialist Group (rashidsma@yahoo.co.uk)
3. Marinelifelife Alliance, Judge Building, Hotel Sayeman Road, Cox Bazaar. (marinelife\_al@yahoo.com)

##### Designated Focal Point:

Secretary  
Ministry of Environment and Forests  
Bangladesh Secretariat  
DHAKA 1000  
Bangladesh

E-mail: secretary@moef.gov.bd  
cc: admin1@moef.gov.bd

**Memorandum signed:** 23 October 2003

**Effective Date:** 1 January 2004

**This report was last updated:** 7 September 2011

### OBJECTIVE I. REDUCE DIRECT AND INDIRECT CAUSES OF MARINE TURTLE MORTALITY

#### 1.1 Introduction to marine turtle populations and habitats, challenges and conservation efforts. [INF]

Bangladesh coastline measures 710 kilometres approximately (ICZM 2003). Not all the coastline is suitable for nesting, because sandy beaches are available only in sections along the mainland coast (Islam 2006). Apart from the mainland coast, there are numerous offshore islands whose sandy beaches are ideal for marine turtle nesting (Islam 2006).

Although five species of marine turtles occur in the territorial waters of Bangladesh (Rashid and Islam 2005), only three species have been reported to nest in Bangladesh. Among them, olive ridleys (Ahmed et al 1986, Khan 1987, Rashid 1984, 1986, Rashid and Islam 1999, Islam 2002, Rashid & Islam 2005) and green turtles (Khan 1982, 1987, Rashid 1997, Rashid and Islam 1999) are common, while hawksbills are rare (Rashid 1997, Islam 2002). There was an unconfirmed nesting record of a loggerhead based on a specimen collected by the staff of the Marine Fisheries Research Institute (MFRI) in Cox's Bazaar. Leatherback turtles are seldom encountered (Rashid and Islam 1999) and with no known records of nesting, in Bangladesh; although, one crawl mark recorded in Ceeradia, St. Martin's Island was suspected to be from a leatherback turtle.

Olive ridleys nest on sandy beaches all along the mainland coast and islands stretching from the Sunderban mangrove forests in the southwest, to St. Martin's Island in the southeast. Subsequent comprehensive studies (CARINAM 1996-98) have shown that the estimated numbers of ridleys nesting annually at St. Martin's Island may be less than 200 individuals. A total of 639 ridleys were recorded to nest on St. Martin's Island from October 1996 to February 2003, with the highest numbers recorded during the 2000-01 season. Centre for Nature Resource Studies (CNRS) recorded 650 nesting individuals (GT-129, OL-521) from 2002 to 2007 during a study funded by CAIRNS-Bangladesh. CWBMP recorded 30 olive ridleys and one green turtle from October 2007 to May 2008.

Green turtles are less widespread than olive ridleys; they nest along the mainland coast as well as on island beaches. They have been reported to nest on south-central island beaches, mainland beaches in the southeast (from Cox's Bazaar

to Teknaf) and also on some coastal islands (e.g., St. Martin's, Sonadia, Kutubdia, Hatiya and Sandweep islands). Nesting records for this species are either rare or absent for the coastal beaches of the Sunderbans. Green turtles nest year-round but the frequency of nesting increases from October to February, with the peak during November to January. They nest on the same beaches as olive ridley turtles, though there may be differences in nest site selection.

Nesting hawksbill turtles are rare visitors to the beaches of Bangladesh (Rashid & Islam 2005). There are a few unconfirmed reports of nesting on St. Martin's Island, the most recent being in 1992 (Rashid 1997). Reports from the local people of the island indicate that it used to nest here regularly in the 1950s. Little information is available on the loggerhead species in Bangladesh. The nearest sites where nesting of loggerheads has been reported are the islands off Myanmar (Thorbjarnarson et al. 2000), which lie east of St. Martin's Island; a few may nest in Bangladesh.

Leatherback turtles have not been recorded nesting in Bangladesh (Islam 2006). A search of the literature found no historic evidence of leatherback nesting in Bangladesh. However, on 11 April 1997 a dead adult leatherback turtle was washed ashore on St. Martin's Island (Islam 1999, Rashid & Islam 2005). During the 2000-01 breeding season, a crawl mark suspected to be that of a leatherback was observed at the southern tip of the southern-most of the three Ceeradia islands. In 2006 two leatherbacks washed ashore and in 2007 a live young leatherback was brought to the Bakkhali river fish landing, Cox's Bazaar after it got trapped in a fishing net. The turtle later died of exhaustion and heat.

See References in Section 3.1.1

### **1.2.1 Describe any protocol or approaches practiced in your country, which you consider exemplary, for minimising threats to marine turtle populations and their habitats, which may be suitable for adaptation and adoption elsewhere. [BPR]**

Involvement is key for successful conservation and management; Bangladesh has a good level of participation.

1. Participation of the locally elected public representatives, community members and local government agencies/officials through formation of Ecologically Critical Area Management Committees at the Union (smallest administrative unit), Upazila and district levels.
2. In-situ conservation of marine turtle nests by community guarding in St. Martin's Island, Cox's Bazaar - Teknaf sea beach, and Sonadia Island.
3. Ex-situ conservation through establishment of beach hatcheries in St. Martin's Island, Cox's Bazaar - Teknaf sea beach, Sonadia Island and Kutubdia Island.
4. Control lights in nesting areas, particularly in St. Martin's Island and Cox's Bazaar - Teknaf sea beach.
5. Restricting movement of tourists at night on the beaches in St. Martin's Island.

The 'best practice' approach adopted with success is the community based approach by mostly CWBMP-contracted NGOs:

1. By creating alternative income sources (horticulture, fish processing, fishing) through providing conservation grants.
2. Involving community in awareness activities.
3. Community involvement through employment of community members for guarding beaches.

See:

CWBMP (2006a) St Martin's Island ECA Draft Conservation Management Plan Coastal and Wetland Biodiversity Management Project BGD/99/G31  
CWBMP (2006b) Sonadia Island ECA Draft Conservation Management Plan Coastal and Wetland Biodiversity Management Project BGD/99/G31  
CWBMP (2006c) Teknaf Peninsula ECA Draft Conservation Management Plan Coastal and Wetland Biodiversity Management Project BGD/99/G31

### **1.3.1 Describe any socio-economic studies or activities that have been conducted among communities that interact with marine turtles and their habitats. [BPR, INF]**

Socio-economic studies were carried out for St. Martin's Island under NCSIP-1 (1996), under St. Martin's Project (2002), and under the CWBMP (2005) project. Some changes are visible, such as the exploitation rate of corals, mollusc shells and marine turtle eggs have decreased significantly.

See:

Hasan, M. M. (2009). "Tourism and Conservation of Biodiversity: A Case Study of St. Martins Island, Bangladesh." Law, Social Justice & Global Development (An Electronic Law Journal)

### **1.3.2 Which of these adverse economic incentives are underlying threats to marine turtles in your country? [TSH]**

- High prices earned from turtle products relative to other commodities
- Lack of affordable alternatives to turtle products

Ease of access to the turtle resource (eg. by virtue of proximity or ease of land/water access)

**Low cost of land near nesting beaches**

Low penalties against illegal harvesting

Other1: Unregulated expansion of tourism

Other2: Lack of enforcement of regulations

Other3:

None of the above or Not Applicable

Various measures have been proposed to counteract adverse economic incentives, namely:

- 1) Alternative livelihoods for the local community people;
- 2) financial support for creating public awareness;
- 3) incentives for NGOs in turtle conservation activities;
- 4) Protection for in-situ conservation of breeding grounds;
- 5) Logistics support for conservation agency.
- 6) Involvement of stake holders through collaborative management
- 7) Awareness building programmes.

**1.3.3 Has your country has taken any measures to try to correct these adverse economic incentives?**

**[BPR]**

YES  NO  NOT APPLICABLE (no adverse economic incentives exist)

The Government of Bangladesh (GoB) has declared three of the coastal beaches and islands as ecologically critical areas (ECA). As a measure to conserve biodiversity and to lessen the burden on the St. Martin's Island's limited resources (e.g., freshwater, undeveloped sewage system), the GoB has put a restriction on the construction of hotels/motels/resorts in St. Martin's Island and Cox's Bazaar-Teknaf sea beach.

Some poachers have been employed by the project authority in St. Martin's Island and now poachers have become protectors.

Forest Department & NGOs are also working in some areas.

It must be realized that "alternative income generating opportunities of the coastal fishing communities are very limited" (BoBLME 2010, p 38).

See:

BOBLME (2010). BOBLME National Inception Workshop- Bangladesh 6-7 January 2010 BRAC Centre Inn, Dhaka, Bangladesh. BOBLME-2010-Project-01.

**1.4.1 Indicate, and describe in more detail, the main fisheries occurring in the waters of your country, as well as any high seas fisheries in which flag vessels of your country participate, that could possibly interact with marine turtles. [INF]**

**a) Shrimp trawls:**  YES  NO

In the last twenty years, fishing in the marine sector has expanded rapidly due to initiatives in the 1970's. The expansion has gone on without any real control and management. This has lead to a sharp increase in fishing effort. The ownership of the industry has changed dramatically. With the introduction of more expensive fishing methods most of the boats are no longer owned by fishermen, but by business men who then employ fishers on a catch sharing basis. Even for those fishermen not using boats, they are no longer in control of the fishing resources.

For effective management of marine and coastal fisheries the management regimes are divided into three principal categories: I) Artisanal Fisheries Management, II) Mechanised Commercial Boat Fisheries Management and III) Industrial Trawl Sector Management (Marine Fisheries Sector Sub-Strategy, Dept. of Fisheries (DOF). 2006) No data are available on the marine turtles from Fishery Statistical Yearbook 2006-07. A total of 127 fishing trawlers (Shrimp trawler - 39; Fish trawler - 88) are involved in the marine fisheries (DOF 2008).

See also BOBLME 2010.

**b) Set gill nets:**  YES  NO

Set gill nets, though banned by the government, are still operational. A total of 25,369 (18,992 mechanized and 6,377 non-mechanized) boats with 71,768 and 34,548 gill nets (Total 106,316 net units) are operational, respectively (DOF 2008).

See also BOBLME 2010.  
Hussain, M.G. and Hoq, M.E. (eds.). 2010

**c) Anchored Fish Aggregating Devices (FADs):**  YES  NO

**d) Purse seine (with or without FADs):**  YES  NO

Purse seines contribute around 2,082 units to the total fishing effort; these nets (with or without FADs) are allowed for fishing (DOF 2008).

See also BOBLME 2010.  
Hussain, M.G. and Hoq, M.E. (eds.). 2010

**e) Longline (shallow or deepset):**  YES  NO

Long-line fishing is well represented in the total fishing effort: Mechanised 1,350 (with 13,619 net units); Non-mechanised 222 (1,592 with net units); other Long Line 1,069 (with 9,403 net units) operating for artisanal fishing (DOF 2008).

See also BOBLME 2010.  
Hussain, M.G. and Hoq, M.E. (eds.). 2010

**f) Driftnet:**  YES  NO

Around 1,103 drift nets are in operation (DOF 2008).

See also BOBLME 2010.  
Hussain, M.G. and Hoq, M.E. (eds.). 2010

**g) Other1:**

There are 1,091 seasonal mechanized crafts with 2,007 net units; 4,664 non-mechanized crafts with 18,970 net units and 7,010 all-season non-mechanized crafts with 29,106 nets operating in the Bay (DOF 2008).

See also BOBLME 2010.  
Hussain, M.G. and Hoq, M.E. (eds.). 2010

**h) Other2:**

None of the above

#### 1.4.2 Please indicate the relative level of **fishing effort** and **perceived impact** of each of the above fisheries on marine turtles (e.g. in terms of by-catch). [TSH]

**a) Shrimp trawls**

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source: The total fish catch was 35,391 metric tons for 2006-07: from Shrimp trawl - 5,908 mt and fish trawl - 29,483 mt. (DOF 2008). These trawlers may have an impact on the marine turtle population during their long trawls but this needs further investigation.

***b) Set gill nets***

**Fishing effort:**

RELATIVELY HIGH  **MODERATE**  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  **MODERATE**  RELATIVELY LOW  NONE  UNKNOWN

Source: (DOF 2008).

***c) Anchored Fish Aggregating Devices (FADs)***

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  **NONE**  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  **NONE**  UNKNOWN

Source: (DOF 2008).

***d) Purse seine (with or without FADs)***

**Fishing effort:**

RELATIVELY HIGH  **MODERATE**  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  **UNKNOWN**

Source: (DOF 2008).

***e) Longline (shallow or deepset)***

**Fishing effort:**

RELATIVELY HIGH  **MODERATE**  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  **UNKNOWN**

Source: (DOF 2008).

***f) Driftnet***

**Fishing effort:**

RELATIVELY HIGH  **MODERATE**  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  **UNKNOWN**

Source: (DOF 2008).

***g) Other1 (from 1.4.1): Trammel Nets***

**Fishing effort:**

RELATIVELY HIGH  **MODERATE**  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  **UNKNOWN**

Source: (DOF 2008).

**h) Other2 (from 1.4.1):**

**Fishing effort:**

RELATIVELY HIGH  MODERATE  **RELATIVELY LOW**  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  **UNKNOWN**

Source:

**1.4.3 Describe any illegal fishing that is known to occur in or around the waters of your country that may impact marine turtles. Describe the measures being taken to deal with this problem and any difficulties encountered in this regard. [TSH]**

Occasionally, some foreign fishing vessels enter the Bangladesh territorial water and fish illegal. They are also reported to use explosives as a fishing method. The situation needs clarification.

See:

Islam, M. Z. (2001). "Notes on the Trade in Marine Turtle Products in Bangladesh." Marine Turtle Newsletter 94: 10-11.  
Rahman, M. M. (2006). Marine Turtle Illegal Trade in the Southwest Coastal part of Bangladesh. Centre for Coastal Environmental Conservation (CCEC), Bangladesh.

**1.4.4 Which of the following methods are used by your country to minimise incidental capture/mortality of marine turtles in fishing activities? [IND]**

a) **Appropriate handling** of incidentally caught turtles (e.g. resuscitation or release by fishers using equipment such as de-hooking, line cutting tools and scoop nets)

YES  **NO**  NOT APPLICABLE

Marine turtles trapped in the nets are usually killed to free the nets. Many of these turtles wash ashore.

b) **Devices that allow the escape of marine turtles** (e.g. turtle excluder devices (TEDs) or other measures that are comparable in effectiveness)

**YES**  NO  NOT APPLICABLE

Use of TEDs is limited at present. However, initiatives to enhance their use are being taken by GoB through CWBMP and Department of Fisheries (DOF) and NGOs. The use of TEDs in marine trawls to minimise incidental mortality rate of turtles in the national waters and on the high seas is on the table for discussion and implementation but initiatives are yet to be taken (DOF 2006).

c) **Measures to avoid encirclement** of marine turtles in purse seine fisheries

YES  **NO**  NOT APPLICABLE

d) **Appropriate combinations** of hook design, type of bait, depth, gear specifications and fishing practices

YES  **NO**  NOT APPLICABLE

e) **Monitoring and recovery of fish aggregating devices** (FADs)

YES  **NO**  NOT APPLICABLE

f) **Net retention and recycling schemes**

YES  **NO**  NOT APPLICABLE

g) **Spatial and temporal control of fishing** (e.g. seasonal closures of fishing activities)

YES  NO  **NOT APPLICABLE**

In order to protect the breeding grounds and breeding seasons for the different species, sanctuaries and off seasons were declared (DOF 2006). These need to be established through a committee comprising of fishermen, researchers and DoF. In shore sanctuaries and banned seasons affecting artisanal fishermen should be enforced by the authorities at Upazila level. Offshore sanctuaries and banned seasons should be enforced by the coast guard in collaboration with DoF and fishermen's organisations (FAO 2007). Monitoring of the sanctuaries and banned seasons need to be undertaken to examine the effects these have on fish stocks. Sanctuaries to protect nursery grounds will be identified and prioritized for gradual legislative actions. The Upazila level Fishery officers with technical support from the Marine /Coastal Fishery Officers will implement the rules in this regard. Administrative powers under the Marine Fishery Ordinance will be delegated to them.

The Forest Department is responsible for management of the Sundarbans resources. They are collecting revenue for fishing without any attempt to control the fishing effort.

See also: Flewelling, P. and Hosch, G. (2006) Country Review: Bangladesh. In: De Young, C. (ed.) Review of the state of world marine capture fisheries management: Indian Ocean. FAO Fisheries Technical Paper. No. 488. Rome, FAO. 2006. 458p.

h) **Effort management control**

YES  NO  **NOT APPLICABLE**

Marine Fisheries Sector Sub-Strategy has been proposed to the GoB by the Department of Fisheries (DOF 2006) but has yet to implemented.

**Other (list and explain):**

Motivation and Awareness: fishermen are being motivated to release the turtles during fishing.

None of the above

**1.4.5 Which of the following programmes has your country developed - in consultation with the fishing industry and fisheries management organisations - to promote implementation of measures to minimise incidental capture and mortality of turtles in national waters and in the high seas? [IND]**

**Onboard observer programmes**

YES  **NO**  NOT APPLICABLE

Source: Flewelling, P. and Hosch, G. (2006) Country Review: Bangladesh. In: De Young, C. (ed.) Review of the state of world marine capture fisheries management: Indian Ocean. FAO Fisheries Technical Paper. No. 488. Rome, FAO. 2006. 458p.

**Vessel monitoring systems**

YES  **NO**  NOT APPLICABLE

Under the planned strategy, all mechanised commercial fishing boats that undertake up to 7- 15 day long trips should land their catch in landings defined by the Department of Fisheries. Since these boats are operated from coastal districts, management responsibility of these boats currently vested with the marine wing of DoF will be decentralised to coastal districts. This management regime will include all mechanised commercial fishing boats operating drift gill nets, marine set bag nets and long lines in the sea up to a depth of 40 meters. The area from 10 km off the shore up to a depth of 40 meters shall be allocated to mechanized boat operating drift gill nets, marine set bag net and long lines. All mechanised commercial boats, of the stipulated size and capacity shall be brought under licensing.

Fisheries Department has taken initiatives to register all vessels that fish in the Bay. The use of TEDs in marine trawl to minimise incidental mortality rate in the national waters and on the high seas is on the table for discussion and implementation but initiatives are yet to be taken (DOF 2006).

**Inspections** (i.e. at sea, in port, at landing sites)

**YES**  NO  NOT APPLICABLE

Not on a regular basis, data also irregular and incomplete. Typically only on commercial vessels.

**Training programmes / workshops** to educate fishers

**YES**  NO  NOT APPLICABLE

Initiatives have been taken to motivate the local government, local administration and local communities to encourage fishermen to release turtles during captures in fishing. CWBMP has contracted some NGOs who are working with the community people to make them aware and provide with some incentives for releasing marine turtle if caught in their nets and report. The incentives are in the form of biodiversity grants to help the communities develop initiatives for additional livelihood options and to improve their living conditions.

**Informative videos, brochures, printed guidelines** etc.

**YES**  NO  NOT APPLICABLE

St. Martin's Project published and distributed several information brochures for the conservation of marine turtles and their nesting habitats. CWBMP and partner NGOs have produced many posters, brochures, videos on the subject. These are distributed free of cost to the coastal people and particularly in the fishing community. In addition many billboards have been hoisted at strategic locations by CWBMP in all three ECAs.

**Other (list and explain):**

**YES**  NO  NOT APPLICABLE

Some NGOs like MarineLife Alliance have produced awareness materials that include posters, post cards, stickers, etc.

**None of the above**

**1.4.6 Are the mitigation measures described in 1.4.4 and 1.4.5, periodically reviewed and evaluated for their efficacy? [SAP]**

**YES**  NO  UNSURE

CWBMP is collecting information on some of the aspects of monitoring through regular quarterly meetings with community members and contracted NGOs.

**1.4.7 In your country, what types of data collection, research and development have been undertaken to support the reduction of marine turtle incidental catch (while taking into consideration the impact of various mitigation measures on other species)? [SAP]**

Data on incidental turtle mortality are collected occasionally. The Village Conservation Groups are being sensitized through awareness programs to reduce incidental catch. CWBMP-partner NGOs (Bangladesh Center for Village Development) are organizing some training workshops, to train the fishing community. Some data come from motivated community people and fishermen.

**1.4.8 Has your country exchanged information and provided technical assistance (formally or informally) to other Signatory States to promote the activities described in 1.4.4, 1.4.5 and 1.4.7 above? [SAP]**

YES  **NO**  UNSURE

**1.4.9 What legislative and practical measures has your country taken in support of UN General Assembly Resolution 46/215 concerning the moratorium on the use of large-scale driftnets? [SAP]**

Driftnets have been prohibited in some restricted areas of Sundarbans. Gill nets (including nets made of monofilament locally called current net) have been prohibited during breeding season of fish in the Sundarbans and in the open sea waters.

Marine turtles have been included in the list of protected animals in the revised Bangladesh Wildlife Preservation Act 2008. It is currently in a draft form, yet to be approved by the Parliament.

**1.5.1 Does your country have legislation to prohibit direct harvest and domestic trade in marine turtles, their eggs, parts and products; and to protect important turtle habitats? [IND]**

**YES**  NO  UNSURE

Amendment of Bangladesh Wildlife Preservation Act - 1974 is under consideration for inclusion of marine turtles in the list of protected animals. However the GoB has given a blanket protection to all wildlife including marine turtles. The Environment Conservation Act 1995 has restricted any killing or capturing of the marine turtles. Marine turtles have been included in the list of protected animals in the revised Bangladesh Wildlife Preservation Act 2008. It is currently in a draft form, yet to be approved by the Parliament.

See:

Rashid, S. M. A. & M. Z. Islam. (2005). Review: Conservation and research on marine turtles in Bangladesh. In: Shanker, K & B. C. Choudhury (eds.) Sea Turtles of the Indian Subcontinent. Wildlife Institute of India, Dehradun, India. Pg. 200 - 216.

**1.5.2 Which, among the following list, are economic uses and cultural values of marine turtles in your country? Please rate the relative prevalence / importance of each consumptive or non-consumptive use. [INF]**

**USES / VALUES**

**RELATIVE PREVALENCE / IMPORTANCE**

**Meat consumption**

**YES**  NO

HIGH  MODERATE  **LOW**  UNKNOWN

Some fishermen consume meat at Patharghata, Chittagong.

**Egg consumption**

**YES**  NO

HIGH  **MODERATE**  LOW  UNKNOWN

Eggs are consumed on a regular basis, mostly by the people from the tribal communities (Islam 2001).

**Shell products**

**YES**  NO

HIGH  MODERATE  **LOW**  UNKNOWN

**Fat consumption**

**YES**  NO

HIGH  MODERATE  **LOW**  UNKNOWN

**Traditional medicine**

**YES**  NO

HIGH  MODERATE  **LOW**  UNKNOWN

**Eco-tourism programmes**

**YES**  NO

HIGH  **MODERATE**  LOW  UNKNOWN

### Cultural / traditional significance

YES  NO

HIGH  MODERATE  LOW  UNKNOWN

Particularly among the followers of Hindu religion and some tribal members.

### Other

### 1.5.3 Please indicate the relative level and impact of traditional harvest on marine turtles and their eggs. [IND, TSH]

#### Level of harvest:

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

#### Impact of harvest:

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source of information:

Local information and observation at sites

### 1.5.4 Have any domestic management programmes been established to limit the levels of intentional harvest? [SAP]

YES  NO  UNKNOWN

Harvesting marine turtles is illegal under the proposed Bangladesh Wildlife Preservation Act 2008, and also under the Environment Conservation Act 1995. As such no harvesting limits are set.

### 1.5.5 Describe any management agreements negotiated between your country and other States in relation to sustainable levels of traditional harvest, to ensure that such harvest does not undermine conservation efforts. [BPR]

None.

### 1.6.1 First, select one of the options at left to indicate whether or not your country has any of the following measures in place to minimise the mortality of eggs, hatchlings and nesting females. If yes, then estimate the relative effectiveness of these measures. [IND, SAP]

#### MEASURES

#### RELATIVE EFFECTIVENESS

#### Monitoring/protection programmes

YES  NO  N/A

EXCELLENT  GOOD  LOW  UNKNOWN

Previously SMP used to guard and monitor the nesting turtles and undertook ex-situ measures by establishing beach hatcheries to protect the nesting turtles, eggs and hatchlings at St. Martin's Island. Currently CWBMP has reinforced the program by extending it to the three coastal ecologically critical areas, including St. Martin's Island, Cox's Bazaar-Teknaf peninsula beach and Sonadia Island.

See references in Section 3.1.1

#### Education/awareness programmes

YES  NO  N/A

EXCELLENT  GOOD  LOW  UNKNOWN

#### Egg relocation/hatcheries

YES  NO  N/A

EXCELLENT  GOOD  LOW  UNKNOWN

#### **Predator control**

YES  NO  N/A

EXCELLENT  GOOD  LOW  UNKNOWN

Through CWBMP feral dogs were killed to reduce marine turtle mortality from these predators. Feral dogs were involved in the deaths of many nesting female marine turtles. A total of 205 feral dogs were killed between January 23 and 29, 2008 (Sonadia ECA-27; Cox's Bazaar-76; Teknaf-53; & St. Martin's Island-49). The Project needs more financial support to continue this activity on a regular basis. The current status is unknown.

See management plans.

#### **Vehicle / access restrictions**

YES  NO  N/A

EXCELLENT  GOOD  LOW  UNKNOWN

It is illegal to drive on the beaches of Cox's Bazaar - Teknaf sea beach; however, this has yet to be enforced. In some sections of the long beach, identified as important marine habitats, mooring of fishing boats/ trawlers is also restricted.

See management plans.

#### **Removal of debris / clean-up**

YES  NO  N/A

EXCELLENT  GOOD  LOW  UNKNOWN

Annual beach clean-up programs are organized by several NGOs and business firms (MarineLife Alliance, Oceanic Scuba Diving, Nature Adventurers, etc). In addition the Cox's Bazaar District Beach Management Committee also takes up programs to keep some sections that are mostly visited by the tourists clean.

See management plans.

#### **Re-vegetation of frontal dunes**

YES  NO  N/A

EXCELLENT  GOOD  LOW  UNKNOWN

CWBMP has taken up activities through the contracted NGOs to re-vegetate/plant the dunes at the three coastal ECA sites. Naturally occurring vegetation are planted to protect the sand dunes.

See management plans.

#### **Building location/design regulations**

YES  NO  N/A

EXCELLENT  GOOD  LOW  UNKNOWN

According to the Bangladesh Environment Conservation Act 1995 under which the ECAs have been declared, construction of buildings along the beach is restricted within the ECA areas.

#### **Light pollution reduction**

YES  NO  N/A

EXCELLENT  GOOD  LOW  UNKNOWN

#### **Other (list and rate them)**

YES  NO  N/A

### 1.6.2 Has your country undertaken any evaluation of its nest and beach management programmes?

[SAP]

YES  NO  NOT APPLICABLE

Sporadic evaluations were done by the Forest Department, Project Authority of St. Martin's Island. CWBMP evaluates its beach management programs on a quarterly basis. In addition the Cox's Bazaar district administration also has a beach management committee that meets once a month and takes initiatives to keep the beaches clean and in good condition. The Forestry Department established Jhau (*Casurina*) plantation along the sea beach to provide a shelter belt.

## OBJECTIVE II. PROTECT, CONSERVE AND REHABILITATE MARINE TURTLE HABITATS

### 2.1.1 What is being done to protect critical habitats *outside* of established protected areas? (NB: It is assumed that legislation relating to established protected areas will have been described in Section 1.5.1) [BPR, SAP]

Critical nesting habitats for the marine turtles have been identified (Rashid 1997, Rashid & Islam 2005) but those areas have yet to be officially declared by the government. Some of the areas identified are within the protected areas while some are outside the protected areas. CNRS is working in Kutubdia Island which is outside the protected area. Nothing significant is being done in other areas except that the legislation gives a blanket cover to protect the marine turtles and habitats critical to their nesting.

### 2.1.2 Are assessments routinely made of the environmental impact of marine and coastal development on marine turtles and their habitats? [IND, SAP]

YES  NO  NOT APPLICABLE

The Integrated Coastal Zone Management Project (ICZMP) carried out some impact assessments on the coastal areas due to developmental activities. The report dealing with the important coastal areas (Working Paper 030) may be downloaded from [www.iczmpbangladesh.org](http://www.iczmpbangladesh.org).

### 2.1.3 Is marine water quality (including marine debris) monitored near turtle habitats? If yes, describe the nature of this monitoring and any remedial measures that may have been taken. [SAP]

YES  NO  NOT APPLICABLE

Through CWBMP the Department of Environment has identified some sites that correspond with the marine turtle nesting beaches (St. Martin's Island and Sonapara near Inani beach). Data were collected but the results have yet to be released.

See also BoBLME 2011.

### 2.1.4 Are measures in place to prohibit the use of poisonous chemicals and explosives? [SAP]

YES  NO  NOT APPLICABLE

Not yet.

### 2.2.1 Are efforts being made to recover degraded coral reefs? If yes, give details (location, duration, effectiveness, lessons learned, future plans etc). [IND, SAP]

YES  NO  NOT APPLICABLE (no degraded coral reefs)

The Ministry of Environment & Forest is actively pursuing actions to conserve and rehabilitate the corals in St. Martin's Island. Previously some actions were undertaken by Conservation of Biodiversity, Marine Park Establishment and Eco-Tourism Development Project and currently CWBMP has taken up the initiative for coral mapping to identify the areas where corals have degraded and to mark areas with good coral and sea grass habitats around the St. Martin's Island.

See management plans.

**2.2.2 Are efforts being made to recover degraded mangrove habitats that are important for turtles? If yes, give details (location, duration, effectiveness, lessons learned, future plans etc.) [IND, SAP]**

YES  NO  NOT APPLICABLE (no mangrove habitats important for turtles)

Actions were taken to recover degraded mangrove at Sundarbans by the Forest Department and at the Sonadia Island and a small patch in St. Martin's Island by CWBMP.

See management plans.

**2.2.3 Are efforts being made to recover degraded sea grass habitats? If yes, give details (location, duration, effectiveness, lessons learned, future plans etc.). [IND, SAP]**

YES  NO  NOT APPLICABLE (no degraded sea grass habitats)

Few sea grass beds were identified during the survey under the NCSIP-1 during 1996-97. CWBMP is currently engaged in assessing the status and mapping sea grass beds around the St. Martin's Island for protection and rehabilitation.

See management plans.

**OBJECTIVE III. IMPROVE UNDERSTANDING OF MARINE TURTLE ECOLOGY AND POPULATIONS THROUGH RESEARCH, MONITORING AND INFORMATION EXCHANGE**

**3.1.1 Give a list of available literature that includes baseline information from studies carried out in your country on marine turtle populations and their habitats. [INF]**

Ahmed, B; K.M.N. Huda and G. S.M. Asmat. (1986). The Breeding of Olive Ridley at St. Martin's Island, Bangladesh. J. Zool. 14(I):59-69.

Hasan, M. M. (2009). Tourism and Conservation of Biodiversity: A Case Study of St. Martins Island, Bangladesh. Law, Social Justice & Global Development (An Electronic Law Journal) .

Hossain, M. M. (2004). National Report of Bangladesh Sustainable Management of the Bay of Bengal Large Marine Ecosystem (BOBLME).

Humayun, K. (Undated). Marine Fisheries in Bangladesh An Overview.

Islam, M. Z. (2001). Notes on the Trade in Marine Turtle Products in Bangladesh. Marine Turtle Newsletter 94: 10-11.

Islam, M. Z. (2002). Marine turtle nesting at St. Martin's Island, Bangladesh. Marine Turtle Newsletter 96: 19-21.

Islam M. Z. (2002) Impact of coastal development on sea turtle at St. Martin and Cox's Bazar coast. Threats to in Bangladesh; Technical Report. Marine Life Alliance. 25.

Islam M. Z. (2003) 'Records of sea turtle in Cox's Bazar coast, Bangladesh, Marine Life Alliance. Technical Paper.'

Islam M. Z. (2005) Live leatherback records in Bangladesh: News to IOSEA MoU secretariat 2005.

Islam M. Z. (2005) Impact of coastal development on sea turtle at St. Martin & Cox's Bazar coast and Sonadia Island in Bangladesh; Technical Report. CWBMP.

Islam, M. Z. (2006). Status of leatherback turtles in Bangladesh. Indian Ocean – South-East Asian Leatherback Turtle Assessment IOSEA Marine Turtle MoU – 24-29.

Islam, M. Z., M. S. Islam and S. M. A. Rashid. (1999). Marine turtle conservation program in St. Martin's Island, Bangladesh by CARINAM: A brief review. Tigerpaper. 26: 17-28.

Kabir, D. S. a. S. B. M. (2002). A review of the present state of the protected areas of Bangladesh. Bangladesh Environment 489-503.

IUCN-Bangladesh. (2000). Red Book of Threatened Amphibians and Reptiles of Bangladesh. IUCN-The World Conservation Union. xii+95pp.

Khan, M. A. R. (1982). Wildlife of Bangladesh - A Checklist. Dhaka University, Dhaka. 96pp.

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Mitra SC (1914. Reprinted 2001). 'Jessore-Khulnar Itihas. Rupantar, Khulna.

Quader, O. (2010). Coastal and marine biodiversity of Bangladesh (Bay of Bengal). Proc. of International Conference on Environmental Aspects of Bangladesh (ICEAB10), Japan, Sept. 2010.

Rashid S.M.A. (1986). Conservation Plan for Marine Turtles in St. Martin's Island, Bangladesh VI Nat. Zool. Conf. Chittagong University. 8pp.

Rashid S.M.A. (1997). Bangladesh National Report for the Northern Indian Ocean, Sea Turtle Workshop and Strategic Planning, 13-18 Jan', Bhubenswar, India.

Rashid, S. M. A. (2002). Letter to the editors: Viewpoint - Sea turtle management in Bangladesh. Marine turtle Newsletter 96: 23.

Rashid, S. M. A. (2004). Faunal diversity of Bangladesh: Conservation Prospects and Constraints. National Biodiversity Strategy Action Plan report to IUCN-Bangladesh Country Office. x + 196 pp.

Rashid, S. M. A. & M. Z. Islam. (1999). Establishing marine turtle hatchery in St. Martins Island, Bangladesh. Proceedings of the 4th Asia-Pacific NGOs Environmental Conference. National University of Singapore. pp. 150-162.

Rashid, S. M. A. & M. Z. Islam. (2005). Review: Conservation and research on marine turtles in Bangladesh. In: Shanker, K & B. C. Choudhury (eds.) Sea Turtles of the Indian Subcontinent. Wildlife Institute of India, Dehradun, India. Pg. 200 - 216.

Thorbjarnarson, J. B., Platt, S.G. and Khaing, S.T. (2000). Sea Turtles in Myanmar: Past and Present. Marine Turtle Newsletter 88: 10-11.

**3.1.2 Have long-term monitoring programmes (i.e. of at least 10 years duration) been initiated or planned for priority marine turtle populations frequenting the territory of your country? [IND, BPR]**

YES  NO  UNSURE

CARINAM initiated a comprehensive study on the marine turtles nesting in the St. Martin's Island in 1997 through the MTSG/Small Grant Program. Since then the GoB through the St. Martin's Biodiversity Conservation Project 2000-2006 and currently GEF-funded CWBMP 2002 - present data is being collected for the marine turtles in St. Martin's Island. CWBMP has also started collecting data on the marine turtles in Sonadia Island and Cox's Bazaar - Teknaf peninsula beach since 2007. Center for Natural Resources Study (CNRS) an NGO is conducting study on the marine turtles in Kutubdia Island with funding from initially Shell Oil-Bangladesh and later from CAIRNS-Bangladesh.

**3.1.3 Has the genetic identity of marine turtle populations in your country been characterised? [INF, PRI]**

YES  NO  UNSURE

**3.1.4 Which of the following methods have been or are being used to try to identify migration routes of turtles? Use the text boxes to provide additional details. [INF, PRI]**

**Tagging**  YES  NO

Tagging of marine turtles at St. Martin's Island was initiated in 2000 and tagging techniques followed Balazs (1999). All the tags were monel (#1005-49, National Band and Tag Co., Kentucky), numbered from N401 to N500. The return address inscribed on the tags was: Research Box 736, Durban, South Africa. The tags were attached to the hind margin of the front flipper (left or right) of both olive ridleys and green turtles. In some cases, the tags were attached to the rear right or left flipper. Sixty-five turtles (olive ridleys and green turtles) were tagged beginning in October 2000. Tagging stopped in March 2001. Tagging provided primary data on multiple clutches, inter-nesting intervals between clutches and nest site fidelity.

Olive ridleys were recorded to nest twice during a nesting season with an interval of 14-16 days (average=14.8 days; n=18). There were only three re-nesting records for green turtles, with the nesting interval ranging between 14-17 days (Average=15.3 days; n=3); the females laid eggs two to three times during a season.

Among the tagged turtles, nine females were recovered with serious injuries on the carapace, two individuals with the hind-flippers cut, and two with fibropapilloma tumours on the front flipper. The injuries on the carapace give some indication of the threats to the turtles while they are at sea (Rashid & Islam 2005).

**Satellite tracking**  YES  NO

The first-ever sea turtle tracking project in Bangladesh has been initiated by Marinelife Alliance. An Olive ridley turtle – named “Urmee”, which means “wave” in Bangla – was fitted with a Platform Terminal Transmitter (PTT) and released into the Bay of Bengal from Sonadia Island during the evening of 29 March 2010. The signal was lasted for about one year.

See: [http://www.seaturtle.org/tracking/?project\\_id=487](http://www.seaturtle.org/tracking/?project_id=487)

Other

None of the above

**3.1.5 Have studies been carried out on marine turtle population dynamics and survival rates (e.g. including studies into the survival rates of incidentally caught and released turtles)?** [INF, PRI]

YES  NO  UNSURE

**3.1.6 Has research been conducted on the frequency and pathology of diseases in marine turtles?** [INF, PRI]

YES  NO  UNSURE

**3.1.7 Is the use of traditional ecological knowledge in research studies being promoted?** [BPR, PRI]

YES  NO  UNSURE

Information gathered by CARINAM and by the SMP and CWBMP is available to the scientific and local fisher communities. Information is collected from the fishermen on a regular basis through interviews and documented in project reports.

The most common traditional knowledge used is during the turtle walks. The weather conditions (wind, tide) and the intensity of moonlight are some of the clues used by the local fishermen to find nesting turtles.

Traditional knowledge has never been shared with other signatory states.

**3.2.1 List any regional or sub-regional action plans in which your country is already participating, which may serve the purpose of identifying priority research and monitoring needs.** [INF]

Some activities are initiated in collaboration with SACEP.

**3.2.2 On which of the following themes have collaborative studies and monitoring been conducted? Use the text boxes to describe the nature of this international collaboration or to clarify your response. Answer 'NO' if the studies/monitoring undertaken do not involve international collaboration.** [INF, PRI]

a) Genetic Identity  YES  NO  NOT APPLICABLE

b) Conservation status  YES  NO  NOT APPLICABLE

c) Migrations  YES  NO  NOT APPLICABLE

**d) Other biological and ecological aspects**     YES     NO     NOT APPLICABLE

Other

**3.3.1 List, in order of priority, the marine turtle populations in your country in need of conservation actions, and indicate their population trends. [PRI]**

Hawksbill turtle - Last nesting recorded in 1992 in St. Martin's Island and since then there has been no nesting record. A young hawksbill was, however, caught in a fishing net in 1997.

Green turtle - significant population decline. Khan 1982 mentioned it to be a common nesting turtle and, presently, it is very uncommon (Rashid & Islam 2005). The nesting habitat varies in some physical features from that of the common olive ridleys; for example, sand grain size & composition, slope angle, and distance from shoreline (Rashid & Islam 1999).

Most of the nesting in recent years is by olive ridleys, however, their numbers have declined.

**3.3.2 Are research and monitoring activities, such as those described above in Section 3.1 periodically reviewed and evaluated for their efficacy? [SAP]**

YES     NO     UNSURE

**3.3.3 Describe how research results are being applied to improve management practices and mitigation of threats (in relation to the priority populations identified in 3.3.1, among others). [SAP]**

Under the CWBMP conservation management plans (CMP) have been developed for the coastal ecologically critical areas (ECA) which include the St. Martin's Island, Cox's Bazaar - Teknaf Peninsula beach, and Sonadia Island. Information collected was analysed, discussed with the community and relevant local public representatives and government officials during the monthly meetings of the ECA Coordination Committee (ECACC). Unanimous decisions are conveyed to the community members and implemented accordingly through the contracted-NGOs and Village Conservation Groups. If the situation demands actions not mentioned in the CMP or any threat mitigation measure that needs immediate attention, remedial actions are implemented with approval from the ECACC.

See management plans listed in Section 1.2.1

**3.4.1 Has your country undertaken any initiatives (nationally or through collaboration with other Range States) to standardise methods and levels of data collection? [BPR, INF]**

YES     NO     UNSURE

The knowledge gathered by some of the MTSG members on the methods for data collection is transferred during various marine turtle workshops to the younger generation who work on marine turtles. The MTSG book on research techniques is use as the standard reference for filed work.

**3.4.2 To what extent does your country exchange scientific and technical information and expertise with other Range States? [SAP, IND]**

OFTEN (SYSTEMATICALLY)                       OCCASIONALLY                       RARELY                       NEVER

**3.4.3 If your country shares scientific and technical information and expertise with other Range States, what mechanisms have commonly been used for this purpose? Comment on any positive benefits/outcomes achieved through these interactions. [INF]**

Sharing through regional workshops and scientific publications

**3.4.4 Does your country compile and make available to other countries data on marine turtle populations of a regional interest? [INF]**

YES  NO  UNSURE

**OBJECTIVE IV. INCREASE PUBLIC AWARENESS OF THE THREATS TO MARINE TURTLES AND THEIR HABITATS, AND ENHANCE PUBLIC PARTICIPATION IN CONSERVATION ACTIVITIES**

**4.1.1 Describe the educational materials, including mass media information programmes that your country has collected, developed and/or disseminated. [INF, PRI]**

Posters, brochures and stickers have been prepared and disseminated for public education and awareness by CWBMP and partner-NGOs.

Video documentation has been prepared and disseminated to the local community people and stake holders.

MarineLife Alliance organized various activities during the Year of the Turtle 2006, including rallies, drawing competition, exhibition of information materials, picture post cards, posters, etc. They also produced marine turtle identification charts to distribute among the fishermen and to some educational and local government institutions. This material is still available and being used.

CWBMP has plans to produce exclusive video documentaries on the marine turtles. Professional assistance would be highly appreciated.

**4.1.2 Which of the following groups have been the targets of these focused education and awareness programmes described in above in Section 4.1.1? [PRI, INF]**

- Policy makers**
- Fishing industry
- Local/Fishing communities**
- Indigenous groups
- Tourists**
- Media**
- Teachers**
- Students**
- Military, Navy, Police**
- Scientists**
- Other:**
- None of the above

Information provided to the CWBMP personnel by the fishermen on sightings of marine turtles during their fishing trips, and accidental catches are also reported. Tourists are particularly instructed not take a stroll on the beaches between 10pm and 6am. If anyone accidentally comes across a nesting marine turtle they are instructed not to disturb the animal and inform the nearest patrolling team. Local people have been hired to patrol the beaches during night time in all the three coastal ECAs.

**4.1.3 Have any community learning / information centres been established in your country? [BPR, SAP]**

YES  NO

One information centre was established at St. Martin's Island but with the termination of the project the centre is closed now. Regular community awareness programmes were conducted by St. Martin's Project. CWBMP, through its contracted NGOs, is carrying out awareness programs. Re-establishing the information centre is under consideration.

**4.2 Alternative livelihood opportunities [IND, BPR] Describe initiatives already undertaken or planned to identify and facilitate alternative livelihoods (including income-generating activities) for local communities.**

Temporary and project-based alternative income generating activities and livelihood skill development training were undertaken for the local community people at St. Martin's Island by the St. Martin's Project, but unfortunately they did little good for the community. CWBMP, through its biodiversity conservation grant to the locally established Village Conservation Groups, is engaging the community members in horticultural activities and providing fishing gear in all three ECAs. Local people have been hired to guard the plantations, raise nurseries of local plants, guard beaches during night, conduct beach cleaning activities, and are trained as tourist guides. Tourists are recommended to hire trained guides. Local people are encouraged to make tourist boarding facilities to further help them earn money to meet their living costs.

**4.3.1 Describe initiatives already undertaken or planned by your country to involve local communities, in particular, in the planning and implementation of marine turtle conservation programmes. Please include details of any incentives that have been used to encourage public participation, and indicate their efficacy. [BPR, IND]**

Village Conservation Groups (VCG) have been formed involving members from the local communities by CWBMP. ECA Management Committees have been formed involving representatives from all the stakeholders. VCGs are registered with the cooperative department as such to have a legal basis and also acknowledged through government gazette notification. VCGs are provided with conservation grant money against some conservation activity or alternate livelihood activity. That grant keeps rolling and increasing through deposits with interest. Members of the VCGs offer services for turtle conservation activities.

**4.3.2 Describe initiatives already undertaken or planned to involve and encourage the cooperation of Government institutions, NGOs and the private sector in marine turtle conservation programmes. [IND, BPR]**

A national committee has been formed headed by Chief Conservator of Forests, Forest Department of Bangladesh to encourage the participation of Government institutions, NGO's, Private Sector and General Community in conservation efforts. NGOs have already been contracted to work for the conservation of marine turtles. Private sector has yet to be attracted to join the marine turtle conservation activities.

**OBJECTIVE V. ENHANCE NATIONAL, REGIONAL AND INTERNATIONAL COOPERATION**

**5.1.1 Has your country undertaken a national review of its compliance with Convention on International Trade in Endangered Species (CITES) obligations in relation to marine turtles? [SAP]**

YES  NO  NOT APPLICABLE

Forest Department is the management authority for CITES. Information not available.

**5.1.2 Does your country have, or participate/cooperate in, CITES training programmes for relevant authorities? [SAP]**

YES  NO  NOT APPLICABLE

Forest Department officials regularly attend CITES training programs. Details not available.

**5.1.3 Does your country have in place mechanisms to identify international illegal trade routes (for marine turtle products etc.)? Please use the text box to elaborate on how your country is cooperating with other States to prevent/deter/eliminate illegal trade. [SAP]**

YES  NO  NOT APPLICABLE

Bangladesh Coast Guard and Bangladesh Navy are in place to check all boats for illegal trade (in general) throughout the coast line of Bangladesh. The Customs Department is vigilant at all entry/exit points of the country.

**5.1.4 Which international compliance and trade issues related to marine turtles has your country raised for discussion (e.g. through the IOSEA MoU Secretariat, at meetings of Signatory States etc.)? [INF]**

Sufficient information not available.

**5.1.5 Describe measures in place to prevent, deter and eliminate domestic illegal trade in marine turtle products, particularly with a view to enforcing the legislation identified in Section 1.5.1. [INF]**

According to the Wildlife Preservation Act 1974 trade in protected animals is prohibited in Bangladesh. Government of Bangladesh has issued a circular in this regard. Initiative has been taken to amend the Wildlife Preservation Act 1974 for incorporating the provisions of illegal trade related to marine turtles. The Bangladesh Forest Department is responsible for enforcement.

**5.2.1 Has your country already developed a national action plan or a set of key management measures that could eventually serve as a basis for a more specific action plan at a national level? [IND]**

YES  NO

The National Biodiversity Strategy Action Plan (NBSAP) has been drafted and is yet to be approved by the government. NBSAP suggests some action plan for the marine turtles.

The conservation management plans developed by CWBMP also denotes to some sort of action plan whereby activities are undertaken for the conservation of the marine turtles in Bangladesh. Activities undertaken under the CMPs are reviewed on a quarterly basis by the CWBM Project Management Unit (PMU) and ECA Management Cell (ECAMC) of the Department of Environment (DOE).

**5.2.2 From your country's perspective, which conservation and management activities, and/or which particular sites or locations, ought to be among the highest priorities for action? [PRI]**

- 1) Protection of known nesting beaches and fishing grounds (2.1)
- 2) Motivation and awareness (4.1)
- 3) Research and monitoring (3.1)
- 4) Capacity building
- 5) Legislation up-dating
- 6) Regulating tourism
- 7) Socio-economic survey
- 8) Enforcement and punitive measures
- 9) Network development and bilateral cooperation with other regional countries
- 10) Priority sites include: St. Martin's Island, Sonadia Island, Cox's Bazaar -Teknaf beach

**5.2.3 Please indicate, from your country's standpoint, the extent to which the following local management issues require international cooperation in order to to achieve progress. [PRI]**

<b>Illegal fishing in territorial waters</b>	<input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL
<b>Incidental capture by foreign fleets</b>	<input type="checkbox"/> ESSENTIAL <input type="checkbox"/> IMPORTANT <input checked="" type="checkbox"/> <b>LIMITED</b> <input type="checkbox"/> NOT AT ALL
<b>Enforcement/patrolling of territorial waters</b>	<input checked="" type="checkbox"/> <b>ESSENTIAL</b> <input type="checkbox"/> IMPORTANT <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL
<b>Hunting/harvest by neighboring countries</b>	<input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL
<b>Poaching, illegal trade in turtle projects</b>	<input type="checkbox"/> ESSENTIAL <input type="checkbox"/> IMPORTANT <input checked="" type="checkbox"/> <b>LIMITED</b> <input type="checkbox"/> NOT AT ALL
<b>Development of gear technology</b>	<input type="checkbox"/> ESSENTIAL <input type="checkbox"/> IMPORTANT <input checked="" type="checkbox"/> <b>LIMITED</b> <input type="checkbox"/> NOT AT ALL
<b>Oil spills, pollution, marine debris</b>	<input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL
<b>Training / capacity-building</b>	<input checked="" type="checkbox"/> <b>ESSENTIAL</b> <input type="checkbox"/> IMPORTANT <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL
<b>Alternative livelihood development</b>	<input checked="" type="checkbox"/> <b>ESSENTIAL</b> <input type="checkbox"/> IMPORTANT <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL
<b>Identification of turtle populations</b>	<input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL
<b>Identification of migration routes</b>	<input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL
<b>Tagging / satellite tracking</b>	<input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL

Habitat studies

ESSENTIAL  IMPORTANT  LIMITED  NOT AT ALL

Genetics studies

ESSENTIAL  IMPORTANT  LIMITED  NOT AT ALL

**5.3.1 Identify existing frameworks/organisations that are, or could be, useful mechanisms for cooperating in marine turtle conservation at the sub-regional level. Please comment on the strengths of these instruments, their capacity to take on a broader coordinating role, and any efforts your country has made to enhance their role in turtle conservation. [INF, BPR]**

Bangladesh has signed the CBD, CMS, and CITES treaties, and is promoting synergies with regional and other countries under CBD, CMS and CITES. Recently some progress made with SACEP through CWBMP, DOE.

See:

Rashid, S. M. A. & M. Z. Islam. (2005). Review: Conservation and research on marine turtles in Bangladesh. In: Shanker, K & B. C. Choudhury (eds.) Sea Turtles of the Indian Subcontinent. Wildlife Institute of India, Dehradun, India. Pg. 200 - 216.

**5.3.2 Has your country developed, or is it participating in, any networks for cooperative management of shared turtle populations? [BPR, INF]**

YES  NO  NOT APPLICABLE

**5.3.3 What steps has your country taken to encourage Regional Fishery Bodies (RFBs) to adopt marine turtle conservation measures within Exclusive Economic Zones (EEZs) and on the high seas? [SAP]**

Yes (details not available)

**5.4.1 Describe your country's needs, in terms of human resources, knowledge and facilities, in order to build capacity to strengthen marine turtle conservation measures. [PRI]**

Marine turtle identification is required as part of all turtle activities. Yet it is a major problem to get the species identification right. This is more of a motivational and/or practice problem rather than a learning or knowledge deficiency. There are few people (may be counted by fingers) who are well trained in marine turtle identification and other conservation activities.

Bangladesh needs training of field workers of Forest Department, Department of Environment, marine Fisheries Department, Marine Academy, NGOs, and relevant tertiary level institutions is a high priority.

**5.4.2 Describe any training provided in marine turtle conservation and management techniques (e.g. workshops held, training manuals produced etc.), and indicate your plans for the coming year. [PRI, INF]**

Some government officers from the Forest Department and NGO representatives have attended training programmes. However the opportunities are very limited.

**5.4.3 Specifically in relation to capacity-building, describe any partnerships developed or planned with universities, research institutions, training bodies and other relevant organisations. [BPR]**

These are in the process of being established.

**5.5.1 National policies and laws concerning the conservation of marine turtles and their habitats will have been described in Section 1.5.1. Please indicate their effectiveness, in terms of their practical application and enforcement. [SAP, TSH]**

Law and legal provisions exist, but enforcement is still limited. Under the Forest Department a separate wild management and nature conservation division has been created which has special laws and legal provisions under the Wildlife Act 1974.

See: <http://www.bforest.gov.bd/>

**5.5.2 Has your country conducted a review of policies and laws to address any gaps, inconsistencies or impediments in relation to marine turtle conservation? If not, indicate any obstacles encountered in this regard and when this review is expected to be done. [SAP]**

YES  NO  UNSURE

The review of The Wildlife Act 1974 is under consideration to address the issues of marine turtle conservation. Implementation is slow.

**5.5.3 From the standpoint of law enforcement, has your country experienced any difficulties achieving cooperation to ensure compatible application of laws across and between jurisdictions? [TSH]**

YES  NO  UNSURE

None

## **OBJECTIVE VI. PROMOTE IMPLEMENTATION OF THE MoU INCLUDING THE CONSERVATION AND MANAGEMENT PLAN**

**6.1.1 What has your country already done, or will it do, to encourage other States to sign the IOSEA MoU? [INF]**

The country intends to contribute in the future. IOSEA memorandum has already played an important role in the field of conservation.

**6.1.2 Is your country currently favourable, in principle, to amending the MoU to make it a legally binding instrument? [INF]**

YES  NO  NO VIEW

**6.1.3 Would your country be favourable, over a longer time horizon, to amending the MoU to make it a legally-binding instrument? [INF]**

YES  NO  NO VIEW

Subject to final approval of the responsible authority.

### **6.2 Secretariat and Advisory Committee**

**6.2.1 What efforts has your country made, or can it make, to secure funding to support the core operations of the IOSEA MoU (Secretariat and Advisory Committee, and related activities)? [IND]**

The GoB is contributing in kind through providing information and financing in-country projects to protect marine turtles.

**6.3.1 What funding has your country mobilised for domestic implementation of marine turtle conservation activities related to the IOSEA Marine Turtle MoU? Where possible, indicate the specific monetary values attached to these activities/programmes, as well as future plans. [IND]**

The GoB invested Tk 14,00,00,000 (=more than US \$2,000,000) from its own revenue budget for the St. Martin's Project (2000-2006), of which a significant amount was allocated for activities related to marine turtle conservation. GoB is also contributing in kind and in cash for the CWBM Project which is protecting marine turtles in the three coastal ECAs.

**6.3.2 Has your country tried to solicit funds from, or seek partnerships with, other Governments, major donor organisations, industry, private sector, foundations or NGOs for marine turtle conservation activities? [IND]**

YES  NO

The 7-year CWBMP (2002-2009) project was a US \$5m project funded by GEF. Different NGOs have been successful to attract some funds for marine turtle work.

**6.3.3 Describe any initiatives made to explore the use of economic instruments for the conservation of marine turtles and their habitats. [BPR]**

Not yet

**6.4.1 Has your country designated a lead agency responsible for coordinating national marine turtle conservation and management policy? If not, when is this information expected to be communicated to the IOSEA MoU Secretariat? [IND]**

YES  NO

Wildlife and Nature Conservation Circle of Forest Department.

**6.4.2 Are the roles and responsibilities of all government agencies related to the conservation and management of marine turtles and their habitats clearly defined? [IND]**

YES  NO  UNSURE

Wildlife and Nature Conservation Circle of Forest Department has been identified and entrusted with the responsibility to conserve the activities of marine turtles.

**6.4.3 Has your country ever conducted a review of agency roles and responsibilities? If so, when, and what was the general outcome? If not, is such a review planned and when? [SAP],**

YES  NO  UNSURE

Review of the situation for wildlife and nature conservation within the Forest Department requires conservation of habitat and special training of personnel for management.

**Comments/suggestions to improve the present reporting format:**

The format is quite exhaustive and it takes a lot of time to complete. Moreover information provided in this document require information from various government agencies which at times is difficult to get. However there is a provision to correct or update if in any case the information provided is either not satisfactory or incomplete.

In the site threat information sheet the use of the word "harvest" contradicts with "exploitation". Usually "harvest" is for human use/consumption or other commercial use. Whether the killings of turtles on land without any reason/use be also treated "harvest" needs clarification.

**Additional information not covered above:**

Bangladesh needs support from regional and other IOSEA member countries to develop her capacity in monitoring and application of technological developments in the field of marine turtle studies.

More funding needs to be tapped. The fact is that relevant government agencies have limited technical know-how in conservation of marine turtles particularly related to the use of TEDs. Training opportunities may be created by IOSEA for people from the relevant government departments.

IOSEA may organize workshops on marine turtle related events in collaboration relevant agency in Bangladesh to raise the profile of marine turtles and awareness among the policy makers, NGOs and the general masses.

IOSEA may also facilitate researchers/educational institutions/NGOs for working on marine turtles.

**Other Citations**

BOBLME (2010) BOBLME National Inception Workshop- Bangladesh 6-7 January 2010 BRAC Centre Inn, Dhaka,

Bangladesh. BOBLME-2010-Project-01.

BOBLME (2011) Country report on pollution in the BOBLME – Bangladesh. BOBLME-2011-Ecology-01.

CWBMP (2002-2009) Conservation Management Plan Coastal and Wetland Biodiversity Management Project.

CWBMP (2006a) St Martin's Island ECA Draft Conservation Management Plan Coastal and Wetland Biodiversity Management Project BGD/99/G31

CWBMP (2006b) Sonadia Island ECA Draft Conservation Management Plan Coastal and Wetland Biodiversity Management Project BGD/99/G31

CWBMP (2006c) Teknaf Peninsula ECA Draft Conservation Management Plan Coastal and Wetland Biodiversity Management Project BGD/99/G31

DoF (Department of Fisheries). (2006). Annual Report. Department of Fisheries. Bangladesh.

DOF (Department of Fisheries). 2008. Fisheries Resources Development Campaign-2008. Directorate of Fisheries, Dhaka. 95 p. (in Bengali).

DoF. 2009. Fishery Statistical Yearbook of Bangladesh. Department of Fisheries, Bangladesh. 42p.

Hussain, M.G. and Hoq, M.E. (eds.). 2010. Sustainable Management of Fisheries Resources of the Bay of Bengal-Compilation of national and regional workshop reports. Support to Sustainable Management of the BOBLME Project, Bangladesh Fisheries Research Institute. SBOBLMEP Pub./Rep. 2. 122 p.



## India

### GENERAL INFORMATION

#### Agency or institution primarily responsible for the preparation of this report:

Ministry of Environment & Forest,  
Government of India,  
Paryavaran Bhawan,  
Lodhi Road,  
New Delhi - 110 003  
India

#### Other agencies, institutions, or NGOs that have provided input:

Wildlife Institute of India,  
Post Box 18,  
Chandrabani,  
Dehra Dun - 248001 (Uttarakhand)  
India

#### Designated Focal Point:

Shri A.K. Srivastava  
Inspector General of Forests (WL)  
Ministry of Environment and Forests  
Room No. 106, Paryavaran Bhawan  
CGO Complex, Lodi Road  
NEW DELHI 110003  
India

Tel: +91 11 243 66704  
Fax: +91 11 243 63685/243 60695  
Email: srivastavaak1954@gmail.com

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### OBJECTIVE I. REDUCE DIRECT AND INDIRECT CAUSES OF MARINE TURTLE MORTALITY

#### 1.1 Introduction to marine turtle populations and habitats, challenges and conservation efforts. [INF]

India with ~8500 km coastline and two marine eco-regions (Bay of Bengal and the Arabian Sea), supports four species of marine turtles out of the seven species known in the world: green turtle, olive ridley, hawksbill, leatherback. A fifth species (loggerhead) inhabits the eco-regions, at least in small numbers.

India supports the largest known population of nesting olive ridley turtles, along the Orissa coast, and the largest nesting population of leatherback turtles in the Andaman & Nicobar Islands in the south Asia region. Foraging areas used by these species are presumed to be, at least in part, within the Indian Ocean. The Andaman & Nicobar and Lakshadweep group of islands, with extensive coral formations and undisturbed lagoons, also support a large foraging population and some nesting populations of hawksbill and green turtles. The full extent of the foraging areas used by these species is undefined.

The marine turtles in India face many threats including incidental capture in marine fisheries and a host of other problems on the nesting beaches, due to the various developmental activities and coastal human population density and

their dependency on the marine environment. In addition, industrial development and production, ports and shipping, beach armouring, erosion and coastal plantations, etc. pose serious threats to the survival of marine turtles (Rodrigues et al 2010).

Because they are protected under the Indian Wildlife (Protection) Act, 1972, marine turtles in India have received much conservation and management attention for the last three decades. The MoEF (Ministry of Environment & Forests) supports conservation efforts of the maritime provinces to protect and manage the marine turtle populations and their habitats through the Govt. of India Wildlife Conservation Schemes. In addition to the Forest and Wildlife organizations of the central and maritime states, the Indian Coast Guard, Indian Navy and the marine fisheries organizations have also been involved in the conservation of marine turtles, particularly in controlling incidental capture related mortalities in the state of Orissa.

Several academic institutions and organisations have also been supported for conducting basic and management related research on marine turtles and their habitats including population surveys, genetic studies, and satellite telemetry studies to identify migratory routes and foraging habitats of turtles.

Based on citations in Section 3.1.1 and

Choudhury, B. C., S. C. Sharma, et al. (2000). "The sea turtle conservation agenda of India." Sea turtles of the Indo-Pacific: research management and conservation. Proceedings of the Second ASEAN Symposium and Workshop on Sea Turtle Biology and Conservation.: 100-106.

Rodriguez, S and Sridhar, A. 2010. Harboured Trouble: The Social and Environmental Upshot of Port Growth in India. Dakshin Foundation, Bangalore, p 62. ([www.dakshin.org](http://www.dakshin.org))]

Shanker, K. (2004). Marine turtle status and conservation in the Indian Ocean FAO Fisheries Report Supplement Rome, 9-12 March 2004 FAO. 738: 238p.

Shanker, K. & Choudhury, BC (eds.) 2006. "Marine Turtles of Indian Subcontinent" . Universitie Press, Hyderabad. A Publication of GOI-UNDP & Wildlife Institute of India, Dehra Dun.

Sampath, V. (2003). NATIONAL REPORT on the Status and Development Potential of the Coastal and Marine Environment of the East Coast of India and its Living Resources.

### **1.2.1 Describe any protocol or approaches practiced in your country, which you consider exemplary, for minimising threats to marine turtle populations and their habitats, which may be suitable for adaptation and adoption elsewhere. [BPR]**

The country has adopted globally accepted standard practices in marine turtle conservation and management which include offshore congregation protection, onshore nesting beach protection and management, arribada and sporadic nesting population monitoring, control and management of destructive practices and activities on the nesting beaches, fishing ban during breeding season, TED promotion and implementation, education and awareness and promotion of research on marine turtles. All of these are indeed adopted in the sense that they are acknowledged to be required, but the level of implementation of each varies, as indicated in various sections of this report (Shanker & Kutty 2005).

Arribada and sporadic nesting population monitoring is conducted in Orissa by the Wildlife Institute of India, Indian Institute of Science, and Forest Department; in Andaman and Nicobar Islands by the Indian Institute of Science and Andaman and Nicobar Environment Team; and in all the other states by various NGOs.

Education, awareness programs, and promotion of research on marine turtles are conducted mainly by NGOs and independent research organisations.

See:

Boopendranath et al. 2006. Design and development of the TEDS for Indian fisheries. In: Sea Turtles of the Indian Sub-continent (eds. K. Shanker & B. C. Choudhury), Universities Press, Hyderabad, India. pp 244-261.

Shanker, K. & R. Kutty (2005) Sailing the flagship fantastic: myth and reality of sea turtle conservation in India. Maritime Studies 3(2) and 4(1): 213-240.

### **1.3.1 Describe any socio-economic studies or activities that have been conducted among communities that interact with marine turtles and their habitats. [BPR, INF]**

Only recently, have studies on the socio-economic impacts on fisheries communities of been initiated because of marine turtle conservation action have been initiated and consultation with cross-sectoral agencies have been attempted (see list of reports below; available at [www.dakshin.org](http://www.dakshin.org)).

There are two ongoing studies of human-turtle interactions in: (a) Lakshadweep Islands, conducted by Nature Conservation Foundation and (b) Orissa, conducted by Ashoka Trust for Research in Ecology and the Environment and Dakshin Foundation. This is part of a collaborative project on Human Wildlife Conflict between the Norwegian Institute of Nature Research and Indian Institute of Science, Bangalore.

Relevant reports :

Sridhar, A. 2010. Planning for Vulnerability: The Hazards and Setbacks in Coastal Legislation . Dakshin Foundation,

Bangalore. pp 11.

Rodriguez, S and A. Sridhar. 2010. Harboursing Trouble: The Social and Environmental Upshot of Port Growth in India. Dakshin Foundation, Bangalore, p 62.

Rodriguez, S. 2010. Claims for Survival: Coastal Land Rights of Fishing Communities. Dakshin Foundation, Bangalore, p 42.

Murugan, A. and R. Durgekar. 2008. Beyond the Tsunami: Status of Fisheries in Tamil Nadu, India: A Snapshot of Present and Long-term Trends. UNDP/UNTRS, Chennai and ATREE, Bangalore, India. pp. 75.

Rodriguez, S., G. Balasubramanian, M. P. Shiny, M. Duraiswamy and P. Jaiprakash. 2008. Beyond the Tsunami: Community Perceptions of Resources, Policy and Development, Post-Tsunami Interventions and Community Institutions in Tamil Nadu, India. UNDP/UNTRS, Chennai and ATREE, Bangalore, India. p 78.

Sridhar, A., M. Menon, S. Rodriguez and S., Shenoy. 2008. Coastal Management Zone Notification '08 – The Last Nail in the Coffin. ATREE, Bangalore. pp 81.

Menon, M., S. Rodriguez, A. Sridhar. 2007. Coastal Zone Management Notification '07 – Better or bitter fare? ATREE, Bangalore. pp 21.

### 1.3.2 Which of these adverse economic incentives are underlying threats to marine turtles in your country?

[TSH]

High prices earned from turtle products relative to other commodities

Lack of affordable alternatives to turtle products

**Ease of access to the turtle resource (eg. by virtue of proximity or ease of land/water access)**

**Low cost of land near nesting beaches**

Low penalties against illegal harvesting

Other1:

Other2:

Other3:

None of the above or Not Applicable

Ease of access to the turtle resource. However, direct take of turtles is not a major threat in most parts of the coast.

Low cost of land near nesting beaches. This is an important factor given coastal development. Incentives for coastal development to industry are called special economic zones; there are large-scale incentives with large potential adverse effects on sea turtle habitats. Some coastal states have rejected special economic zones because of their potential environmental and social impacts.

See :

Rodriguez, S. 2010. Claims for Survival: Coastal Land Rights of Fishing Communities. Dakshin Foundation, Bangalore, p 42.

Sridhar, A., M. Menon, S. Rodriguez and S., Shenoy. 2008. Coastal Management Zone Notification '08 – The Last Nail in the Coffin. ATREE, Bangalore. pp 81.

### 1.3.3 Has your country has taken any measures to try to correct these adverse economic incentives?

[BPR]

YES  NO  NOT APPLICABLE (no adverse economic incentives exist)

Regulations for control and management of destructive practices and activities on the nesting beaches are still under debate because coastal communities want stricter protection of the coastal resources.

### 1.4.1 Indicate, and describe in more detail, the main fisheries occurring in the waters of your country, as well as any high seas fisheries in which flag vessels of your country participate, that could possibly interact with marine turtles. [INF]

a) *Shrimp trawls*:  YES  NO

Shrimp trawls operate all along the coastline of India except for two months annually (fishing holidays). It is assumed that 60% of the mortality of turtles along the Indian coastline is the result of incidental capture in shrimp trawls. In Orissa, it is legally mandated that trawlers use TEDs. However, practically no trawler in Orissa uses TEDs. Acceptance of TEDs, even though provided free of cost by the Marine Product Export Development Authority (MPEDA) under the Ministry of Commerce, Government of India, is not satisfactory.

In the southern states, including Kerala and Tamil Nadu, there seem to be large-scale shifts away from trawling, but not necessarily towards friendlier fishing practices.

See :

Rodriguez, S., G. Balasubramanian, M. P. Shiny, M. Duraiswamy and P. Jaiprakash. 2008. Beyond the Tsunami: Community Perceptions of Resources, Policy and Development, Post-Tsunami Interventions and Community Institutions in Tamil Nadu, India. UNDP/UNTRS, Chennai and ATREE, Bangalore, India. p 78.

**b) Set gill nets:**  YES  NO

Although capture of turtles occurs, the mortality due to use of set gill nets is not adequately investigated. However, there is a CMFRI study that documents relative mortality in gill and trawl nets.

See :

Rajagopalan, M., E. Vivekanandan, S.K. Pillai, M. Srinath & A.B. Fernando. 1996. Incidental catch of sea turtles in India. Marine Fisheries Information Service, T & E Series 143: 8-16.

Rajagopalan, M., K. Vijayakumaran & E. Vivekanandan. 2006. Marine fishery related mortality of sea turtles in India - an overview. In: Sea Turtles of the Indian Sub-continent (eds. K. Shanker & B. C. Choudhury), Universities Press, Hyderabad, India. pp 227-237.

**c) Anchored Fish Aggregating Devices (FADs):**

**d) Purse seine (with or without FADs):**  YES  NO

These are being used in Kerala and there is some work on this. Not much turtle mortality is reported from these operations.

**e) Longline (shallow or deepset):**  YES  NO

In surveys conducted from 2005-08, there were 19 reported instances of sea turtle interactions with the longline gear during the survey conducted in the west coast (Arabian Sea) involving 23 turtles, out of which 19 were olive ridleys, whereas two numbers each of green turtles and hawksbills were also recorded. The sea turtle HR recorded from this region was 0.068 individuals/1000 hooks, contributing 0.943% to the total catch recorded from the region. Along the west coast also, sea turtle interaction was more pronounced in the northern latitudes (lat. 15–23°N), from where 15 sea turtles were recorded, whereas the remaining 8 turtles were recorded from the southern latitudes.

In the A&N waters, instances of sea turtle interaction were meagre, the only recorded interaction being from the latitudes 12°N to 13°N (one turtle each), although extensive survey was conducted in this area during the study period. The turtle HR recorded from the A&N waters was only 0.008, and their contribution to the total catch of the region was 0.102%. Since the A&N waters are also a part of Bay of Bengal large marine ecosystem (LME), the data pertaining to these two regions were pooled together and the results showed that 64 sea turtles were recorded as bycatch from the Bay of Bengal LME, with an HR of 0.137 individuals/1000 hooks, contributing 1.769% of the total catch recorded from this LME.

Month-wise analysis of data on the sea turtles interaction revealed that along the west coast, sea turtle interaction was more during November–March, the maximum HR being recorded during March (0.175), followed by February (0.144). Along the east coast, the seasonal variations in the sea turtle interaction were not prominent, although the number of specimens recorded varied greatly during different months. No interactions were observed during six months, viz. January, March, April, August, November and December while the catch was in the range of 1 (June) to 25 (May) during the remaining months. From the A&N waters, both the reported interactions were during January.

See :

Sijo P. Varghese\*, S. Varghese and V. S. Somvanshi 2010. Impact of tuna longline fishery on the sea turtles of Indian seas. CURRENT SCIENCE, 98 (10): 1378-1384.

**f) Driftnet:**  YES  NO

Since a very large number of trawl nets, gill nets etc. are discarded by marine fisheries operations; their contribution to turtle mortality is not ruled out. However, this has not been investigated in a systematic manner in the offshore waters.

**g) Other1:**

Monofilament nets used by artisanal fisherfolks within the first two km of shoreline have also been recorded to be responsible for turtle mortality. However, their contribution to turtle mortality is insignificant as the artisanal fisherfolk remove the turtles as soon as they detect a turtle to save the net.

***h) Other2:***

Dynamite fishing in coral reef harbouring areas of the country has been recorded to contribute to some level of sea turtle mortality though such fishing practices are largely targeted for fish only.

**None of the above**

**1.4.2 Please indicate the relative level of **fishing effort** and **perceived impact** of each of the above fisheries on marine turtles (e.g. in terms of by-catch). [TSH]**

***a) Shrimp trawls***

**Fishing effort:**

**RELATIVELY HIGH**  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

**RELATIVELY HIGH**  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source: This varies by state/region (e.g., relatively high effort and impact on the east coast. Relatively low on west coast and negligible on the islands (A&N and Lakshadweep)).

Source : "Marine Turtles of Indian Subcontinent" edited by Kartik Shanker & BC Choudhury, 2006, Universitie Press, Hyderabad. A Publication of GOI-UNDP & Wildlife Institute of India, Dehra Dun.

***b) Set gill nets***

**Fishing effort:**

RELATIVELY HIGH  **MODERATE**  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  **MODERATE**  RELATIVELY LOW  NONE  UNKNOWN

Source: This varies by state: moderate to high on the southeastern coast (Tamil Nadu), and low elsewhere. According to published papers (below), 60-70 % of the mortality is from gill nets on the east coast of India. This is likely to be incorrect for Orissa where trawling was greatly underestimated, but it may reflect a higher level of gill net mortality than suspected for the other states.

Source: Rajagopalan, M., E. Vivekanandan, S.K. Pillai, M. Srinath & A.B. Fernando. 1996. Incidental catch of sea turtles in India. Marine Fisheries Information Service, T & E Series 143: 8-16.

Rajagopalan, M., K. Vijayakumaran & E. Vivekanandan. 2006. Marine fishery related mortality of sea turtles in India - an overview. In: Sea Turtles of the Indian Sub-continent (eds. K. Shanker & B. C. Choudhury), Universities Press, Hyderabad, India. pp 227-237.

***c) Anchored Fish Aggregating Devices (FADs)***

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  **NONE**  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  **NONE**  UNKNOWN

Source:

***d) Purse seine (with or without FADs)***

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source:

***e) Longline (shallow or deepset)***

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source: Surveys conducted from 2005-2008 revealed that longline fishery is exerting an impact on the sea turtles population of the seas around India, as in the case of many longline fisheries in other parts of world. But the observed hook rate of sea turtles from the entire Indian EEZ (0.108 turtle/1000 hooks) was markedly lower than many of the studies conducted elsewhere in the world.

The study revealed that the quantum of interaction of sea turtles with longline gear varies greatly among the three regions of Indian EEZ, the greatest number of interactions and hook rate being from the east coast (Bay of Bengal, 0.302/1000 hooks) followed by west coast (Arabian Sea, 0.068/1000 hooks) whereas the least was from the A&N waters (0.008/1000 hooks). This can be attributed to the increased abundance of olive ridleys in the east coast whose main nesting ground is in the Orissa coast.

See:

Sijo P. Varghese, S. Varghese and V. S. Somvanshi 2010. Impact of tuna longline fishery on the sea turtles of Indian seas. CURRENT SCIENCE, 98 (10): 1378-1384.

Andrews, H.V., S. Krishnan & P. Biswas. 2006. Distribution and status of marine turtles in the Andaman and Nicobar Islands. In: Eds. K. Shanker & B.C. Choudhury. 2006. Marine Turtles of the Indian Subcontinent. Hyderabad, India: Universities Press. pp 33-57.

***f) Driftnet***

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source: Unpublished Information and Unpublished Reports.

Andrews, H.V., S. Krishnan & P. Biswas. 2006. Distribution and status of marine turtles in the Andaman and Nicobar Islands. In: Eds. K. Shanker & B.C. Choudhury. 2006. Marine Turtles of the Indian Subcontinent. Hyderabad, India: Universities Press. pp 33-57.

***g) Other1 (from 1.4.1): Monofilament gill net***

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source: Pandav, B. & Choudhury, B.C. 2000. Conservation and Management of Olive Ridley Turtles along the Orissa Coast of India. Wildlife Institute of India, Dehra Dun, Final Report.

***h) Other2 (from 1.4.1): Dynamite Fishing***

**Fishing effort:**

RELATIVELY HIGH  MODERATE  **RELATIVELY LOW**  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  **RELATIVELY LOW**  NONE  UNKNOWN

Source: CMFRI Publications

**1.4.3 Describe any illegal fishing that is known to occur in or around the waters of your country that may impact marine turtles. Describe the measures being taken to deal with this problem and any difficulties encountered in this regard. [TSH]**

All kinds of fishing in violation of the state maritime fisheries act are controlled by the concerned state fisheries organisations. However, during the breeding season of turtles, the state wildlife department supported by the Indian Coast Guard within the territorial waters and Indian Navy in the EEZ also patrol and prohibit such illegal fishing.

See:

Shanker, K. & R. Kutty (2005) Sailing the flagship fantastic: myth and reality of sea turtle conservation in India. Maritime Studies 3(2) and 4(1): 213-240.

**1.4.4 Which of the following methods are used by your country to minimise incidental capture/mortality of marine turtles in fishing activities? [IND]**

a) **Appropriate handling** of incidentally caught turtles (e.g. resuscitation or release by fishers using equipment such as de-hooking, line cutting tools and scoop nets)

**YES**  NO  NOT APPLICABLE

NGOs are running awareness programmes for fishermen in some states (Tamil Nadu, Gujarat, Andhra Pradesh); however, the answer would be 'No' for other areas.

b) **Devices that allow the escape of marine turtles** (e.g. turtle excluder devices (TEDs) or other measures that are comparable in effectiveness)

**YES**  NO  NOT APPLICABLE

But only in some (limited) areas. Although legislation exists to mandate the use of TEDs, in practice TEDs are not used.

TED promotion and implementation was started several years ago (Boopendranath et al. 2006). The Central Institute of Fisheries Technology developed a TED, and Marine Products Export Development Authority promoted its use, but TEDs are not used in any of the coastal states, including Orissa.

See:

Shanker, K. & R. Kutty (2005) Sailing the flagship fantastic: myth and reality of sea turtle conservation in India. Maritime Studies 3(2) and 4(1): 213-240.

Gopi, G. V., B. Pandav & B. C. Choudhury. 2002. A quantitative analysis of incidental turtle mortalities during commercial shrimp trawling in the coastal waters off Orissa. Wildlife Institute of India, Dehradun. 40p.

c) **Measures to avoid encirclement** of marine turtles in purse seine fisheries

YES  **NO**  NOT APPLICABLE

d) **Appropriate combinations** of hook design, type of bait, depth, gear specifications and fishing practices

YES  NO  **NOT APPLICABLE**

e) **Monitoring and recovery of fish aggregating devices** (FADs)

YES  **NO**  NOT APPLICABLE

f) **Net retention and recycling schemes**

YES  **NO**  NOT APPLICABLE

g) **Spatial and temporal control of fishing** (e.g. seasonal closures of fishing activities)

**YES**  NO  NOT APPLICABLE

There are seasonal and area bans on fishing in Orissa and a few other places for both commercial and artisanal fishers. A fishing ban during breeding season of sea turtles exists in Orissa, but it is poorly implemented. An upcoming report will review these measures.

See:

Flewelling, P. and Hosch, G. 2006. Country review: India (East coast) Pp. 111-125. In: De Young, C. (ed.) Review of the state of world marine capture fisheries management: Indian Ocean. FAO Fisheries Technical Paper. No. 488. Rome, FAO. 2006. 458p.

h) **Effort management control**

**YES**  NO  NOT APPLICABLE

Gear and size restrictions are legislated for commercial gear but not that used by artisanal fishermen.

See:

Flewelling, P. and Hosch, G. 2006. Country review: India (East coast) Pp. 111-125. In: De Young, C. (ed.) Review of the state of world marine capture fisheries management: Indian Ocean. FAO Fisheries Technical Paper. No. 488. Rome, FAO. 2006. 458p.

Other (list and explain):

None of the above

**1.4.5 Which of the following programmes has your country developed - in consultation with the fishing industry and fisheries management organisations - to promote implementation of measures to minimise incidental capture and mortality of turtles in national waters and in the high seas? [IND]**

**Onboard observer programmes**

YES  **NO**  NOT APPLICABLE

**Vessel monitoring systems**

YES  **NO**  NOT APPLICABLE

**Inspections** (i.e. at sea, in port, at landing sites)

**YES**  NO  NOT APPLICABLE

Random inspections at landing sites occur for commercial and artisanal vessels, at least infrequently. Although legislation exists, enforcement and implementation are poor or non-existent.

See:

Flewelling, P. and Hosch, G. 2006. Country review: India (East coast) Pp. 111-125. In: De Young, C. (ed.) Review of the state of world marine capture fisheries management: Indian Ocean. FAO Fisheries Technical Paper. No. 488. Rome, FAO. 2006. 458p.

**Training programmes / workshops** to educate fishers

**YES**  NO  NOT APPLICABLE

A series of workshops and training programmes for education, awareness and training frontline staff of forest and fisheries departments in maritime states have been conducted as part of GOI-UNDP sea turtle project from 2000-2002.

More recently, training programmes have been and are being conducted by a range of NGOs across the country including by WWF-India, Ashoka Trust for Research in Ecology and Environment, Dakshin Foundation, TREE foundation and other NGOs along the coast. In Orissa, the Orissa Marine Resources Conservation Consortium was established in 2004 to enable conservationists and fisher organisations to work together.

Details of the work by NGOs along the coast are given in the report of the national workshop of Turtle Action Group, 2010.

See:

Shenoy, S, N. Namboothri, T. Berlie and K. Shanker (2010) Building a network for conservation of marine turtles in India. Project report submitted to the USFWS. Ashoka Trust for Research in Ecology and the Environment, Bangalore. 57p.

**Informative videos, brochures, printed guidelines** etc.

**YES**  NO  NOT APPLICABLE

Bilingual video film on TED efficacy distributed in coastal fishing centres along Orissa coast.

**Other (list and explain):** TED Demonstrations

**YES**  NO  NOT APPLICABLE

TED demonstration and free distribution of TED to fisherfolks by Central Institute of Fisheries Technology, GOI-UNDP sea turtle project, MPEDA centres and maritime states fisheries departments were been conducted several years ago.

More recent efforts include the work of WWF India in Orissa.

**None of the above**

**1.4.6 Are the mitigation measures described in 1.4.4 and 1.4.5, periodically reviewed and evaluated for their efficacy? [SAP]**

**YES**  NO  UNSURE

Although the rules and regulations are reviewed, the on-ground situation No would better reflect the situation on the ground.

**1.4.7 In your country, what types of data collection, research and development have been undertaken to support the reduction of marine turtle incidental catch (while taking into consideration the impact of various mitigation measures on other species)? [SAP]**

The Central Marine Fisheries Research Institute and the Central Institute of Fisheries Technology of the Agriculture Ministry have been assigned the responsibility to monitor bycatch in various kinds of fishing practices and maintain data. The CIFT developed an indigenous TED, and conducted demonstrations in the early 2000s. In addition, there is ongoing monitoring of bycatch in general by CMFRWWF Study.

Research conducted during the UNDP funded Post Tsunami Environment Initiative project also addressed bycatch in Tamil Nadu, but not on sea turtles alone.

See:

Boopendranath et al. 2006. Design and development of the TEDS for Indian fisheries. In: Sea Turtles of the Indian Sub-continent (eds. K. Shanker & B. C. Choudhury), Universities Press, Hyderabad, India. pp 244-261.

Gopi, G. V., B. Pandav & B. C. Choudhury. 2002. A quantitative analysis of incidental turtle mortalities during commercial

shrimp trawling in the coastal waters off Orissa. Wildlife Institute of India, Dehradun. 40p.

Lobo, A.S., Balmford, A., Arthur, R., & Manica, A. (2010) Commercializing bycatch can push a fishery beyond economic extinction. Conservation Letters 3: 277-285.

Lobo, A.S., Santhanakrishnan, M., Iyer, V & Arthur, R. 2008. Chickenfeed: Bycatch and the economics of trawling along the Coromandel Coast. In Scraping the bottom: Monitoring human impacts on benthic ecosystems of Tamil Nadu UNDP/UNTRS and NCF. Chennai. pg 6-44.

Murugan, A. and R. Durgekar. 2008. Beyond the Tsunami: Status of Fisheries in Tamil Nadu, India: A Snapshot of Present and Long-term Trends. UNDP/UNTRS, Chennai and ATREE, Bangalore, India. pp. 75.

**1.4.8 Has your country exchanged information and provided technical assistance (formally or informally) to other Signatory States to promote the activities described in 1.4.4, 1.4.5 and 1.4.7 above? [SAP]**

YES  NO  UNSURE

**1.4.9 What legislative and practical measures has your country taken in support of UN General Assembly Resolution 46/215 concerning the moratorium on the use of large-scale driftnets? [SAP]**

Large scale driftnets are not adequately known within the EEZ of India. However, the recent decision of the Agriculture Ministry, Government of India, to open deep sea fishing may require discussion for safeguards on this subject.

**1.5.1 Does your country have legislation to prohibit direct harvest and domestic trade in marine turtles, their eggs, parts and products; and to protect important turtle habitats? [IND]**

YES  NO  UNSURE

Under the Wildlife (Protection) Act, 1972, all species of marine turtles are in Schedule-I of the act and, thereby, harvest and domestic trade in any form is prohibited. Aboriginal communities in the Andaman and Nicobar Islands are exempt from the provisions of the act, but their level of take is very low.

Also there are several marine and coastal sanctuaries to protect offshore populations, and nesting and feeding habitats, including:

Gulf of Kutch Marine National Park

Gulf Of Mannar Marine National Park

Gahirmatha Marine Sanctuary and Bhitarkanika National Park (for olive ridleys)

Many coastal sanctuaries and parks

Also, legislation banning fishing within the offshore areas of Gahirmatha, Devi and Rushikulya during the breeding season. However, the levels of enforcement and compliance are undocumented.

**1.5.2 Which, among the following list, are economic uses and cultural values of marine turtles in your country? Please rate the relative prevalence / importance of each consumptive or non-consumptive use. [INF]**

**USES / VALUES**

**RELATIVE PREVALENCE / IMPORTANCE**

**Meat consumption**

YES  NO

HIGH  MODERATE  LOW  UNKNOWN

**Egg consumption**

YES  NO

HIGH  MODERATE  LOW  UNKNOWN

**Shell products**

YES  NO

HIGH  MODERATE  LOW  UNKNOWN

**Fat consumption**

YES  NO  HIGH  MODERATE  LOW  UNKNOWN

**Traditional medicine**

YES  NO  HIGH  MODERATE  LOW  UNKNOWN

**Eco-tourism programmes**

YES  NO  HIGH  MODERATE  LOW  UNKNOWN

**Cultural / traditional significance**

YES  NO  HIGH  MODERATE  LOW  UNKNOWN

See : Shanker and Choudhury, 2006 for state-wise comments.

**Other**

**1.5.3 Please indicate the relative level and impact of traditional harvest on marine turtles and their eggs. [IND, TSH]**

**Level of harvest:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Impact of harvest:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source of information:

"Marine Turtles of Indian Subcontinent" edited by Kartik Shanker & BC Choudhury, 2006, Universitie Press, Hyderabad. A Publication of GOI-UNDP & Wildlife Institute of India, Dehra Dun.

**1.5.4 Have any domestic management programmes been established to limit the levels of intentional harvest? [SAP]**

YES  NO  UNKNOWN

Yes, implementation and enforcement of the Wildlife (Protection) Act, 1972 and education and awareness through Billboards, posters, etc. at the landing sites and nesting beaches has been under implementation. Non Governmental Organizations are also actively involved in awareness programmes.

**1.5.5 Describe any management agreements negotiated between your country and other States in relation to sustainable levels of traditional harvest, to ensure that such harvest does not undermine conservation efforts. [BPR]**

None exist.

**1.6.1 First, select one of the options at left to indicate whether or not your country has any of the following measures in place to minimise the mortality of eggs, hatchlings and nesting females. If yes, then estimate the relative effectiveness of these measures. [IND, SAP]**

**MEASURES****RELATIVE EFFECTIVENESS****Monitoring/protection programmes** **YES**  NO  N/A EXCELLENT  **GOOD**  LOW  UNKNOWN

Onshore nesting beach protection and management occurs mainly at Gahirmatha, which is part of a sanctuary, and to some extent at Rushikulya during mass nesting. For the rest of the states, there is little state-directed protection or management, but NGOs work on a large number of nest beaches, and carry out in-situ conservation or have hatcheries.

**Education/awareness programmes** **YES**  NO  N/A EXCELLENT  **GOOD**  LOW  UNKNOWN**Egg relocation/hatcheries** **YES**  NO  N/A EXCELLENT  **GOOD**  LOW  UNKNOWN**Predator control** **YES**  NO  N/A EXCELLENT  GOOD  **LOW**  UNKNOWN**Vehicle / access restrictions** **YES**  NO  N/A EXCELLENT  **GOOD**  LOW  UNKNOWN**Removal of debris / clean-up** **YES**  NO  N/A EXCELLENT  **GOOD**  LOW  UNKNOWN

Varies considerably from place to place.

**Re-vegetation of frontal dunes** YES  **NO**  N/A EXCELLENT  GOOD  LOW  UNKNOWN

In many states, the Forest Department plants Casuarina, an exotic, as part of afforestation programmes (in recent years, funded as part of many post tsunami projects). This species possibly has negative consequences for nesting beaches.

See:

Chaudhari, S.A., K.V. Devi Prasad and K. Shanker (2009) Impact of Casuarina plantations on olive ridley turtle nesting along the northern Tamil Nadu coast, India. ATREE, Bangalore and Madras Crocodile Bank Trust, Mamallapuram. 44p.

**Building location/design regulations** **YES**  NO  N/A EXCELLENT  GOOD  **LOW**  UNKNOWN

This is addressed by the Coastal Regulation Zone notification. Building location/design regulations are good, in principle, but enforcement is lacking.

See:

Sridhar A., 2005. Statement on the CRZ Notification and Post Tsunami Rehabilitation in Tamil Nadu. UNDP Discussion Paper, New Delhi, India.

Sridhar, A., M. Menon, S. Rodriguez and S., Shenoy. 2008. Coastal Management Zone Notification '08 -- The Last Nail in the Coffin. ATREE, Bangalore. pp 81.

### Light pollution reduction

YES  NO  N/A

EXCELLENT  GOOD  LOW  UNKNOWN

### Other (list and rate them)

YES  NO  N/A

### 1.6.2 Has your country undertaken any evaluation of its nest and beach management programmes? [SAP]

YES  NO  NOT APPLICABLE

Not a formal review. However, the Turtle Action Group (a national network of organisation working on sea turtles) conducts an annual workshop. See report.

Shenoy, S, N. Namboothri, T. Berlie and K. Shanker (2010) Building a network for conservation of marine turtles in India. Project report submitted to the USFWS. Ashoka Trust for Research in Ecology and the Environment, Bangalore. 57p.

## OBJECTIVE II. PROTECT, CONSERVE AND REHABILITATE MARINE TURTLE HABITATS

### 2.1.1 What is being done to protect critical habitats *outside* of established protected areas? (NB: It is assumed that legislation relating to established protected areas will have been described in Section 1.5.1) [BPR, SAP]

The coastal waters of Orissa -- particularly the river mouth of Dhamra, Mahanadi, Devi, Chilka and Rushikulya -- have been declared as no fishing zone during turtle breeding season. Also the onshore habitat at mass nesting sites have been protected by the forest department from predation and other beach related casualty of turtles.

Offshore congregation protection is specific to Orissa and was carried out for a few years by the Forest Department in collaboration with a NGO initiative (Operation Kachhapa), but is currently not very rigorous. Lack of resources, capacity, and collaboration between the Forest and Fisheries Departments are the main reasons.

There are NGOs working in almost every single state in India, some of which are listed below. The work of these organisations is critical for the conservation of sea turtles outside protected areas.

Andaman and Nicobar Islands Environmental Team (ANET): Port Blair, Andaman Islands

Canara Green Academy: Sirsi, Karnataka

Field Services and Intercultural Learning (FSL): Kundapur, Karnataka

Green Life Rural Association (GLRA): Puri dist., Orissa

Green Mercy: Srikakulam, Andhra Pradesh

Lakshadweep Marine Research and Conservation Centre (LMRCC): Kavarathi Island, Lakshadweep

Madras Crocodile Bank Trust: Mamallapuram, Tamil Nadu

Naithal (Coastal Information Conservation and Action): Kasargod, Kerala

Podampeta Ecotourism and Olive Ridley Protection Club: Ganjam dist., Orissa

Rushikulya Sea Turtle Protection Committee: Ganjam dist., Orissa

Sahyadri Nisarga Mitra: Chiplun, Maharashtra

Sea Turtle Action Project: Puri dist., Orissa

Students' Sea Turtle Conservation Network (SSTCN): Chennai, Tamil Nadu

Theeram Prakriti Samrakshana Samiti: Kolavipalam, Kerala

Trust for Environment Education (TREE) Foundation: Chennai, Tamil Nadu

Visakha Society for Prevention of Cruelty to Animals (VSPCA): Visakhapatnam, Andhra Pradesh

Wildlife Society of Orissa: Cuttack, Orissa

**2.1.2 Are assessments routinely made of the environmental impact of marine and coastal development on marine turtles and their habitats? [IND, SAP]**

YES  NO  NOT APPLICABLE

All onshore and offshore developmental projects along the coastline of India are required to conduct EIA studies and develop environmental management plans before obtaining formal approval of the MoEF; despite which a large number of ports and industries have been cleared in the last few years without critical review, notably the Tata port at Dhamra, and the Posco port, both in Orissa.

**2.1.3 Is marine water quality (including marine debris) monitored near turtle habitats? If yes, describe the nature of this monitoring and any remedial measures that may have been taken. [SAP]**

YES  NO  NOT APPLICABLE

As part of the country-wide project by Govt. of India- UNEP, the West Bengal Department of Fisheries carried out a pilot project in West Bengal waters to monitor the water quality near marine turtle habitat; however the monitoring was for one season only.

Apart from fishing-related casualty, marine debris and coastal water pollution being a contributing factor for sea turtle well being, nongovernmental organisations have taken up onshore debris clearance prior to nesting season in some areas. However, no specific ongoing monitoring of pollution in coastal waters and its impact on marine turtles has been taken up.

**2.1.4 Are measures in place to prohibit the use of poisonous chemicals and explosives? [SAP]**

YES  NO  NOT APPLICABLE

Under the Central Pollution Control Board as well as the Indian Coast Guard's mandate, relevant acts have been promulgated. However, levels of enforcement and compliance are unknown.

**2.2.1 Are efforts being made to recover degraded coral reefs? If yes, give details (location, duration, effectiveness, lessons learned, future plans etc). [IND, SAP]**

YES  NO  NOT APPLICABLE (no degraded coral reefs)

Coral reef restoration projects are currently in operation in the Gulf of Mannar, Gulf of Katchchh, and Lakshadweep islands of India. Some attempts of onshore nesting habitat restoration have been in progress in Andaman & Nicobar islands.

Background information and further details can be found in:

Sampath, V. (2003). NATIONAL REPORT on the Status and Development Potential of the Coastal and Marine Environment of the East Coast of India and its Living Resources.

Pernetta, J.C. (Ed). 1993. Marine Protected Area Needs in the South Asian Seas Region. Volume 2: India. A Marine Conservation and Development Report. IUCN, Gland, Switzerland. vii+ 77pp.

**2.2.2 Are efforts being made to recover degraded mangrove habitats that are important for turtles? If yes, give details (location, duration, effectiveness, lessons learned, future plans etc.) [IND, SAP]**

YES  NO  NOT APPLICABLE (no mangrove habitats important for turtles)

Under the MoEF's Mangrove and Coral Reef programme, a national mangrove conservation programme is in operation. Thirty five locations along the coastline have been identified and supported under the Mangrove Restoration project. A further impetus to mangrove restoration have also been given after the post tsunami reconstruction programme and launching of the Mangroves for the Future project (MFF) of the IUCN.

Background information and further details can be found in:

Sampath, V. (2003). NATIONAL REPORT on the Status and Development Potential of the Coastal and Marine Environment of the East Coast of India and its Living Resources.

Pernetta, J.C. (Ed). 1993. Marine Protected Area Needs in the South Asian Seas Region. Volume 2: India. A Marine Conservation and Development Report. IUCN, Gland, Switzerland. vii+ 77pp.

### **2.2.3 Are efforts being made to recover degraded sea grass habitats? If yes, give details (location, duration, effectiveness, lessons learned, future plans etc.). [IND, SAP]**

**YES**  NO  NOT APPLICABLE (no degraded sea grass habitats)

Only in the Gulf of Mannar, Gulf of Kachchh, Andaman & Nicobar and Lakshadweep islands of India by establishing Marine Protected Areas.

Background information and further details can be found in:

Sampath, V. (2003). NATIONAL REPORT on the Status and Development Potential of the Coastal and Marine Environment of the East Coast of India and its Living Resources.

Pernetta, J.C. (Ed). 1993. Marine Protected Area Needs in the South Asian Seas Region. Volume 2: India. A Marine Conservation and Development Report. IUCN, Gland, Switzerland. vii+ 77pp.

## **OBJECTIVE III. IMPROVE UNDERSTANDING OF MARINE TURTLE ECOLOGY AND POPULATIONS THROUGH RESEARCH, MONITORING AND INFORMATION EXCHANGE**

### **3.1.1 Give a list of available literature that includes baseline information from studies carried out in your country on marine turtle populations and their habitats. [INF]**

This is an incomplete list of Publications; SEE: [www.seaturtlesofindia.org](http://www.seaturtlesofindia.org) and [www.iotn.org](http://www.iotn.org)

BHASKAR, S. 1978. Notes from Gulf of Kutchh. Hamadryad . 3(3) 9-10.

BHASKAR, S. 1979a. Preliminary Report on Sea Turtles in the Gulf of Kutch. Marine Turtle Newsletter 11:3-4.

BHASKAR, S. 1979b. Sea turtle survey in the Andaman and Nicobars. Hamadryad , 4(3), 2-26.

BHASKAR, S. 1982. Sea turtles of Suheli island. Hamadryad 7(3): 22.

BHASKAR, S. 1982. Turtle tracking in Gujarat. Hamadryad 7(1) 13-14.

BHASKAR, S. 1984a. Preliminary Report on Sea Turtles in the Gulf of Kutch, Marine Turtle Newsletter 11: 3-4.

BHASKAR, S. 1984b. Marine Turtles in India's Lakshadweep Islands, Marine Turtle Newsletter 8:5

BHASKAR, S. 1984c. The distribution and status of sea turtles in India. Pp. 21-35. In: E. G. Silas (Ed.) Proceedings of the Workshop on sea turtle conservation. CMFRI Special Publication No. 18, 119 p.

BISWAS, S L. N. ACHARYO & B.C. MAHAPATRA. 1977. Observation on incubating eggs of *Lepidochelys olivacea* (Eschscholtz) from Orissa Coast in natural and artificial condition. Science & Culture, 143: 43-45.

BISWAS, S. 1982. A Report on the olive ridley, *Lepidochelys olivacea* (Eschscholtz) [Testudines: Chelonidae] of Bay of Bengal. Records of the Zoological Survey of India, 79: 275-302.

BUSTARD, H. R. & C.S. KAR. 1981. Annual nesting of the pacific ridley sea turtle (*Lepidochelys olivacea*) in Orissa, India. British Journal of Herpetology, 6:139 p.

BUSTARD, H.R. 1974. India - A preliminary survey of the prospects of crocodile farming (Based on the work of HR Bustard). FAO, Rome: 1-50.

BUSTARD, H.R. 1976. World's largest sea turtle rookery - Tiger Paper, 3(3); 25.

DAS, I. 1985. Marine turtle drain. Hamadryad 10(1&2): 17.

- DASH, M. C. AND C.S. KAR. 1990. Turtle Paradise - Gahirmatha (An ecological analysis and conservation strategy). Interprint, New Delhi: 295p.
- DAVIS, T.A. & R. BEDI. 1978. The sea turtle rookery of Orissa. *Environmental Awareness* 1(2): 63-66.
- DERANIYAGALA, P.E.P. 1953. A Colored Atlas of Some Vertebrates from Ceylon, Vol 2: Tetrapod Reptilia. National Museum, Colombo; The Ceylon Government Press, Ceylon, 101 p.
- DIMOND, M.T. and P. MOHANTY-HEJMADI. 1983. Incubation temperature and sex differentiation in a sea turtle. *American Zoologist* 23:1017.
- F.A.O., 1974: India: A Preliminary survey of the prospects for crocodile farming (Based on the works of HR. Bustard,) F.A.O., Rome: 1-50.
- KAR, C.S. 1984. The Gahirmatha turtle rookery along the coast of Orissa, India, *Marine Turtle Newsletter* 15:2-3.
- KAR, C.S. 1988. Ecological studies on the olive ridley sea turtles, *Lepidochelys olivacea* (Eschscholtz, 1829) of Orissa coast. Ph.D. Thesis, Sambalpur University, Orissa.
- KAR, C.S. & M.C. DASH. 1984. Conservation & status of sea turtles in Orissa In: Proceedings of the workshop on sea turtle conservation. Madras, 27-29 February 1984, CMFRI Special Publication No. 18: 93-107.
- KAR, C.S. & S. BHASKAR. 1982. The status of sea turtles in the Eastern Indian Ocean. pp.365-372. In: Bjorndal, K. (Ed.) *The Biology and Conservation of Sea Turtles*. Smithsonian Institution Press, Washington D.C. 615p.
- KAR, C.S. 1980. The Gahirmatha turtle rookery along the coast of Orissa, India; *IUCN/SSC Marine Turtle Newsletter*, Canada 15:2-3.
- KAR, C.S. 1982. Discovery of second mass nesting ground for pacific ridley sea turtles in Orissa, India, *Marine Turtle Newsletter* 23:3.
- KAR, C.S. 2001. Review of threats to sea turtles in Orissa. In: Shanker, K. & B.C. Choudhury (Eds.), *Proceedings of the Workshop for the development of a National Sea Turtle Conservation Action Plan*. Wildlife Institute of India, Dehradun, 15 -19p.
- MOHANTY-HEJAMDI, P.M. BEHERA AND S.K. DUTTA. 1989. Commensals on the olive ridley sea turtle. *Marine Turtle Newsletter* 45:11-13.
- MOHANTY-HEJMADI, M.M. BEHRA & MARIE T. DIAMOND. 1985. Temperature dependent sex differentiation in the olive ridley *Lepidochelys olivacea* and its implications for conservation. Pp. 260-263. In: E.G. Silas (Ed.) *Proceedings of the Symposium on Endangered Marine Animals and Parks*, Marine Biological Association of India, Cochin, 505 p.
- MOHANTY-HEJMADI, P., M.T. DIMOND & J. KANUNGO. 1984. Biochemical constituents of serum of young female hatchlings of olive ridley *Lepidochelys olivacea*. *Marine Turtle Newsletter* 27:4-5.
- MURTHY, T.S.N. & A.G.K. MENON. 1976. The turtle resources of India. *Seafood Export Journal*, 81:1-12.
- MURTHY, T.S.N. 1981. Turtles: Their natural history, economic importance & conservation. *Zoologiana* 4: 57-65.
- OLIVER, J.A. 1946. An aggregation of pacific sea turtles. *Copeia*, 103.
- PANDAV, B. 2000. Conservation and management of olive ridley sea turtles along the Orissa coast. Unpublished PhD thesis. Utkal University, Bhubaneswar, India.
- PANDAV, B. AND B.C. CHOUDHURY. 2000. Conservation & management of olive ridley sea turtle (*Lepidochelys olivacea*) in Orissa. Final Report, Wildlife Institute of India, Dehradun. 77p.
- PANDAV, B.B.C. CHOUDHURY AND C.S. KAR. 1994a. A status survey of olive ridley sea turtle (*Lepidochelys olivacea*) and its nesting habitats along the Orissa coast, India. *Wildlife Institute of India*: Pp 48.
- PANDAV, B.B.C. CHOUDHURY AND C.S. KAR. 1994b. Discovery of a new sea turtle rookery in Orissa. *Marine Turtle Newsletter* 67: 15-16 p.
- PANIGRAHY, R.C., R. GOUDA, S. MISRA, AND L. NAYAK. 1990. Availability of marine turtle eggs near Rushikulya River mouth, east coast of India. *Indian Forester* 116(6): 515-516.
- RAJAGOPALAN, M. 1984. Value of sea turtles to India. In: Silas, E.G. (Ed.) *Proceedings of the workshop on sea turtle conservation*. 49-58 p. CMFRI Special Bulletin 18: 120 p.
- RAM, K. 2000. Behavioral Ecology of the olive ridley sea turtle *Lepidochelys olivacea* (Eschscholtz, 1827) during the

breeding period. Unpublished Masters' dissertation, Salim Ali School of Ecology, Pondicherry University.

SAHOO, G., B.K. MOHAPATRA, R.K. SAHOO & P. MOHANTY-HEJMADI. 1996. Ultra structure and characteristics of eggshells of the olive ridley turtle (*Lepidochelys olivacea*) from Gahirmatha, India. *Acta Anatomica* 156(4):261-67. Sahoo et al., 1998.

SAHOO, G., R.K. SAHOO & P. MOHANTY-HEJMADI. 1998. Calcium metabolism in olive ridley turtle eggs during embryonic development. *Comparative Biochemistry and Physiology A-Molecular and Integrative Physiology* 121(1): 91-97.

SHANKER, K. 1995. Conservation of sea turtles on the Madras coast. *Marine Turtle Newsletter* 64: 36p.

SHANKER, K. 2003. Thirty years of sea turtle conservation on the Madras coast: a review. *Kachhapa* 8:16-19.

SHANKER, K.B. PANDAV AND B.C. CHOUDHURY. 2004. An assessment of the olive ridley turtle (*Lepidochelys olivacea*) nesting population in Orissa, India. *Biological Conservation* 115: 149 - 160.

SHANKER, K. B.C. CHOUDHURY, B. PANDAV, B. TRIPATHY, C.S. KAR, S.K. KAR, N.K. GUPTA AND J. G. FRAZIER. 2002. Tracking olive ridley turtles from Orissa. Pp. 50-51. J.A. Seminoff (Ed.) *Proceedings of the 22nd Annual Symposium on Sea Turtle Biology & Conservation*, Miami, Florida, USA. NOAA Technical Memorandum NMFS-SEFSC-503.

SHANKER, K. R.K. AGGARWAL, J. RAMA DEVI, B.C. CHOUDHURY, AND L. SINGH. 2004a. Phylogeography of olive ridley turtles (*Lepidochelys olivacea*) on the east coast of India: implications for conservation theory. *Molecular Ecology* 13:1899-1909.

SILAS, E.G. AND M. RAJAGOPALAN. 1984. Recovery programme for olive ridley *Lepidochelys olivacea* (Eschscholtz) along Madras coast. *Bulletin of Central Marine Fisheries Research Institute* 35: 921p.

SILAS, E.G.M. RAJAGOPALAN & A.B. FERNANDO. 1983. Sea turtles of India - Need for a crash programme on conservation and effective management of the resource. *Fisheries Information Service T & E Series No. 50: 1-12.*

SILAS, E.G.M. RAJAGOPALAN & S.S. DAN. 1983b. Marine turtle conservation and management: A survey of the situation in West Bengal 1981/82 & 1982/83. *Fisheries Information Service T & E Series No. 50: 24-32.*

SILAS, E.G.M. RAJAGOPALAN, A. BASTIAN FERNANDO AND S.S. DAN. 1983a Marine turtle conservation and management. A survey of the situation in Orissa during 1981-82 and 1982-83. *Marine Fisheries Research Institute Information Service T & E Series, CMFRI, Cochin* 50: 13-23 p.

SILAS, E.G.M. RAJAGOPALAN, S.S. DAN & A.B. FERNANDO. 1984. Observations on the mass nesting and immediate post-mass nesting influxes of the olive ridley *Lepidochelys olivacea* at Gahirmatha, Orissa, 1984 Season. *Bulletin of Central Marine Fisheries Research Institute*, 35: 76-82.

SILAS, E.G.M. RAJAGOPALAN, S.S. DAN & A. BASTIAN FERNANDO. 1985. On the large and mini arribada of the olive ridley *Lepidochelys olivacea* at Gahirmatha, Orissa during the 1985 season. *CMFRI Marine Fisheries Information Service T & E*, 64: 1-16.

TRIPATHY, B. 2004. A study of the offshore distribution of olive ridley turtles (*Lepidochelys olivacea*) in the coastal waters of Rushikulya rookery along the Orissa coast, India. *Wildlife Conservation Society-India Programme, CWS, Bangalore*, 34 p.

TRIPATHY, B. AND B.C. CHOUDHURY. in communication. A review of sea turtle exploitation in India with special reference to Orissa, Andhra Pradesh and Lakshadweep island of India (in preparation for *Indian Journal of Traditional Knowledge*, CSIR).

TRIPATHY, B.K. SHANKER AND B.C. CHOUDHURY. 2003a. A survey of olive ridley sea turtles along the Andhra coast, India. *Oryx*, Vol. 37 (4) 454-463.

TRIPATHY, B., B. PANDAV AND R.C. PANIGRAHY. 2003b. Hatching success and orientation of *Lepidochelys olivacea* (Eschscholtz) at Rushikulya rookery, Orissa, India. *Hamadryad*, Vol. 27(2) 185-192.

TRIPATHY, B.K. SHANKER AND B.C. CHOUDHURY. The status of sea turtles and their habitats in the Lakshadweep Archipelago, India. *Journal of Bombay Natural History Society*(in press).

VALLIAPAN, S. & WHITAKER, R. 1974. Olive ridleys on the Coromandel coast. *Madras Snake Park, Guindy Deer Park*.

WHITAKER, R. & C.S. KAR. 1984. Arribada - The arrival of the turtles. *Sanctuary Asia* 4(2): 140-149.

WHITAKER, R. 1984. Note on the observations at the olive ridley rookery at Gahirmatha, Orissa. *Hamadryad* 9(3):19-20.

Also see: [http://www.seaturtle.org/iotn/bib\\_orissa.html](http://www.seaturtle.org/iotn/bib_orissa.html)

**3.1.2 Have long-term monitoring programmes (i.e. of at least 10 years duration) been initiated or planned for priority marine turtle populations frequenting the territory of your country? [IND, BPR]**

YES  NO  UNSURE

The Government of Orissa has a full fledged operational unit for monitoring olive ridley turtle populations along the Orissa coast under its state forest department. For other population the monitoring work is taken up on an annual basis by the state wildlife management agencies and or research institutions.

Several NGOs have monitoring programmes that have lasted well beyond 10 years; for example:

Students Sea Turtle Conservation Network. Chennai – 1988 to present  
Andaman and Nicobar Environmental Team, Andamans – 2000 to present  
Several states have NGO based monitoring programmes that are about 5 years old

**3.1.3 Has the genetic identity of marine turtle populations in your country been characterised? [INF, PRI]**

YES  NO  UNSURE

Populations on the east coast of India were studied. See:

- Shanker, K., J. Rama Devi, B.C. Choudhury, L. Singh & R.K. Aggarwal (2004) Phylogeography of olive ridley turtles (*Lepidochelys olivacea*) on the east coast of India: implications for conservation theory. *Molecular Ecology* 13: 1899-1909.
- Aggarwal, R.K., T.P. Velavan, D. Udaykumar, P.S. Hendre, K. Shanker and L. Singh (2004) development and characterization of novel microsatellite markers from the olive ridley sea turtle (*Lepidochelys olivacea*). *Molecular Ecology Notes* 4: 77-79.

The study shows that the olive ridley population on the east coast of India is unique and ancestral to olive ridleys in the Atlantic and Pacific Oceans.

Under a research project of the Wildlife Institute of India and Centre for Cellular and Molecular Biology, a project has collected tissue and blood samples of all species and a preliminary progress report is available. However, the complete report of this project is yet to be finalised.

There is an ongoing project on sea turtle genetics at the Indian Institute of Science, Bangalore.

**3.1.4 Which of the following methods have been or are being used to try to identify migration routes of turtles? Use the text boxes to provide additional details. [INF, PRI]**

**Tagging**  YES  NO

The Orissa Forest Department initiated a tagging programme in 1980's and thereafter the CMFRI tagged nearly 500 turtles in Orissa. More recently, around 10,000 nesting olive ridley turtles and 1600 mating pairs were tagged during 1996-1999 by the Wildlife Institute of India along the Orissa coast and tag returns have been received from many parts of Sri Lanka and all along the east coast of India. Similar tagging programmes were also carried out in Andaman & Nicobar, Lakshadweep and Tamil Nadu.

See:

Tripathy, B. and Pandav, B (2007) Beach fidelity and interesting movements of olive ridley turtles (*Lepidochelys olivacea*) at Rushikulya, India. *Herpetological Conservation and Biology* 3

Andrews, H.V., S. Krishnan & P. Biswas. 2006. Distribution and status of marine turtles in the Andaman and Nicobar Islands. In: Eds. K. Shanker & B.C. Choudhury. 2006. *Marine Turtles of the Indian Subcontinent*. Hyderabad, India: Universities Press. pp 33-57.

**Satellite tracking**  YES  NO

In 2001, four female olive ridley turtles were deployed with PTTs along Orissa coast. Thereafter again in 2007, 32 female olive ridley turtles were fitted with PTTs to study the migration and movement along the east coast of India. The results of both the satellite telemetry studies suggest that sea turtle migrate at least up to southern Sri Lanka. Additional transmitters have since been deployed, bringing the total number of olive ridleys tagged as part of this project to 60-70

(number to be confirmed). See also the IOSEA Satellite Tracking Metadatabase for details: [http://ioseaturtles.org/satellite\\_tracking.php](http://ioseaturtles.org/satellite_tracking.php)

Olive ridleys and one green turtle have been tagged by TREE Foundation on the southeastern coast of India.

Three leatherback turtles have been tagged by the Indian Institute of Science and Andaman and Nicobar Environmental Team on Little Andaman Island in January 2011.

■ **Other**

The Madras Crocodile Bank Trust and the Andaman Nicobar Environmental Team monitored the nesting population of leatherback turtles using PIT tags at Galathea, Great Nicobar Island from 2000-2002.

The Indian Institute of Science and Andaman and Nicobar Environmental Team have been monitoring the nesting population of leatherback turtles using PIT tags on Little Andaman Island in January 2011.

Andrews, H.V., S. Krishnan & P. Biswas. 2006. Distribution and status of marine turtles in the Andaman and Nicobar Islands. In: Eds. K. Shanker & B.C. Choudhury. 2006. Marine Turtles of the Indian Subcontinent. Hyderabad, India: Universities Press. pp 33-57.

☐ **None of the above**

**3.1.5 Have studies been carried out on marine turtle population dynamics and survival rates (e.g. including studies into the survival rates of incidentally caught and released turtles)? [INF, PRI]**

■ **YES** ☐ NO ☐ UNSURE

Yes, several studies have been carried out on olive ridley population dynamics along the Orissa coast. However, no specific studies have been conducted into the survival rates of incidentally caught and released turtles as no such programme for reviving comatose turtles in incidental captures are in operation.

For a review, see:

Shanker, K., B. Pandav & B.C. Choudhury (2004). An assessment of the olive ridley turtles (*Lepidochelys olivacea*) nesting population in Orissa, India. *Biological Conservation* 115: 149 – 160.

**3.1.6 Has research been conducted on the frequency and pathology of diseases in marine turtles? [INF, PRI]**

☐ YES ☐ NO ■ **UNSURE**

**3.1.7 Is the use of traditional ecological knowledge in research studies being promoted? [BPR, PRI]**

■ **YES** ☐ NO ☐ UNSURE

The traditional capture methods have been employed by field researchers for capturing turtle to be tagged and or deployment of satellite transmitters.

**3.2.1 List any regional or sub-regional action plans in which your country is already participating, which may serve the purpose of identifying priority research and monitoring needs. [INF]**

There is no sub-regional forum action plan in which India has participated. However, India has a trans-boundary protected area management initiative in which mechanisms are under development between India-Bangladesh, India-Sri Lanka and India-Pakistan with respect to marine fauna in contiguous protected areas.

**3.2.2 On which of the following themes have collaborative studies and monitoring been conducted? Use the text boxes to describe the nature of this international collaboration or to clarify your response. Answer 'NO' if the studies/monitoring undertaken do not involve international collaboration. [INF, PRI]**

a) Genetic Identity  YES  NO  NOT APPLICABLE

b) Conservation status  YES  NO  NOT APPLICABLE

c) Migrations  YES  NO  NOT APPLICABLE

Collaborative study on "satellite telemetry on olive ridley sea turtles along Orissa coast" by Wildlife Institute of India and Smithsonian Institution, USA.

d) Other biological and ecological aspects  YES  NO  NOT APPLICABLE

Nature Conservation Foundation – ongoing project on foraging of green turtles in the Lakshadweep

Lal, A., Arthur, R., Marba, N., Lill, A. and Alcoverro, T., (2010). Implications of conserving an ecosystem modifier: Increasing green turtle (*Chelonia mydas*) densities substantially alters seagrass meadows. *Biological Conservation* 143.

Other

### 3.3.1 List, in order of priority, the marine turtle populations in your country in need of conservation actions, and indicate their population trends. [PRI]

1. Olive ridley turtle in Orissa - Population declining due to fisheries-interface mortality. Curtailing fisheries related mortality and safeguarding arribada population and developmental activities in the vicinity of congregation site and monitoring of population trends are the priority. Recent port development poses a major threat.

2. Leatherback turtle in the Andaman and Nicobar Islands - Current data shows the recovery of nesting beaches in the Nicobar Islands. This needs monitoring. Currently, ANET and IISc are monitoring beaches on Little Andaman Island on a regular basis.

3. Hawksbill turtle in the Andaman and Nicobar Islands - Population status not determined and is a priority. [But see Bhaskar, S. 1996. Re-nesting intervals of the hawksbill turtle (*Eretmochelys imbricata*) on south Reef Island, Andaman Islands, India. *Hamadryad* 21: 19-22.]

4. Green turtle in Gujarat, Lakshadweep and Andaman Islands. Population status not known. Assessment and monitoring are a priority.

### 3.3.2 Are research and monitoring activities, such as those described above in Section 3.1 periodically reviewed and evaluated for their efficacy? [SAP]

YES  NO  UNSURE

In some cases the answer is 'Yes' but for the most part reviews tend to be superficial or simply do not happen.

### 3.3.3 Describe how research results are being applied to improve management practices and mitigation of threats (in relation to the priority populations identified in 3.3.1, among others). [SAP]

i. The offshore congregation monitoring of olive ridley turtles has helped in deployment of offshore patrolling vessels in Orissa for minimising fisheries interface.

ii. Sporadic nesting monitoring of olive ridleys and other species along the Indian coast has helped the management to setup beach hatcheries as well as in situ protection of nests from predators and egg poachers.

### 3.4.1 Has your country undertaken any initiatives (nationally or through collaboration with other Range

**States) to standardise methods and levels of data collection? [BPR, INF]**

YES  NO  UNSURE

As part of GOI-UNDP sea turtle project, four user-friendly manuals have been published which are not only used by the frontline staff in India but also in the neighboring countries.

- Shanker, K., B.C. Choudhury & H.A. Andrews (2003) Sea turtle conservation: Beach Management and hatchery programmes. Centre for Herpetology/Madras Crocodile Bank Trust, Tamil Nadu, India.
- Shanker, K., B. Pandav & H.A. Andrews (2003) Sea turtle conservation: Research and management techniques. Centre for Herpetology/Madras Crocodile Bank Trust, Tamil Nadu, India.
- Shanker, K., B. Pandav & B.C. Choudhury (2003) Sea turtle conservation: Population Monitoring and Census. Centre for Herpetology/Madras Crocodile Bank Trust, Tamil Nadu, India.
- Choudhury, B.C., Tripathy, B. and H.V. Andrews (2003) Sea turtle conservation: Eco (turtle) friendly coastal development. Centre for Herpetology/Madras Crocodile Bank Trust, Tamil Nadu, India.

Ashoka Trust for Research in Ecology and Environment and Southeastern Louisiana University collaborated to standardize mass nesting census in India, Mexico and Costa Rica. The following manual was developed:

- Shanker, K., B.C. Choudhury & C.S. Kar (2010) Census techniques for arribadas. ATREE, Bangalore and Marine Turtle Conservation Act Fund, USFWS.

**3.4.2 To what extent does your country exchange scientific and technical information and expertise with other Range States? [SAP, IND]**

OFTEN (SYSTEMATICALLY)  OCCASIONALLY  RARELY  NEVER

**3.4.3 If your country shares scientific and technical information and expertise with other Range States, what mechanisms have commonly been used for this purpose? Comment on any positive benefits/outcomes achieved through these interactions. [INF]**

The exchange is only at scientific and academic level through sharing of published literature and newsletter (such as IOTN). The Indian Ocean Turtle Newsletter reaches over 1500 readers in the Indian Ocean and Southeast Asia.

**3.4.4 Does your country compile and make available to other countries data on marine turtle populations of a regional interest? [INF]**

YES  NO  UNSURE

This will be made available through a collaboration between SWOT and TAG (turtle action group – India) and [www.seaturtlesofindia.org](http://www.seaturtlesofindia.org)

**OBJECTIVE IV. INCREASE PUBLIC AWARENESS OF THE THREATS TO MARINE TURTLES AND THEIR HABITATS, AND ENHANCE PUBLIC PARTICIPATION IN CONSERVATION ACTIVITIES**

**4.1.1 Describe the educational materials, including mass media information programmes that your country has collected, developed and/or disseminated. [INF, PRI]**

THIS IS AN INCOMPLETE LIST OF MATERIALS

1. A book on "Marine Turtles of Indian Subcontinent" edited by Kartik Shanker and BC Choudhury and published as an outcome of GOI-UNDP and WII study by Universities Press, India.
2. Sea Turtle Research, Management and Conservation Manuals published by Wildlife Institute of India and Madras Crocodile Bank Trust.
3. A documentary on sea turtle-fisheries interface with special emphasis on TED efficacy produced as part of GOI-UNDP Sea Turtle Project for popularisation of TED.
4. Sea turtle resource book for teachers was published by Centre for Environmental Education, Ahmedabad.
5. Posters and brochures on marine turtles of India have been prepared by various national and local NGOs, as well as

Forest Departments (see list of NGOs earlier)

6. A manual on Orissa Marine Conservation Laws (English, Oriya) by ATREE, Bangalore
7. CD on TED efficacy by GOI-UNDP sea turtle project.
8. 'Turtle Story', a children's book published by ATREE and Pratham Books, Bangalore (Available in English, Hindi, Kannada, Marathi, Tamil, Telugu, Urdu, Gujarati, Oriya)
9. Posters on fishing regulations in Rushikulya, Gahirmatha and Devi, Orissa by ATREE, Bangalore.
10. 'Riddle of the Ridley' (2006). Written by Shekar Dattatri, distributed by Tulika books. (Available in English, Hindi, Oriya and Tamil).
11. 'The Killing Fields – Orissa's appalling turtle crises' – a pro bono 17 minute film that outlines the conflict between sea turtles and mechanised fishing and ways to resolve major turtle conservation problems in the state of Orissa in India. (2003). Produced by Shekar Dattatri, distributed by Wildlife Protection Society of India.
12. 'Turtle Telemetry' – A short training video for Wildlife Institute of India on fitting radio transmitters on olive ridley sea turtles. (2002). Produced and written by Shekar Dattatri.
13. 'The Ridley's Last Stand' a self-financed production for conservation awareness, on why 15,000 olive ridley sea turtles are dying in Orissa, on the east coast of India, every year, and what can be done to stop this. (2001). Produced and written by Shekar Dattatri.
14. 'Right to survive: Turtle conservation and fisheries livelihoods'. A film produced by the International Collective in Support of Fishworkers (ICSF), Chennai.
15. 'INDIAN OCEAN TURTLE NEWSLETTER' – Nearly 1000 copies of the newsletter are distributed throughout India to a wide range of stakeholders including government and NGOs. SEA TURTLES OF INDIA WEBSITE ([www.seaturtlesofindia.org](http://www.seaturtlesofindia.org)) – the website provides information on sea turtles in India, and provides other online resources (maps, publications, manuals) to users.

PDF copies are made available freely online through the website mentioned above

#### **4.1.2 Which of the following groups have been the targets of these focused education and awareness programmes described in above in Section 4.1.1? [PRI, INF]**

- Policy makers**
- Fishing industry**
- Local/Fishing communities**
- Indigenous groups**
- Tourists**
- Media**
- Teachers**
- Students**
- Military, Navy, Police
- Scientists**
- Other:
- None of the above

Shenoy, S, N. Namboothri, T. Berlie and K. Shanker (2010) Building a network for conservation of marine turtles in India. Project report submitted to the USFWS. Ashoka Trust for Research in Ecology and the Environment, Bangalore. 57p.

#### **4.1.3 Have any community learning / information centres been established in your country? [BPR, SAP]**

- YES**  **NO**

**4.2 Alternative livelihood opportunities [IND, BPR] Describe initiatives already undertaken or planned to identify and facilitate alternative livelihoods (including income-generating activities) for local communities.**

The WWF-India has initiated a programme to promote bycatch reduction in marine fisheries to artisanal fisherfolk impacted by protection oriented marine turtle conservation programmes.

Many of the NGOs working on sea turtle conservation (listed in Section 2.1.1) have direct or indirect projects on alternate livelihoods.

As a large scale initiative, the Orissa Marine Resources Conservation Consortium (OMRCC) in Orissa has the mandate of addressing issues relating to alternate livelihoods. With funding from Ford Foundation, the OMRCC has been working on projects related to providing alternate livelihoods, particularly in southern Orissa.

**4.3.1 Describe initiatives already undertaken or planned by your country to involve local communities, in particular, in the planning and implementation of marine turtle conservation programmes. Please include details of any incentives that have been used to encourage public participation, and indicate their efficacy. [BPR, IND]**

On the west coast of India, local NGOs in Kerala (THEERAM), Karnataka (Canara Green Academy), Maharashtra (Sahyadri Nisarga Mitra) and Gujarat (Prakruti Nature Club) have initiated community involved nest protection and hatchery management programmes as well as interaction with tourists.

Similarly along east coast of India several NGOs involve or were formed by local communities: e.g. in Tamil Nadu (TREE Foundation) and Orissa (RSTPC, APOWA, STAP, GLRA). The Government of Orissa also involves local fishing communities in collection of degraded nests, participation in arribada censuses, and safe release of disoriented hatchlings on mass nesting beaches.

Dakshin Foundation and the Madras Crocodile Bank Trust, with funding support from the USFWS Marine Turtle Conservation Fund, have facilitated a national level network of turtle conservation groups called the 'Turtle Action Group', constituted of local and community-based organisations from across the Indian coastline. Under the various activities of the projects, publication of outreach and education material is produced, translated and distributed to member organisations for their individual outreach and awareness programmes. The programme also makes available small grants to member organisations to carry out monitoring and data collection, preparation of management plans, etc. The Turtle Action Group has is also now a contributor to the SWOT (State of the World's Sea Turtles) database.

See:

Shenoy, S, N. Namboothri, T. Berlie and K. Shanker (2010) Building a network for conservation of marine turtles in India. Project report submitted to the USFWS. Ashoka Trust for Research in Ecology and the Environment, Bangalore. 57p.

**4.3.2 Describe initiatives already undertaken or planned to involve and encourage the cooperation of Government institutions, NGOs and the private sector in marine turtle conservation programmes. [IND, BPR]**

Dakshin Foundation and the Madras Crocodile Bank Trust, with funding support from the USFWS Marine Turtle Conservation Fund, have facilitated a national level network of turtle conservation groups called the 'Turtle Action Group', constituted of local and community based organisations from across the Indian coastline.

The 30th Annual Symposium on Sea Turtle Biology and Conservation was held in Goa, India, in April 2010. Held in the South Asian region for the first time, it had 500 participants from more than 50 countries across the world. Several training workshops (statistics, stable isotopes, rehabilitation, marine invasives, etc) were held as part of the symposium.

**OBJECTIVE V. ENHANCE NATIONAL, REGIONAL AND INTERNATIONAL COOPERATION**

**5.1.1 Has your country undertaken a national review of its compliance with Convention on International Trade in Endangered Species (CITES) obligations in relation to marine turtles? [SAP]**

YES  NO  NOT APPLICABLE

India is a signatory nation to the CITES and in consonance with the marine turtles in CITES appendices, India has placed all species of marine turtles in the Schedule I of the Indian Wildlife (Protection) to curtail illegal capture of turtles in the offshore and onshore areas.

**5.1.2 Does your country have, or participate/cooperate in, CITES training programmes for relevant authorities? [SAP]**

YES  NO  NOT APPLICABLE

Whenever and wherever CITES organises training programmes, enforcement officials of Government of India and coastal states participate.

**5.1.3 Does your country have in place mechanisms to identify international illegal trade routes (for marine turtle products etc.)? Please use the text box to elaborate on how your country is cooperating with other States to prevent/deter/eliminate illegal trade. [SAP]**

YES  NO  NOT APPLICABLE

The MoEF, Govt. of India has established CITES management authorities regional offices with complimentary staff to monitor illegal trade involving all CITES and IWP scheduled species. Further, recently has established the National Wildlife Crime Control Bureau (NWCCB) with regional offices to collect intelligence information on wildlife trade and to train frontline trans-border enforcement officials.

**5.1.4 Which international compliance and trade issues related to marine turtles has your country raised for discussion (e.g. through the IOSEA MoU Secretariat, at meetings of Signatory States etc.)? [INF]**

Not Applicable

**5.1.5 Describe measures in place to prevent, deter and eliminate domestic illegal trade in marine turtle products, particularly with a view to enforcing the legislation identified in Section 1.5.1. [INF]**

The Wildlife (Protection) Act, 1972 of the Union Government of India.

**5.2.1 Has your country already developed a national action plan or a set of key management measures that could eventually serve as a basis for a more specific action plan at a national level? [IND]**

YES  NO

The MoEF, Govt. of India launched the national sea turtle conservation programme through the UNDP supported GOI-UNDP sea turtle project. This project identified the threats and management strategies, guidelines and action plans which the maritime states, with support from the Government of India, implement.

**5.2.2 From your country's perspective, which conservation and management activities, and/or which particular sites or locations, ought to be among the highest priorities for action? [PRI]**

Use of TED by trawlers on eastern coast of India and reduction of bycatch.

**5.2.3 Please indicate, from your country's standpoint, the extent to which the following local management issues require international cooperation in order to to achieve progress. [PRI]**

- |   |  |
|---|--|
| <b>Illegal fishing in territorial waters</b>        | <input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL |
| <b>Incidental capture by foreign fleets</b>         | <input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL |
| <b>Enforcement/patrolling of territorial waters</b> | <input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL |
| <b>Hunting/harvest by neighboring countries</b>     | <input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL |
| <b>Poaching, illegal trade in turtle projects</b>   | <input checked="" type="checkbox"/> <b>ESSENTIAL</b> <input type="checkbox"/> IMPORTANT <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL |
| <b>Development of gear technology</b>               | <input checked="" type="checkbox"/> <b>ESSENTIAL</b> <input type="checkbox"/> IMPORTANT <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL |
| <b>Oil spills, pollution, marine debris</b>         | <input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL |

- Training / capacity-building**  **ESSENTIAL**  IMPORTANT  LIMITED  NOT AT ALL
- Alternative livelihood development**  **ESSENTIAL**  IMPORTANT  LIMITED  NOT AT ALL
- Identification of turtle populations**  **ESSENTIAL**  IMPORTANT  LIMITED  NOT AT ALL
- Identification of migration routes**  **ESSENTIAL**  IMPORTANT  LIMITED  NOT AT ALL
- Tagging / satellite tracking**  **ESSENTIAL**  IMPORTANT  LIMITED  NOT AT ALL
- Habitat studies**  **ESSENTIAL**  IMPORTANT  LIMITED  NOT AT ALL
- Genetics studies**  **ESSENTIAL**  IMPORTANT  LIMITED  NOT AT ALL

Development of gear technology - Local versions have been developed.

Training / capacity-building - Limited, capacity likely exceeds that of neighbours

Identification of turtle populations - Especially in areas where they overlap

Tagging / satellite tracking - Limited to a few areas

Habitat studies - Limited (gulf of mannar)

Genetics studies - Limited to a few areas

**5.3.1 Identify existing frameworks/organisations that are, or could be, useful mechanisms for cooperating in marine turtle conservation at the sub-regional level. Please comment on the strengths of these instruments, their capacity to take on a broader coordinating role, and any efforts your country has made to enhance their role in turtle conservation. [INF, BPR]**

SAARC - The SAARC secretariat supports training of wildlife managers, biologists and such other officials from the SAARC nations in any regional training programmes. The SAARC secretariat may be approached to support a sub-regional initiative on sea turtle conservation.

**5.3.2 Has your country developed, or is it participating in, any networks for cooperative management of shared turtle populations? [BPR, INF]**

YES  **NO**  NOT APPLICABLE

**5.3.3 What steps has your country taken to encourage Regional Fishery Bodies (RFBs) to adopt marine turtle conservation measures within Exclusive Economic Zones (EEZs) and on the high seas? [SAP]**

Non at this moment.

**5.4.1 Describe your country's needs, in terms of human resources, knowledge and facilities, in order to build capacity to strengthen marine turtle conservation measures. [PRI]**

The marine protected areas and marine environment conservation and management responsibility rests with the forest and wildlife departments of maritime states. While the managerial strength, in terms of number, is adequate and their capacity building is taken care of by the Wildlife Institute of India, there is a need to reorient them into the marine environment management. NGOs and other research institutions working at specific sites also contribute to capacity building and training.

Similar capacity enhancement is also required for research biologists in the marine environment. Exchange programmes, short duration field visits, hands-on training workshops etc will be required for sea turtle conservation and management in India. Also there is a need of programmes on awareness regarding turtle conservation among the coastal communities.

**5.4.2 Describe any training provided in marine turtle conservation and management techniques (e.g. workshops held, training manuals produced etc.), and indicate your plans for the coming year. [PRI, INF]**

In the past, a number of workshops and short duration programmes under GOI-UNDP Sea Turtle Conservation Project were undertaken.

A week-long training programme on sea turtle satellite telemetry for research personnel and wildlife managers was conducted during March 2007 in Orissa. The WII also proposes to conduct similar training workshop to share the findings of a major satellite telemetry project and to develop refinement required in such initiatives. [Such a training programme is proposed to be organised towards the end of 2009 where in neighboring country participants can also be encouraged.]

National:

- Shanker, K., B.C. Choudhury & H.A. Andrews (2003) Sea turtle conservation: Beach Management and hatchery programmes. Centre for Herpetology/Madras Crocodile Bank Trust, Tamil Nadu, India.
- Shanker, K., B. Pandav & H.A. Andrews (2003) Sea turtle conservation: Research and management techniques. Centre for Herpetology/Madras Crocodile Bank Trust, Tamil Nadu, India.
- Shanker, K., B. Pandav & B.C. Choudhury (2003) Sea turtle conservation: Population Monitoring and Census. Centre for Herpetology/Madras Crocodile Bank Trust, Tamil Nadu, India.
- Choudhury, B.C., Tripathy, B. and H.V. Andrews (2003) Sea turtle conservation: Eco (turtle) friendly coastal development. Centre for Herpetology/Madras Crocodile Bank Trust, Tamil Nadu, India.
- Shanker, K., B.C. Choudhury & C.S. Kar (2010) Census techniques for arribadas. ATREE, Bangalore and Marine Turtle Conservation Act Fund, USFWS.

Several training workshops are held by the NGOs in specific areas. Too many to be listed here.

The Turtle Action Group (TAG-INDIA) has held a national sea turtle workshop each year since 2009: Chennai, January 2009; Bhubaneswar, January 2010; Kumta, November 2010). Capacity building and training is built into these workshops.

The 30th Annual Symposium on Sea Turtle Biology and Conservation was held in Goa, India, in April 2010. Held in the South Asian region for the first time, it had 500 participants from more than 50 countries across the world. Several training workshops (statistics, stable isotopes, rehabilitation, marine invasives, etc) were held as part of the symposium.

**5.4.3 Specifically in relation to capacity-building, describe any partnerships developed or planned with universities, research institutions, training bodies and other relevant organisations. [BPR]**

All research programmes are carried out through coast-based universities for capacity building of academic researchers. Collaborations also have existed with Centre for Cellular and Molecular Biology for conservation genetics related issues. For fisheries related issues, the Central Marine Fisheries Research Institute, Central Institute of Fisheries Technology are collaborating with the MoEF.

Major institutional collaborations for research include: Wildlife Institute of India and Indian Institute of Science, Bangalore.

**5.5.1 National policies and laws concerning the conservation of marine turtles and their habitats will have been described in Section 1.5.1. Please indicate their effectiveness, in terms of their practical application and enforcement. [SAP, TSH]**

Yes, the Indian Wildlife (Protection) Act, 1972 is very effective in protection of sea turtles in India.

There are many more laws and policies that concern the conservation of marine turtles. See reviews below for details.

Upadhyay, S. & V. Upadhyay. 2002. International and national instruments and marine turtle conservation in India. Journal of International Wildlife Law and Policy 5(1 & 2): 65-86.

See also:

In Shanker and Choudhury (2006)

Part 7 - Legal Instruments for the Conservation of Marine Turtles

Chapter 24. Laws and Marine Turtle Conservation in India – Sanjay Upadhyay and Videh Upadhyay

Chapter 25. International Instruments and Marine Turtle Conservation – Sali J Bache and John G Frazier

**5.5.2 Has your country conducted a review of policies and laws to address any gaps, inconsistencies or impediments in relation to marine turtle conservation? If not, indicate any obstacles encountered in this**

regard and when this review is expected to be done. [SAP]

YES  NO  UNSURE

**5.5.3 From the standpoint of law enforcement, has your country experienced any difficulties achieving cooperation to ensure compatible application of laws across and between jurisdictions? [TSH]**

YES  NO  UNSURE

## **OBJECTIVE VI. PROMOTE IMPLEMENTATION OF THE MoU INCLUDING THE CONSERVATION AND MANAGEMENT PLAN**

**6.1.1 What has your country already done, or will it do, to encourage other States to sign the IOSEA MoU? [INF]**

India would try to organise sub-regional workshops and consider supporting attendance of a larger delegation in future IOSEA meetings.

**6.1.2 Is your country currently favourable, in principle, to amending the MoU to make it a legally binding instrument? [INF]**

YES  NO  NO VIEW

**6.1.3 Would your country be favourable, over a longer time horizon, to amending the MoU to make it a legally-binding instrument? [INF]**

YES  NO  NO VIEW

However, it is mentioned that in the Indian context, the Wildlife Protection Act provides a very strong legal framework for implementation of MoU.

### **6.2 Secretariat and Advisory Committee**

**6.2.1 What efforts has your country made, or can it make, to secure funding to support the core operations of the IOSEA MoU (Secretariat and Advisory Committee, and related activities)? [IND]**

**6.3.1 What funding has your country mobilised for domestic implementation of marine turtle conservation activities related to the IOSEA Marine Turtle MoU? Where possible, indicate the specific monetary values attached to these activities/programmes, as well as future plans. [IND]**

Both state and federal governments provide financial assistance for conservation of turtles including habitat protection and improvement and research work.

**6.3.2 Has your country tried to solicit funds from, or seek partnerships with, other Governments, major donor organisations, industry, private sector, foundations or NGOs for marine turtle conservation activities? [IND]**

YES  NO

Yes, from sources such as GEF-UNDP through Government of India programmes. Other national NGOs, such as WWF-India, have made attempts to raise funds from other donor agencies.

**6.3.3 Describe any initiatives made to explore the use of economic instruments for the conservation of**

marine turtles and their habitats. [BPR]

**6.4.1 Has your country designated a lead agency responsible for coordinating national marine turtle conservation and management policy? If not, when is this information expected to be communicated to the IOSEA MoU Secretariat? [IND]**

YES  NO

The Ministry of Environment and Forests (MoEF), Government of India, is the lead agency and has designated the Additional Director General (Wildlife) to be the national director for coordinating marine turtle conservation programmes and policies.

**6.4.2 Are the roles and responsibilities of all government agencies related to the conservation and management of marine turtles and their habitats clearly defined? [IND]**

YES  NO  UNSURE

The federal government through the MoEF is to provide the policy framework and national guidelines for the maritime states to develop appropriate conservation action plans and implement them with support from the federal government.

**6.4.3 Has your country ever conducted a review of agency roles and responsibilities? If so, when, and what was the general outcome? If not, is such a review planned and when? [SAP],**

YES  NO  UNSURE

No such reviews are planned at this moment.

**Comments/suggestions to improve the present reporting format:**

**Additional information not covered above:**



## Indonesia

### GENERAL INFORMATION

#### Agency or institution primarily responsible for the preparation of this report:

Directorate of Biodiversity Conservation,  
 Directorate General of Forest Protection and Nature Conservation,  
 Ministry of Forestry of the Republic of Indonesia,  
 Manggala Wanabakti Building, 7th Block, 7th Floor  
 Jl. Jenderal Gatot Subroto, Jakarta 10270  
 Tel/ Fax. 021-5720227  
 E-mail : herrysusilo@yahoo.com; asbsutito@yahoo.com; exploitasia@yahoo.com

#### Other agencies, institutions, or NGOs that have provided input:

Directorate Conservation and Marine National Parks,  
 Ministry of Marine Affairs and Fisheries of the Republic of Indonesia  
 Jl Medan Merdeka Selatan  
 Jakarta

World Wide Fund for Nature-Indonesia (WWF)  
 Kantor Taman Kuningan A9, Unit A1  
 Jl. Mega Kuningan Lot 8.9/A9  
 Kawasan Mega Kuningan, Jakarta 12950  
 Phone : 021-5761070  
 Fax : 5761080

Additional information on fisheries interactions provided in March 2007 by: Dr Ngurah Nyoman Wiadnyana (Research Centre for Capture Fisheries), Dr Toni Ruchimat (Ministry of Marine Affairs and Fisheries), and Imam Musthofa Zainudin (WWF-Indonesia).

#### Designated Focal Point:

Tonny Soehartono  
 Director of Biodiversity Conservation  
 Directorate General of Forest Protection and Nature Conservation,  
 Ministry of Forestry of the Republic of Indonesia,  
 Manggala Wanabakti Building, 7th Block, 7th Floor  
 Jl. Jenderal Gatot Subroto, Jakarta 10270  
 Tel/ Fax. 021-5720227  
 e-mail : tsoehartono@yahoo.com

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### OBJECTIVE I. REDUCE DIRECT AND INDIRECT CAUSES OF MARINE TURTLE MORTALITY

#### 1.1 Introduction to marine turtle populations and habitats, challenges and conservation efforts. [INF]

Indonesia, the world's largest archipelago with more than 17,000 islands along the equator is blessed with more than 360 million ha of marine area. Being within the North and South 20oC isotherms of average sea surface temperature, Indonesia is a perfect location for the growth of coral-reef, sea grass-bed, and a high biodiversity of marine organisms, including nesting, feeding and migration corridors for six of the world's seven species of marine turtles.

Among the six turtle species found in Indonesian waters, three species are prominent, i.e. the green turtle (*Chelonia mydas*), hawksbill turtle (*Eretmochelys imbricata*), and the leatherback turtle (*Dermochelys coriacea*). The green turtle and the hawksbill turtle have wide distributions and are the most abundant turtles found in the region. The annual total nesting activity throughout the country for the green and hawksbill turtles may exceed 35,000 and 28,000, respectively. Derawan island of East Kalimantan, with annual nesting density between 4635 - 5011 per year is considered to be one of the largest green turtle rookeries in the region. Although the numbers of nesting turtles fluctuate throughout the year (low to peak season), this area is one place where people may see the nesting turtles anytime during the year. This is not necessarily the case for other rookeries, and Derawan island a perfect site to develop turtle-based tourism. The nesting population of the leatherback turtle has not been properly documented, except at the single nesting beach of Jamursba Medi (and nearby), Irian Jaya. However, the northern coast of Papua (including Jamursba Medi) remains as the largest leatherback rookery in the Pacific.

Two of the other three turtle species, i.e. the olive ridley (*Lepidochelys olivacea*) and the loggerhead (*Caretta caretta*), nest in relatively small numbers at scattered locations throughout the archipelago. The third species, the flatback turtle (*Natator depressus*), is endemic to Australia, but is found in many feeding grounds within the Flores Banda and Arafura seas.

See references in Section 3.1.1

### **1.2.1 Describe any protocol or approaches practiced in your country, which you consider exemplary, for minimising threats to marine turtle populations and their habitats, which may be suitable for adaptation and adoption elsewhere. [BPR]**

Indonesia is implementing 'best practice' approaches to minimize the threats to marine turtle populations through the archipelago. These practices include:

- Legal protection for all marine turtle and prohibition of commercial trade in marine turtles;
- Education and awareness programs for various level of audiences;
- Law enforcement (e.g. East Kalimantan, east Java, Bali);
- Select critical nesting beaches for index sites to implement standardized monitoring protocol at selected sites;
- Encourage, facilitate, and support community based turtle conservation through implementation of turtle based ecotourism (e.g., adopt the nest schemes).

All the best practices mentioned above are the elements of the National Marine Turtle Conservation Strategy and Action Plan (2001).

Other examples of good conservation management include, for example, Yayasan Pulau Banyak has a Maklumat Bersama which protects 12 nautical miles from the nesting beach into the sea as a no fishing zone. Through conservation concessions Yayasan Pulau Banyak has also protected a total of 620 ha of mangroves, rainforest and coral reefs in agreement with 3 communities in trade of community assets.

In addition, beach monitoring and surveillance at nesting sites through community based patrols (West Papua) are providing daily nest counts and predator control; collaboration with University for research and monitoring and other NGO (e.g. Sea Turtle Foundation in Berau Islands, East Kalimantan) also collects data and assists with protection by enforcement agencies.

Marine Protected Areas have been established to overcome prevailing threats (expansion of coastal and land development) at some nesting habitats and to ensure long term protection Community Conservation Agreements are used help regulate community activities that may disrupt nesting turtles and habitats (e.g. ban of domestic pigs and dogs; forest clearing) around watershed and nesting beach.

Public campaign to stop trade and support law enforcement activities at major markets (adult turtle in Bali; Turtle eggs in east and west Kalimantan) has been initiated.

### **1.3.1 Describe any socio-economic studies or activities that have been conducted among communities that interact with marine turtles and their habitats. [BPR, INF]**

As part of the implementation of the National Marine Turtle Conservation Strategy and Action Plan (2001), several projects have been conducted to describe and understand the socio-economic relationships among communities that interact with marine turtles:

- Economic Valuation on Marine Biodiversity notably Turtle in Tourism has been conducted in Derawan Island complex (2001-2002) and Bali (2003),
- Incentives through implementation scholarship awards for youth community in Jamursba-Medi complex (2003-now),
- Study on community participation in nesting sites of Kuta - Bali (Balai KSDA Bali, 2004),
- Study on socio economics in Perancak nesting beach, Bali (WWF 2003),
- Community participation program on nesting sites protection (BKSDA Bali 2004, BKSDA East Kalimantan and Berau District Government, 2004-2005)

- Yayasan Pulau Banyak conducted a 2 week long environmental education programme that has been integrated with all local schools.
- 50 teachers were trained to deliver lesson plans on coral reef and rainforest conservation. The workbooklets were curriculum based and teaching materials were provided to accompany the lesson plans.

Other actions include: Incentive agreement for community based conservation (community conservation agreement); scholarship for school kids; direct support of livelihood activities and lobbying local governments for livelihood, health, and education programs based on the findings of the socio economic studies.

### 1.3.2 Which of these adverse economic incentives are underlying threats to marine turtles in your country? [TSH]

High prices earned from turtle products relative to other commodities

**Lack of affordable alternatives to turtle products**

**Ease of access to the turtle resource (eg. by virtue of proximity or ease of land/water access)**

Low cost of land near nesting beaches

Low penalties against illegal harvesting

Other1: Poverty

Other2: Religious ceremonies conducted by Balinese Hindu Priests

Other3:

None of the above or Not Applicable

### 1.3.3 Has your country has taken any measures to try to correct these adverse economic incentives? [BPR]

YES  NO  NOT APPLICABLE (no adverse economic incentives exist)

Development of Ecotourism:

A pilot project of "turtle tours" involving the local communities in Derawan Islands to develop turtle friendly tourism at the nesting beaches and foraging areas was accomplished in September - October 2005 (WWF, 2005).

A similar ecotourism project is under way in Kuta Beach, Bali.

### 1.4.1 Indicate, and describe in more detail, the main fisheries occurring in the waters of your country, as well as any high seas fisheries in which flag vessels of your country participate, that could possibly interact with marine turtles. [INF]

**a) Shrimp trawls:**  YES  NO

The utilization of shrimp trawls in most Indonesian seas is prohibited in accordance with the current Presidential Decree No 39/1980. Fishing vessels operating shrimp trawls operate only in Arafura Sea (southern part of Papua) and they must be equipped with Turtle Excluder Devices.

Onboard observations were carried out by WWF in 2005 and 2006 on the following fishing grounds: Arafura Sea, Digul, Kalmana, and Timika. In 2005, 12 observed vessels had by-catch of 133 turtles; in 2006 (3 months only) 4 observed vessels had by-catch of 26 turtles.

Additionally, interview data from fishermen (157 respondents) indicated that an average of one sea turtle was caught per individual vessel / trip.

**b) Set gill nets:**  YES  NO

Most fishing vessels in Indonesia use set gill nets. The nets are arranged in accordance with the fish targets by regulating mesh sizes in the fishing gears.

No interactions with sea turtles were reported.

**c) Anchored Fish Aggregating Devices (FADs):**  YES  NO

FADs ("rumpon") are used traditionally by artisanal fisherman.

During the assessment of interactions between sea turtles and fisheries, some fishermen reported often finding sea turtles swimming around their FADs, especially those installed close to nesting areas such as north coast of Papua, Manado (north coast of Sulawesi), Maluku (Banda Seas).

**d) Purse seine (with or without FADs):**  YES  NO

Purse seines are used by both traditional fisheries and large scale fisheries.

Purse seiners in Java say that they catch at least one turtle during a trip, especially where the fishing ground was near a turtle nesting beach.

**e) Longline (shallow or deepset):**  YES  NO

The longline fishery operates in the high seas mostly and is used by large scale fisheries with vessels bearing Indonesian flag.

Data from WWF-RCCF observations (May-December 2006) show that 10 tuna longline vessels with 32,208 hooks (539 settings) caught 85 sea turtles (plus 1 whale, 2 dolphins, 2 seabirds, and 507 sharks).

**f) Driftnet:**  YES  NO

Commonly used by traditional fisheries.

During onboard observation in tuna longline, observers reported that sometimes several sea turtles were entangled in drift nets.

**g) Other1:**

**h) Other2:**

None of the above

**1.4.2 Please indicate the relative level of fishing effort and perceived impact of each of the above fisheries on marine turtles (e.g. in terms of by-catch). [TSH]**

**a) Shrimp trawls**

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source: WWF-Indonesia in its report of onboard observation in the trawl fishery during 2005 and 2006.

In theory, the use of shrimp trawl is regulated, whereby a TED must be attached to it (Directorate General of Capture Fisheries, Ministry of Marine Affairs and Fisheries)

**b) Set gill nets**

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  **UNKNOWN**

Source: Directorate General of Capture Fisheries, Ministry of Marine Affairs and Fisheries

**c) Anchored Fish Aggregating Devices (FADs)**

**Fishing effort:**

RELATIVELY HIGH  **MODERATE**  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  **RELATIVELY LOW**  NONE  UNKNOWN

Source: The Indonesian type of FAD, used by traditional fishermen, does not catch big marine life, including turtles. (Source: Directorate General of Capture Fisheries, Ministry of Marine and Fisheries)

WWF-Indonesia in its assessment report of interactions between sea turtles and fisheries in Indonesia confirmed this negligible finding.

**d) Purse seine (with or without FADs)**

**Fishing effort:**

RELATIVELY HIGH  **MODERATE**  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  **MODERATE**  RELATIVELY LOW  NONE  UNKNOWN

Source: There have not been extensive studies on the impacts of this type of fishing, but it is predicted that the impact is moderate. (Source: Directorate General of Capture Fisheries, Ministry of Marine Affairs and Fisheries).

Other studies cited:

TAKA Foundation, Sermarong: Assessment report on sea turtle by-catch in Java.

WWF-Indonesia: Assessment report on sea turtle by-catch in Indonesian fisheries

**e) Longline (shallow or deepset)**

**Fishing effort:**

**RELATIVELY HIGH**  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

**RELATIVELY HIGH**  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source: Onboard observation and interview report by WWF-Indonesia and Research Centre for Capture Fisheries (2006).

**f) Driftnet**

**Fishing effort:**

RELATIVELY HIGH  **MODERATE**  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  **MODERATE**  RELATIVELY LOW  NONE  UNKNOWN

Source: WWF-Indonesia onboard observation activities for tuna longliners. (During onboard observation, the observer found several turtles entangled in driftnets.)

**g) Other1 (from 1.4.1): Danish seine**

**Fishing effort:**

RELATIVELY HIGH  MODERATE  **RELATIVELY LOW**  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  **RELATIVELY LOW**  NONE  UNKNOWN

Source: Based on interviews by RCCF and WWF.

***h) Other2 (from 1.4.1):***

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source:

**1.4.3 Describe any illegal fishing that is known to occur in or around the waters of your country that may impact marine turtles. Describe the measures being taken to deal with this problem and any difficulties encountered in this regard. [TSH]**

Foreign flagged vessels operating in Indonesian seas have been encountered catching marine turtles, notably:

- Purse seiners from Thailand;
- Fish trawls from Taiwan, China;
- Drift gillnet from Japan;
- Longliners from Taiwan, Japan and Rep. of Korea.

Some traditional fishermen are still using explosives and chemicals. In order to eliminate or reduce the use of explosive materials and chemicals, the Government of Indonesia has enacted laws and regulations for that purpose. Furthermore, the law on terrorism which strictly controls the use of explosive materials has been found effective in negating this type of destructive fishing.

For large fishing vessels:

- regulation on operation of fishing vessel by issuance of "legal sheet"
- fishing log book (to identify and list specifications of the vessel and to identify and list specifications of the fishing gear and supporting gear)

**1.4.4 Which of the following methods are used by your country to minimise incidental capture/mortality of marine turtles in fishing activities? [IND]**

a) **Appropriate handling** of incidentally caught turtles (e.g. resuscitation or release by fishers using equipment such as de-hooking, line cutting tools and scoop nets)

**YES**  NO  NOT APPLICABLE

Most traditional fishermen release the turtles. Training in onboard de-hooking methods for fishers and field officers has been undertaken and developed by Ministry of Marine Affairs and Fisheries.

Observers on shrimp trawl and tuna longline vessels have knowledge of appropriate handling of incidentally caught turtles, and they transfer this knowledge to fishermen during their on board activities.

In the tuna longline fishery, some of the vessels have de-hookers, line-cutters, and scoop nets for dealing with marine turtles. Handling manuals were provided by WWF observers.

b) **Devices that allow the escape of marine turtles** (e.g. turtle excluder devices (TEDs) or other measures that are comparable in effectiveness)

**YES**  NO  NOT APPLICABLE

Fishing vessels operating shrimp trawls must be equipped with Turtle Excluder Devices (TED) and are allowed to

operate only in Arafura Sea. The prohibition on the utilization of shrimp trawls in other Indonesian seas is stipulated in Presidential Decree No 39/1980.

Shrimp trawlers in Papua are familiar with TEDs, but they lack discipline to install them in their trawls because they would reduce fish by-catch. Usually, boats crews are entitled to take and sell any such fish by-catch as a bonus; this additional income turns out to be higher than their monthly wages. Unless this issue is tackled, it is highly unlikely that the shrimp trawl industry will implement TED regulations.

c) **Measures to avoid encirclement** of marine turtles in purse seine fisheries

**YES**  NO  NOT APPLICABLE

The Government of Indonesia through the Decree of the Minister of Marine Affairs and Fisheries No 2/2002 concerning Guidance on Capture Fisheries Management provides guidelines on the arrangement of capture areas and depth fishing practices, which helps to avoid encirclement of marine turtles in purse seine fisheries.

d) **Appropriate combinations** of hook design, type of bait, depth, gear specifications and fishing practices

**YES**  NO  NOT APPLICABLE

Regulation on gear specification (Decree of the Minister of Marine Affairs and Fisheries No. 3/2002) provides the combination of use of hook design.

WWF-Indonesia is now in the process of conducting circle hook trials in tuna longline fisheries, and the trials are showing promising results. The Research Centre for Capture Fisheries (RCCF) wants to promote this gear to Indonesian fishermen.

To that end, RCCF and WWF will collaborate to make guidelines on best practice for Indonesian tuna longliners, in order to reduce sea turtle by-catch.

e) **Monitoring and recovery of fish aggregating devices** (FADs)

**YES**  NO  NOT APPLICABLE

Decree of the Minister of Marine Affairs and Fisheries No 3/2002 also provides guidelines on monitoring and recovery of FADs.

f) **Net retention and recycling schemes**

**YES**  NO  NOT APPLICABLE

These schemes are used only by modern fishing boats, especially those which operate in Arafura Sea.

g) **Spatial and temporal control of fishing** (e.g. seasonal closures of fishing activities)

**YES**  NO  NOT APPLICABLE

Spatial and temporal control of fishing is not undertaken in Indonesian seas except those in marine national parks (which are totally protected) and in local (province or district) marine protected areas where fishing is strictly regulated, especially in the core zone.

h) **Effort management control**

YES  NO  **NOT APPLICABLE**

In general, the tropical climate of Indonesia does not necessitate seasonal closures of fishing activities, and therefore, no regulation on the subject is in place. Nevertheless, the Government has established several (local and national) regulations with regard to fisheries management and endangered species, such as turtles and whales.

Other (list and explain):

None of the above

**1.4.5 Which of the following programmes has your country developed - in consultation with the fishing industry and fisheries management organisations - to promote implementation of measures to minimise incidental capture and mortality of turtles in national waters and in the high seas? [IND]**

**Onboard observer programmes**

**YES**  NO  NOT APPLICABLE

A program on Community-based Monitoring System carried out by Directorate General of Marine and Fisheries Resources Monitoring, Ministry of Marine Affairs and Fisheries, has been developed and is currently in operation. This program includes an onboard observer program involving community, local fishermen, and fisheries officers, during which training (e.g. on de-hooking) is undertaken.

An onboard observer program for tuna longliners is supported by WWF and CSIRO; a separate observer program for shrimp trawls is supported by WWF.

**Vessel monitoring systems**

**YES**  NO  NOT APPLICABLE

VMS is implemented through Monitoring, Controlling, Surveillance, Enforcement and Investigation undertaken by the Ministry of Marine Affairs and Fisheries.

**Inspections** (i.e. at sea, in port, at landing sites)

**YES**  NO  NOT APPLICABLE

Inspection at sea, in port, and at landing sites is undertaken through Monitoring, Controlling and Surveillance System of the Directorate General of Marine and Fisheries Resources Monitoring, Ministry of Marine Affairs and Fisheries.

**Training programmes / workshops** to educate fishers

**YES**  NO  NOT APPLICABLE

Some training activities have been undertaken, for example:

Training on Marine Ecosystem Monitoring (Ministry of Marine and Fisheries, 2003)  
Training on Sustainable Fisheries Management (Ministry of Marine and Fisheries, 2004)

RCCF and WWF trained tuna longline crews in 3 major bases of tuna longline vessels in 2005 (Benoa-Bali, Bitung-North Sulawesi, Muara Baru-Jakarta). Training of crew by onboard observers also occurs.

A training programme for 50 local fishermen regarding coral reef conservation and sustainable fishing practises has been conducted. In addition the beach patrol team has been trained to identify fishing nets that have washed up on the nesting beaches.

**Informative videos, brochures, printed guidelines** etc.

**YES**  NO  NOT APPLICABLE

Publications have been produced by the Ministry of Marine and Fisheries (2003-2004).

The video "Crossing the Line" was translated into Bahasa by WWF, for use by longliners. Also, booklets and leaflets on handling sea turtles have been produced.

In addition, stickers and booklets are available for boat crews, as well as on-board observers, to help collect by catch and interaction data.

**Other (list and explain):**

YES  NO  NOT APPLICABLE

**None of the above**

**1.4.6 Are the mitigation measures described in 1.4.4 and 1.4.5, periodically reviewed and evaluated for their efficacy? [SAP]**

**YES**  NO  UNSURE

For example, the methods and capacity-building of observers are reviewed and evaluated every year.

**1.4.7 In your country, what types of data collection, research and development have been undertaken to support the reduction of marine turtle incidental catch (while taking into consideration the impact of various mitigation measures on other species)? [SAP]**

- Interviews with fishermen on tuna longliners and shrimp trawls;
- Assessment of various fishing gears, however coverage is still lacking;
- Onboard observers on tuna longliners and shrimp trawls (which needs to be expanded to other areas, and coverage increased);
- Trials of circle hooks and experimentation with TEDs
- In water data on turtle and marine mammals sightings; number of turtles interacted with fishing activities and locations where interactions take place.
- Post Migration pattern of turtles from some major nesting sites (Derawan islands, East/South Java; Birdhead Region, Papua (Piai Island))

**1.4.8 Has your country exchanged information and provided technical assistance (formally or informally) to other Signatory States to promote the activities described in 1.4.4, 1.4.5 and 1.4.7 above? [SAP]**

**YES**  NO  UNSURE

Indonesia exchanges information regularly with:

- Australian Government AusAID
- Australian Government Department of Agriculture, Fisheries and Forestry
- Australian Fisheries Management Authority
- Australian Marine Science and Technology Management

**1.4.9 What legislative and practical measures has your country taken in support of UN General Assembly Resolution 46/215 concerning the moratorium on the use of large-scale driftnets? [SAP]**

Unknown

**1.5.1 Does your country have legislation to prohibit direct harvest and domestic trade in marine turtles, their eggs, parts and products; and to protect important turtle habitats? [IND]**

**YES**  NO  UNSURE

Act No. 5 /1990 concerning conservation of living resources and their ecosystems provides prohibition for and sanction of direct harvest of protected species. No harvest or trade of protected species, whether alive or dead or parts and derivatives, is allowed with maximum penalty of five years imprisonment and up to Rp 200.000.000 in fines.

Under the Government regulation No 7/1999, Indonesia accords all 6 (six) species of turtles protection status.

**1.5.2 Which, among the following list, are economic uses and cultural values of marine turtles in your country? Please rate the relative prevalence / importance of each consumptive or non-consumptive use. [INF]**

**USES / VALUES****RELATIVE PREVALENCE / IMPORTANCE****Meat consumption** YES  NO HIGH  MODERATE  **LOW**  UNKNOWN

A proportion of turtle meat is still used for religious ceremonial events in Bali, and for cultural events in Eneu island (Moluccas) - WWF Indonesia-/Species program, 2005. Varies with locality: consumption at some locations is more than at others.

**Egg consumption** YES  NO HIGH  **MODERATE**  LOW  UNKNOWN**Shell products** YES  NO HIGH  MODERATE  **LOW**  UNKNOWN**Fat consumption** YES  **NO** HIGH  MODERATE  LOW  UNKNOWN**Traditional medicine** YES  NO HIGH  MODERATE  LOW  **UNKNOWN****Eco-tourism programmes** YES  NO HIGH  **MODERATE**  LOW  UNKNOWN**Cultural / traditional significance** YES  NO HIGH  MODERATE  **LOW**  UNKNOWN**Other**

**1.5.3 Please indicate the relative level and impact of traditional harvest on marine turtles and their eggs.**  
[\[IND, TSH\]](#)

**Level of harvest:** RELATIVELY HIGH **MODERATE** RELATIVELY LOW NONE UNKNOWN**Impact of harvest:** RELATIVELY HIGH **MODERATE** RELATIVELY LOW NONE UNKNOWN

Source of information:

WWF Indonesia - Species Program (June 2005)

**1.5.4 Have any **domestic** management programmes been established to limit the levels of intentional harvest?** [\[SAP\]](#)

**YES**  NO  UNKNOWN

Several programmes been established to limit the levels of intentional harvest :

- Harvest phasing out program is being undertaken in Berau to gradually reduce the harvest, until such time that all islands in Derawan complex can be totally protected;
- Cutting the chain of trade at the national level (by i.e. cooperation with several leading national super (hyper) markets) to stop their retail business in turtle eggs;
- Shifting egg harvest concessionaires into other alternative sources of income (e.g. by promoting turtle-based ecotourism);
- Yayasan Pulau Banyak has initiated a monitoring programme focussing on the main nesting beach which stopped all harvest of sea turtle eggs.

**1.5.5 Describe any management agreements negotiated between your country and other States in relation to sustainable levels of traditional harvest, to ensure that such harvest does not undermine conservation efforts. [BPR]**

None at the moment

**1.6.1 First, select one of the options at left to indicate whether or not your country has any of the following measures in place to minimise the mortality of eggs, hatchlings and nesting females. If yes, then estimate the relative effectiveness of these measures. [IND, SAP]**

**MEASURES**

**RELATIVE EFFECTIVENESS**

**Monitoring/protection programmes**

**YES**  NO  N/A

EXCELLENT  **GOOD**  LOW  UNKNOWN

Nest adoption program in Meru Betiri NP, Kuta (Bali), Sangalaki and Derawan Island.

**Education/awareness programmes**

**YES**  NO  N/A

EXCELLENT  **GOOD**  LOW  UNKNOWN

**Egg relocation/hatcheries**

**YES**  NO  N/A

EXCELLENT  **GOOD**  LOW  UNKNOWN

Setting aside of 80% of the total eggs for hatching program at all nesting areas.

Egg translocation program in many nesting sites undertaken by National Park Authorities.

**Predator control**

**YES**  NO  N/A

EXCELLENT  **GOOD**  LOW  UNKNOWN

**Vehicle / access restrictions**

**YES**  NO  N/A

EXCELLENT  **GOOD**  LOW  UNKNOWN

**Removal of debris / clean-up**

**YES**  NO  N/A

EXCELLENT  **GOOD**  LOW  UNKNOWN

### Re-vegetation of frontal dunes

YES  NO  N/A

EXCELLENT  GOOD  LOW  UNKNOWN

### Building location/design regulations

YES  NO  N/A

EXCELLENT  GOOD  LOW  UNKNOWN

### Light pollution reduction

YES  NO  N/A

EXCELLENT  GOOD  LOW  UNKNOWN

### Other (list and rate them)

YES  NO  N/A

#### 1.6.2 Has your country undertaken any evaluation of its nest and beach management programmes? [SAP]

YES  NO  NOT APPLICABLE

Evaluation of nest and beach management programs has been conducted at Derawan islands complex, District of Berau, Sukamade (Meru Betiri National Park, East Java), Alas Purwo National Park East Java, and extended to include 50,000 ha of its turtles nesting and feeding ground outside protected areas.

## OBJECTIVE II. PROTECT, CONSERVE AND REHABILITATE MARINE TURTLE HABITATS

### 2.1.1 What is being done to protect critical habitats *outside* of established protected areas? (NB: It is assumed that legislation relating to established protected areas will have been described in Section 1.5.1) [BPR, SAP]

Several projects and activities have been established to protect critical habitats outside protected areas:

Beach cleaning activities (Kuta, Bali)

Habitat protection (Derawan Islands, Sorong-Papua, Sumbawa Island)

Protection from main forms of pollution that might endanger turtles (Seribu Islands)

Prohibition of sand and coral excavation (Bali, West Nusa Tenggara)

An ecotourism project in Kuta Beach, Bali

Cash incentive programs by employing them as the coast/beach guards (Derawan Islands, Bali)

Other local examples include: Through a "Maklumat Bersama" an agreement has been reached between local government and communities to allocate 12 nautical miles in front of the nesting beach as a no fishing zone. Other areas of mangroves, rainforest and coral reef, with a total of 620 ha, have been protected through conservation concessions for the next decenium. Community based patrol and outreach (in collaboration with University and local NGO; e.g. other sites in Birdshead, West Papua).

### 2.1.2 Are assessments routinely made of the environmental impact of marine and coastal development on marine turtles and their habitats? [IND, SAP]

YES  NO  NOT APPLICABLE

Act No. 23/1997 concerning EIA of general development planning which includes development in coastal areas.

A local example is: Yayasan Pulau Banyak has recently started a marine debris survey as well as a fishing net survey to identify the types of waste and types of nets washing up on the nesting beaches. All marine debris is collected from the nesting beaches and then divided in hard/soft plastics, metal, rubber, rope, glass and others after which it is

weighed.

**2.1.3 Is marine water quality (including marine debris) monitored near turtle habitats? If yes, describe the nature of this monitoring and any remedial measures that may have been taken. [SAP]**

YES  NO  NOT APPLICABLE

Only at a local level; for example logs around the Birdhead (West Papua) sometimes deter nesting.

**2.1.4 Are measures in place to prohibit the use of poisonous chemicals and explosives? [SAP]**

YES  NO  NOT APPLICABLE

Act No. 31 concerning Fisheries provides for prohibition of the use of destructive fishing methods. Penalties and sanctions for the violation of this prohibition are five years imprisonment and fines of Rp 2 billion.

However, in some areas explosives are used by local fishermen.

**2.2.1 Are efforts being made to recover degraded coral reefs? If yes, give details (location, duration, effectiveness, lessons learned, future plans etc). [IND, SAP]**

YES  NO  NOT APPLICABLE (no degraded coral reefs)

In Pulau Seribu National Park, coral reef rehabilitation has been undertaken since 2004 by a coral transplantation program in the degraded areas. Some fish species have started to inhabit the newly transplanted reefs.

**2.2.2 Are efforts being made to recover degraded mangrove habitats that are important for turtles? If yes, give details (location, duration, effectiveness, lessons learned, future plans etc.) [IND, SAP]**

YES  NO  NOT APPLICABLE (no mangrove habitats important for turtles)

Efforts have been and are being made to recover degraded mangrove habitats that are important for turtles; for example:

Rehabilitation program in Sukamade (6km), Meru Betiri National Park (2003-2004),  
Ngagelan Beach Alas Purwo National Park (18km),  
Post-tsunami disaster mangrove rehabilitation along the northern Sumatra coastal beaches (part of 1500 km identified beaches needing rehabilitation) (Source: Ministry of Forestry, 2005)

**2.2.3 Are efforts being made to recover degraded sea grass habitats? If yes, give details (location, duration, effectiveness, lessons learned, future plans etc.). [IND, SAP]**

YES  NO  NOT APPLICABLE (no degraded sea grass habitats)

No information has been recorded as yet.

**OBJECTIVE III. IMPROVE UNDERSTANDING OF MARINE TURTLE ECOLOGY AND POPULATIONS THROUGH RESEARCH, MONITORING AND INFORMATION EXCHANGE**

**3.1.1 Give a list of available literature that includes baseline information from studies carried out in your country on marine turtle populations and their habitats. [INF]**

Data and information on marine turtle population in Guidelines on Management and Conservation Marine Turtle and Their Habitat (Ministry of Marine Affairs and Fisheries, 2003)

a) NESTING AND FEEDING GROUND

Adnyana, IBW (2005). Preliminary Feeding Ground Survey in Derawan Islands Complex (internal report of WWF)

Indonesia).

Adnyana, IBW, Mahardika, IGNK, and Rusli, A (2003). The Status of Green Sea Turtle Population in Derawan Islands Complex. Internal report of WWF Indonesia Wallacea bioregion.

Adnyana, W., Pet-Soede, L. (2008). "Status of green turtle (*Chelonia mydas*) nesting and foraging populations of Berau, East Kalimantan, Indonesia, including results from tagging and telemetry." *Indian Ocean Turtle Newsletter* 7: 2-11.

Dutton, P. H., Hitipeuw, C., et al. (2007). "Status and genetic structure of nesting populations of leatherback turtles (*Dermochelys coriacea*) in the western Pacific." *Chelonian Conservation and Biology* 6(1): 47-53.

Hitipeuw, C., Dutton, P. H. et al. (2007). "Population Status and Internesting Movement of Leatherback Turtles, *Dermochelys coriacea*, Nesting on the Northwest Coast of Papua, Indonesia." *Chelonian Conservation and Biology* 6(1): 28-36.

Hitipeuw, C. (2002). Status of Sea Turtle Populations in Raja Ampat Islands. In Donnelly, R., Neville, D., & Mous, P. (eds), Report on a rapid ecological assessment of the Raja Ampat Islands, Papua Eastern Indonesia, held 30 October -22 November 2002, pp.85-95. Report from The Nature Conservancy Southeast Asia center for Marine Protected Areas, Sanur, Bali Indonesia.

Hitipeuw, C and Maturbongs, J (2002). Marine Turtle Conservation Programme Jamursba-Medi Nesting Beach, North Coast of the Bird - s Head Peninsula, Papua. In KInan, I (ed), Proceedings of the Western Pacific Sea Turtle Co-operative Research and Management Workshop, 5-8 February 2002, pp. 161-175, Honolulu, Hawaii, USA. Honolulu H: Western Pacific Regional Fishery Management Council.

Stringgel, TB, Bangkaru, M, Steeman, APJM, and Bateman, L (2000). Green Turtle Nesting at Pulau Banyak (Sumatera Indonesia). *Marine Turtle Newsletter*, 90:6-8.

Suganuma, H, Kamezaki, N, and Yusuf, A (1999). Current Status of Nesting Populations of the Hawksbill Turtle (*Eretmochelys imbricata*) in the Java Sea, Indonesia. *Chelonian Conserv. Biol*, 3(2):337-343.

Schulz, JP (1989). Observation on Sea Turtles in East Indonesia (with notes on Nature Conservation in General). Report to IUCN and the Van Tienhoven Foundation, 85 pp.

Raleigh, B. (1982). Sea Turtles in the Meru Betiri Wildlife Reserve. *Marine Turtle Newsletter* 22:3.

van de Merwe, J. P., Ibrahim, K. et al. (2009). "Habitat use by green turtles (*Chelonia mydas*) nesting in Peninsular Malaysia: local and regional conservation implications." *Wildlife Research* 36(7): 637-645.

Winata, C. K., Nadina, A. et al. (2008). "Preliminary study on sea turtles in Bintan Island, Riau Archipelago, Indonesia." *Marine Turtle Newsletter*(119): 13-14.

#### b) REPRODUCTIVE POTENTIAL

Purwanasari HN, Dalem R, and Adnyana IBW (2006). Reproductive potential of green turtle nesting in Sukamade Beach (Thesis manuscript, to be submitted to Udayana University-Bali in 2006);

Suprapti D, Swastika P, and Adnyana IBW (2006). Sex-ratio of hatching green turtle incubated under hatchery condition in Sukamade nesting site. Thesis manuscript, to be submitted to Udayana University-Bali in 2006;

#### c) DISEASES AND PATHOGENS - RELATED DISEASES

Rata J, Suarjana IGK, Adnyana IBW (2006). Assessing potential pathogens for green turtles in Sukamade nesting site. Thesis manuscript, to be submitted to Udayana University-Bali in 2006; Adnyana IBW (1997). Studies on the harvesting and disease of wild caught marine turtles in Indonesia. PhD-Thesis, James Cook University of Queensland Australia, 230pp

#### d) MIGRATION AND GENETICS

Geoffrey G et al (2006). Post-nesting migration of Raja Ampat green turtles. Internal report to WWF Indonesia - Conservation International, and the Nature Conservancy;

Dutton et al (2005). Satellite tracked movement of Papuan leatherbacks in 1993-2004. Unpublished;

Moritz D, Broderick K, Dethmers N, Fitzsimmons and C Limpus (2002): Population genetics of Southeast Asian and Eastern Pacific green turtles, *Chelonia mydas*. Final Report to UNEP/CMS. Department of the Environment and Heritage. GPOBox 787 Canberra ACT 2601 Australia;

Dethmers K & Broderick D (2001). Identification of Units for Regional Management of green turtles in the Australian Region. Papers presented at the National Action Plan Conservation of Marine Turtle in Indonesia conducted by WWF

Indonesia, June 2001, 4pp;

e) TRADE, UTILISATION AND HUMAN THREATS

Adnyana IBW & Frazier J (2003). Trade of marine turtle in Bali. Internal report of WWF Indonesia.

Arinal, I. (1997). Marine Turtle Management in Meru Betiri National Park. In: Proceedings of the workshop on marine turtle research and management in Indonesia (ed.Y. R. Noor, I. R. Lubis, R. Ounsted, S. Troeng & A. Abdullah), pp.151-157. Wetlands International, Bogor, Indonesia.

Barr, Catherine (2001). Current status of trade and legal protection for sea turtles in Indonesia. Marine turtle Newsletter 54:4-7.

Bagus IGN, Arsana IGKG, Suka IG, and Sama IN (1993). Masalah penyu serta kaitannya dengan agama, upacara, dan adapt istiadat di Bali. Suatu tinjauan antropologi (relationships of marine turtle with Balinese religion, rites and culture: Anthropological review). Fakultas Sastra Universitas Udayana Bali, 81 pp.

Hilterman, Martje & Goverse, Edo (2005). A note on the illegal trade in stuffed turtles in South Java Indonesia. Marine Newsletter 109:9.

Kendrick, R. C. and Ades G. W. J. (2009). "Taxonomic and morphometric analysis of a trade confiscation of turtle shells from Java, Indonesia." TurtleLog 4: 1-4.

Suarez, A & Starbird, CH. (1996). Subsistence hunting of leatherback turtles (*Dermochelys coriacea*) in the Kai Islands, Indonesia. Chelonian Conservation and Biology, 2(2):190-195.

Waayers, D. (2006). "Potential for developing marine turtle tourism as an alternative to hunting in Bali and Indonesia." Indian Ocean Turtle Newsletter 4.

Zainudin, Imam Musthofa L. P.-S., Hitipeuw Creusa and Adnyana I.B. Windya, (2007). "Interaction of Sea Turtles with Indonesian Fisheries – Preliminary Findings." Indian Ocean Turtle Newsletter 6.

**3.1.2 Have long-term monitoring programmes (i.e. of at least 10 years duration) been initiated or planned for priority marine turtle populations frequenting the territory of your country? [IND, BPR]**

YES  NO  UNSURE

The following monitoring programs have been initiated since 2003 in several index sites:

Derawan islands complex and Jamursba-Medi Reserves:

- Population status and distribution (migration study and population genetic) DNA analysis
- Determinant of sex ratio in ex situ hatching
- Tagging
- Ecological assessment
- Socio cultural economic and investment opportunity assessment

Long-term beach monitoring for Sukamade green turtle nesting beach has been in place since 1980;

Long-term beach monitoring program has been initiated for Derawan islands complex since Januari 2002.

At Berau and Jamursba-Warmon monitoring is not comprehensive; only nest count data and *in situ* threats are recorded for adaptive management. A long term monitoring programme for sea turtle conservation is in place in Pulau Banyak which includes nightly and daily beach patrol, metal and pit tagging as well as satellite tagging.

**3.1.3 Has the genetic identity of marine turtle populations in your country been characterised? [INF, PRI]**

YES  NO  UNSURE

Information on migration pattern and impact from fisheries activities obtained by genetic profiling and from satellite tracking study undertaken on hawksbill turtle (Halim, 2003)

See:

- Moritz D, Broderick K, Dethmers N, Fitzsimmons and C Limpus (2002): Population genetics of Southeast Asian and Eastern Pacific green turtles, *Chelonia mydas*. Final Report to UNEP/CMS. Department of the Environment and Heritage. GPOBox 787 Canberra ACT 2601 Australia;

- Dethmers K & Broderick D (2001). Identification of Units for Regional Management of green turtles in the Australian Region. Papers presented at the National Action Plan Conservation of Marine Turtle in Indonesia conducted by WWF Indonesia, June 2001, 4pp.

Genetic materials from Indonesia were taken from three nesting site i.e. Pangumbahan of West Java, Enu Island of Aru, and Sangalaki Island of East Kalimantan, which include total samples of 22, 28 and 27 respectively.

Additionally, a total of 40 samples from Aru feeding ground and the other 66 samples from turtle trade centre in Bali were also examined.

See also: Citations in Section 3.1.1

**3.1.4 Which of the following methods have been or are being used to try to identify migration routes of turtles? Use the text boxes to provide additional details. [INF, PRI]**

**Tagging**  YES  NO

On going tagging program in almost all nesting sites

Fragmented tagging activity has been undertaken throughout the country since 1984. The activity involved more than 7000 tags. With regard to the migration routes, however, sufficient reports are not available from which to draw conclusions. The only tag-recovery reports have been published by Sukamade nesting beach authority (Indra Arinal, 1997).

For Sukamade nesters, it was indicated that some of the female turtles undertake post-nesting migration to Northern and Western Australia. This was also confirmed by a tag recaptured in King Sound-Western Australia, as reported by Prince RI (1991) Marine Turtle Newsletter 52:24-25.

**Satellite tracking**  YES  NO

Satellite tracking projects: Studies on migration and genetic population Dermochelys coriacea in Papua by satellite telemetry, genetic sampling and Passive Integrated Transponder (PIT) tagging (National Marine and Fisheries Service, NOAA, La Jolla California, BKSDA II Papua, Sorong, and Papua University, 2003)

Satellite tracking has been carried out for Raja Ampat green turtles (Geoffrey G, 2006. unpublished), Papuan Leatherbacks (Dutton et al, 2005, unpublished), and Sumatran Hawksbill turtles (Halim M, personal communication).

Many more satellite tracking projects have been continued since 2003 in order to identify and study migration of turtles, as well as raising awareness of the locals to support turtle conservation in the region.

See: IOSEA Satellite Tracking Metadatabase for more details. ([http://www.ioseaturtles.org/satellite\\_search.php](http://www.ioseaturtles.org/satellite_search.php))

**Other**

**None of the above**

**3.1.5 Have studies been carried out on marine turtle population dynamics and survival rates (e.g. including studies into the survival rates of incidentally caught and released turtles)? [INF, PRI]**

YES  NO  UNSURE

Status and population genetic at Papua.

Population monitoring leatherback studies on Passive Integrated Transponder Tagging;

Satellite Tracking;

DNA sampling

**3.1.6 Has research been conducted on the frequency and pathology of diseases in marine turtles? [INF, PRI]**

YES  NO  UNSURE

This information is based on a study conducted in Bali turtle slaughter houses during 1993-1995 (see Adnyana, IBW 1997). After examining a total of 1409 green turtles and 140 hawksbill turtles, this worker found pathological conditions associated with fibropapillomatosis (21.5%) and spirorchidiosis (100%), as well as numerous other minor findings, such as renal oxalosis, coccidiosis, bacterial and fungal pneumonia, and Birne-like virus particles in hawksbill turtles.

**3.1.7 Is the use of traditional ecological knowledge in research studies being promoted? [BPR, PRI]**

YES  NO  UNSURE

Local & limited.

**3.2.1 List any regional or sub-regional action plans in which your country is already participating, which may serve the purpose of identifying priority research and monitoring needs. [INF]**

ASEAN MoU on Marine Turtle Conservation (1997): Action plan is not developed and the MoU is inactive

IOSEA CMP has been translated into National Action Plan and partly implemented

Sulu Sulawesi Marine Ecoregion (SSME, 2004): Action plan has been established and implemented

Planned Bismarck-Solomon Seas Ecoregion (BSSE, 2005): ongoing process with Government of PNG and Solomon Islands.

**3.2.2 On which of the following themes have collaborative studies and monitoring been conducted? Use the text boxes to describe the nature of this international collaboration or to clarify your response. Answer 'NO' if the studies/monitoring undertaken do not involve international collaboration. [INF, PRI]**

**a) Genetic Identity**  YES  NO  NOT APPLICABLE

Studies on migration and genetic population: Dermochelys coriacea in Papua by satellite telemetry, genetic sampling and Passive Integrated Transponder (PIT) tagging (National Marine and Fisheries Service, NOAA, La Jolla California, BKSDA II Papua, Sorong, and Papua University, 2003).

**b) Conservation status**  YES  NO  NOT APPLICABLE

**c) Migrations**  YES  NO  NOT APPLICABLE

Studies on migration and genetic population: Dermochelys coriacea in Papua by satellite telemetry, genetic sampling and Passive Integrated Transponder (PIT) tagging (National Marine and Fisheries Service, NOAA, La Jolla California, BKSDA II Papua, Sorong, and Papua University, 2003). See also 3.1.4 (B)

**d) Other biological and ecological aspects**  YES  NO  NOT APPLICABLE

Other

**3.3.1 List, in order of priority, the marine turtle populations in your country in need of conservation actions, and indicate their population trends. [PRI]**

1. Green turtle population of the Derawan islands complex. The population is declining due to egg harvest and poaching

2. Leatherback turtle population in Papua. The population is in threat due to habitat disturbance. (WWF Technical Progress Report, 2005)

All species: Fragmentary data collections in several nesting beaches showing population decline for all population in almost all known nesting beaches.

**3.3.2 Are research and monitoring activities, such as those described above in Section 3.1 periodically reviewed and evaluated for their efficacy? [SAP]**

YES  NO  UNSURE

Research and monitoring activities periodically reviewed and evaluated in index sites (Derawan and Papua, WWF 2005) and Alas Purwo National Park, Kepulauan Seribu National Park, Meru Betiri dan Cikepuh National Park (West Java) - Ministry of Forestry (2005)

Data review is conducted on yearly basis during the annual national turtle assessment workshop

**3.3.3 Describe how research results are being applied to improve management practices and mitigation of threats (in relation to the priority populations identified in 3.3.1, among others). [SAP]**

The results of monitoring programs have been taken into account to develop national turtle conservation management plan in 2004.

Difficulties encountered: a more rigorous campaign should be in place to encourage field workers to use and to adopt the available result of the research for their turtle management practices.

**3.4.1 Has your country undertaken any initiatives (nationally or through collaboration with other Range States) to standardise methods and levels of data collection? [BPR, INF]**

YES  NO  UNSURE

This was done during our 2003 annual national turtle workshop conducted in Bali. Software for data collection, which has been derived from SEAFDEC, has been introduced.

**3.4.2 To what extent does your country exchange scientific and technical information and expertise with other Range States? [SAP, IND]**

OFTEN (SYSTEMATICALLY)  OCCASIONALLY  RARELY  NEVER

**3.4.3 If your country shares scientific and technical information and expertise with other Range States, what mechanisms have commonly been used for this purpose? Comment on any positive benefits/outcomes achieved through these interactions. [INF]**

Not documented

These were mostly based on personal relationships and through participation in regional turtle workshops.

**3.4.4 Does your country compile and make available to other countries data on marine turtle populations of a regional interest? [INF]**

YES  NO  UNSURE

Data on green turtle populations in Derawan islands complex and leatherback turtle populations in Papua have compiled

**OBJECTIVE IV. INCREASE PUBLIC AWARENESS OF THE THREATS TO MARINE TURTLES AND THEIR HABITATS, AND ENHANCE PUBLIC PARTICIPATION IN CONSERVATION ACTIVITIES**

**4.1.1 Describe the educational materials, including mass media information programmes that your country has collected, developed and/or disseminated. [INF, PRI]**

- Turtle consumer map (Report market and consumer survey of turtle consumption in Bali, June 2000)
- Reduce Consumption campaign - Agreement of Key Balinese Clans (Banjar) to support turtle conservation (June 2001)
- Turtle Campaign - in Bali to support ecotourism programs
- Many leaflets and booklets have been produced for awareness purposes
- Press release and conferences have been undertaken several times
- Leaflets for 'turtle entangled & release protocol' has been produced and disseminated in long-liner industries

In addition, a monitoring manual, booklets/poster for on-board handling of by-catch for longline (dehooking, resuscitation), coloring book, kid storybooks/comics, maps migration routes and potential interaction with fisheries, press release for specific events have been produced.

Yayasan Pulau Banyak has developed a 2 week training programme on delivering environmental education programmes. Lesson plans, work booklets and equipment have been provided to these teachers to deliver these programmes to their students in their classrooms and to integrate environmental education into their curriculum. 50 local fishermen have also been part of a workshop on sustainable fisheries and the use of FAD's to promote sustainable fishing methods. FAD's have been provided as a follow up and a cooperative has been formed as a result.

**4.1.2 Which of the following groups have been the targets of these focused education and awareness programmes described in above in Section 4.1.1? [PRI, INF]**

**Policy makers**

**Fishing industry**

**Local/Fishing communities**

Indigenous groups

**Tourists**

**Media**

Teachers

**Students**

Military, Navy, Police

Scientists

**Other:Balinese Hindu Priests; Muslim leaders in Islamic schools (called 'Pesantren').**

**None of the above**

General Public, fishers, community based monitoring groups Local fishermen, youth groups, women groups, school children and teachers.

- Joint decrees by Governors of Bali and West Nusa Tenggara on turtle protection especially prohibition on the consumption of turtle meats for religious ceremonies
- Statement by Hindu priests that the use of turtle meats in the religious ceremonies is not compulsory
- Customary bylaws in Bali have been agreed to be revised to include chapters on turtle conservation and protection, and to conduct law enforcement activities targeting the turtle traders.

**4.1.3 Have any community learning / information centres been established in your country? [BPR, SAP]**

**YES**  **NO**

For example, a turtle center that functions as an education and research center and as an attractive tourist destination has been established in Serangan (Bali). The center is expected to be the focal point of the country's turtle-friendly ecotourism network, which will include Derawan in East Kalimantan and Sukamade in East Java.

Yayasan Pulau Banyak has established an information centre on the main island for tourists to learn about the sea turtle conservation programme and the base camp provides a library on sea turtle conservation information. The work booklets for schools have included sea turtle conservation issues.

**4.2 Alternative livelihood opportunities [IND, BPR] Describe initiatives already undertaken or planned to identify and facilitate alternative livelihoods (including income-generating activities) for local communities.**

Project on turtle-based ecotourism development is being conducted in Bali (2005-2006), located in seven districts involving coastal communities. This project aims to enhance community participation in turtle management and

conservation through development of turtle-based ecotourism, which includes training on turtle identification, egg translocation and hatching, handling of hatchlings, tour guidance, conservation education and establishment of community-based turtle conservation institutions.

Eco-tourism development, FAD's and conservation concessions.

**4.3.1 Describe initiatives already undertaken or planned by your country to involve local communities, in particular, in the planning and implementation of marine turtle conservation programmes. Please include details of any incentives that have been used to encourage public participation, and indicate their efficacy. [BPR, IND]**

- Co-management in the form of ecotourism activities at turtle nesting beach in Perancak Bali;
- Local development of an MoU on funding mechanism at Derawan, Pangumbahan, Meru Betiri and Jamursba Medi between business sectors and local community, which aims to support co-management of ecotourism on nesting beaches.

**4.3.2 Describe initiatives already undertaken or planned to involve and encourage the cooperation of Government institutions, NGOs and the private sector in marine turtle conservation programmes. [IND, BPR]**

A National Strategy and an Action Plan on Marine Turtles have been developed. The action plan includes encouragement of many government agencies including Department of Fisheries, P2O LIPI, Ministry of Environment, Department of Education, Ministry of Communication and Information, Department of Tourism, and NGOs (WWF, TNC, CI and local NGOs) and Universities to conduct marine turtle conservation in accordance with their expertise and mandates. A working group, acting as an advisory body to coordinate the implementation of National Strategy and Action Plan, is in the process of establishment.

**OBJECTIVE V. ENHANCE NATIONAL, REGIONAL AND INTERNATIONAL COOPERATION**

**5.1.1 Has your country undertaken a national review of its compliance with Convention on International Trade in Endangered Species (CITES) obligations in relation to marine turtles? [SAP]**

YES  NO  NOT APPLICABLE

Indonesia implements CITES effectively and treats marine turtles as an Appendix I species by listing the species in the total protection status in accordance with Indonesian national legislation (which has been categorised into legislation that is fully in compliance with the Convention).

**5.1.2 Does your country have, or participate/cooperate in, CITES training programmes for relevant authorities? [SAP]**

YES  NO  NOT APPLICABLE

The Management Authority of CITES conducts CITES training on an annual basis (since 1995) for law enforcement authorities of Customs, Quarantine, Police Officers, Ministry of Fisheries and Marine Affairs and Conservation Officers. This activity is reported to CITES in Indonesia's Biennial Report.

**5.1.3 Does your country have in place mechanisms to identify international illegal trade routes (for marine turtle products etc.)? Please use the text box to elaborate on how your country is cooperating with other States to prevent/deter/eliminate illegal trade. [SAP]**

YES  NO  NOT APPLICABLE

Within the South East Asian region there is a mechanism for cooperation in CITES implementation that includes identification of wildlife (including marine turtle) illegal trade such as ASEAN Experts Group on CITES and newly established ASEAN Wildlife Enforcement Network (ASEAN-WEN). Especially for marine turtles there have been only a few cases of illegal trade within ASEAN; no prosecution has been undertaken.

**5.1.4 Which international compliance and trade issues related to marine turtles has your country raised**

for discussion (e.g. through the IOSEA MoU Secretariat, at meetings of Signatory States etc.)? [INF]

None yet

**5.1.5 Describe measures in place to prevent, deter and eliminate domestic illegal trade in marine turtle products, particularly with a view to enforcing the legislation identified in Section 1.5.1. [INF]**

- All 6 (six) species of marine turtles have been nationally protected, meaning that no capture or trade is allowed. Penalties for violation of this provision are 5 (five) years imprisonment and fines up to IDR 200 million;
- Joint decrees by Governors of Bali and West Nusa Tenggara on turtle protection especially prohibit the consumption of turtle meat for religious ceremonies;
- In some places such as Berau and Sukabumi districts, the provision of the law could not be effectively enforced due to dependency of local people on eggs harvested for subsistence.

**5.2.1 Has your country already developed a national action plan or a set of key management measures that could eventually serve as a basis for a more specific action plan at a national level? [IND]**

YES  NO

- Guidance on management and conservation of marine turtles and their habitats has been established by the Ministry of Fisheries and Marine Affairs (2003);
- Action Plan has also been documented in 2004 for further refinement.

**5.2.2 From your country's perspective, which conservation and management activities, and/or which particular sites or locations, ought to be among the highest priorities for action? [PRI]**

The following programs of the CMP : 1.1, 1.2, 1.5, 1.6, 2.1, 2.2, 3.1, 4.1, 5.5, 6.3, 6.4 have been identified during the National Workshop for the development of National Strategy and Action Plan (2005) as the first priority for immediate actions. These programs are identified as important activities to be taken domestically.

**5.2.3 Please indicate, from your country's standpoint, the extent to which the following local management issues require international cooperation in order to to achieve progress. [PRI]**

- |   |   |
|---|---|
| <b>Illegal fishing in territorial waters</b>        | <input checked="" type="checkbox"/> ESSENTIAL <input type="checkbox"/> IMPORTANT <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL |
| <b>Incidental capture by foreign fleets</b>         | <input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> IMPORTANT <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL |
| <b>Enforcement/patrolling of territorial waters</b> | <input checked="" type="checkbox"/> ESSENTIAL <input type="checkbox"/> IMPORTANT <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL |
| <b>Hunting/harvest by neighboring countries</b>     | <input checked="" type="checkbox"/> ESSENTIAL <input type="checkbox"/> IMPORTANT <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL |
| <b>Poaching, illegal trade in turtle projects</b>   | <input checked="" type="checkbox"/> ESSENTIAL <input type="checkbox"/> IMPORTANT <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL |
| <b>Development of gear technology</b>               | <input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> IMPORTANT <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL |
| <b>Oil spills, pollution, marine debris</b>         | <input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> IMPORTANT <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL |
| <b>Training / capacity-building</b>                 | <input checked="" type="checkbox"/> ESSENTIAL <input type="checkbox"/> IMPORTANT <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL |
| <b>Alternative livelihood development</b>           | <input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> IMPORTANT <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL |
| <b>Identification of turtle populations</b>         | <input checked="" type="checkbox"/> ESSENTIAL <input type="checkbox"/> IMPORTANT <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL |
| <b>Identification of migration routes</b>           | <input checked="" type="checkbox"/> ESSENTIAL <input type="checkbox"/> IMPORTANT <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL |
| <b>Tagging / satellite tracking</b>                 | <input checked="" type="checkbox"/> ESSENTIAL <input type="checkbox"/> IMPORTANT <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL |
| <b>Habitat studies</b>                              | <input checked="" type="checkbox"/> ESSENTIAL <input type="checkbox"/> IMPORTANT <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL |

## Genetics studies

ESSENTIAL  IMPORTANT  LIMITED  NOT AT ALL

- Development of collaborative management for sustainable management of turtles the purpose of which is to enhance welfare of people.

### **5.3.1 Identify existing frameworks/organisations that are, or could be, useful mechanisms for cooperating in marine turtle conservation at the sub-regional level. Please comment on the strengths of these instruments, their capacity to take on a broader coordinating role, and any efforts your country has made to enhance their role in turtle conservation. [INF, BPR]**

- Sulu-Sulawesi Marine Ecoregion (SSME), is a tri-national (Indonesia, Malaysia and the Philippines) cooperatio, one of whose aims is the conservation of migratory species (including marine turtles);  
- Bismarck Solomon Seas Ecoregion is a tri-national (Indonesia, PNG and Solomon Islands) cooperation to conserve Leatherback Turtle. The agreement of this cooperation is being developed among the three countries.

### **5.3.2 Has your country developed, or is it participating in, any networks for cooperative management of shared turtle populations? [BPR, INF]**

YES  NO  NOT APPLICABLE

### **5.3.3 What steps has your country taken to encourage Regional Fishery Bodies (RFBs) to adopt marine turtle conservation measures within Exclusive Economic Zones (EEZs) and on the high seas? [SAP]**

### **5.4.1 Describe your country's needs, in terms of human resources, knowledge and facilities, in order to build capacity to strengthen marine turtle conservation measures. [PRI]**

- Education for local communities that still depend on egg harvest is needed for the conservation of marine turtles; without enhancement of their knowledge on conservation, marine turtles will always be under threat.  
- Establishment of pilot projects on economic development and training for the local communities to develop alternative sources of income is needed. With these projects it is expected that the communities shift their source of income from direct and extractive utilization of turtle products to non-extractive use.  
- Sustainable financing instruments to ensure long term protection.

### **5.4.2 Describe any training provided in marine turtle conservation and management techniques (e.g. workshops held, training manuals produced etc.), and indicate your plans for the coming year. [PRI, INF]**

- Workshop on Sustainable Management of Marine Turtles which aimed to prioritize actions on the turtle populations in Derawan Islands (District of Berau, East Kalimantan, April 2001)  
- Training on in situ Management of Nests, Hatching and Hatchling, for the local authorities (Ministry of Forestry, 2003)  
- Training on marine turtle identification for local authorities and communities (Ministry of Forestry, 2004)  
- Training on biology and conservation and management of marine turtles for local authorities and local NGOs (Ministry of Forestry, 2004)  
- National Workshop on Marine Turtle Conservation to develop National Strategy and Action Plan on Marine Turtle Conservation (Ministry of Forestry, 2005)  
- Monitoring for field practices (collaboration with Udayana University), at site (Pangumbahan, West java) and database and analysis for adaptive management purposes.  
- Patrol staff has been trained according to IUCN guidelines for marine turtle conservation and management. Training has been provided for nest relocation, tagging and beach surveys.

### **5.4.3 Specifically in relation to capacity-building, describe any partnerships developed or planned with universities, research institutions, training bodies and other relevant organisations. [BPR]**

- Some NGOs facilitated some trainings and organised some workshops;  
- University of Udayana (Bali) and Bogor Agricultural University (Bogor) provide lectures and training modules;  
- Universities (Udayana University Bali, University of Papua; SWFSC-NOAA);

- Yayasan Pulau Banyak has established long term partnerships with local government bodies such as the Forestry department (BKSDA), The University of Syiah Kala, Banda Aceh and fisheries department of Aceh Singkil.

**5.5.1 National policies and laws concerning the conservation of marine turtles and their habitats will have been described in Section 1.5.1. Please indicate their effectiveness, in terms of their practical application and enforcement. [SAP, TSH]**

In general, national policies and laws are effective; however they need stronger effort in their enforcement. Act No. 5 of 1990 concerning Conservation of Living Resources and Their Habitats, together with associated implementing regulations (Government regulation No. 7/1999 and No. 8/1999) provides deterrent to the wildlife crime.

**5.5.2 Has your country conducted a review of policies and laws to address any gaps, inconsistencies or impediments in relation to marine turtle conservation? If not, indicate any obstacles encountered in this regard and when this review is expected to be done. [SAP]**

YES  NO  UNSURE

- Act No. 5 of 1990 concerning Conservation of Living Resources and Their Habitats is being reviewed in order to be in line with CITES provisions, especially with regard to sanctions that need to be increased to provide more deterrent;

- Some Ministerial Decrees that allow egg harvest are in the process of revocation

**5.5.3 From the standpoint of law enforcement, has your country experienced any difficulties achieving cooperation to ensure compatible application of laws across and between jurisdictions? [TSH]**

YES  NO  UNSURE

**OBJECTIVE VI. PROMOTE IMPLEMENTATION OF THE MoU INCLUDING THE CONSERVATION AND MANAGEMENT PLAN**

**6.1.1 What has your country already done, or will it do, to encourage other States to sign the IOSEA MoU? [INF]**

Indonesia is currently active in the process of the development of sub-regional cooperation in the South Pacific between Indonesia, PNG and Solomon Islands through BSSE (Bismark-Solomon Sea Ecoregion) initiative, meant to conserve leatherback turtles in the South Pacific. Through this mechanism Indonesia will encourage other two States to join IOSEA.

**6.1.2 Is your country currently favourable, in principle, to amending the MoU to make it a legally binding instrument? [INF]**

YES  NO  NO VIEW

**6.1.3 Would your country be favourable, over a longer time horizon, to amending the MoU to make it a legally-binding instrument? [INF]**

YES  NO  NO VIEW

The current status of this instrument has provided some basic guidelines for the conservation of marine turtle in the region, so that there is no sufficient reason at the current stage to make it legally binding.

**6.2 Secretariat and Advisory Committee**

**6.2.1 What efforts has your country made, or can it make, to secure funding to support the core operations of the IOSEA MoU (Secretariat and Advisory Committee, and related activities)? [IND]**

**6.3.1 What funding has your country mobilised for domestic implementation of marine turtle conservation activities related to the IOSEA Marine Turtle MoU? Where possible, indicate the specific monetary values attached to these activities/programmes, as well as future plans. [IND]**

- The central government provides an annual budget for implementation of the activities including those undertaken by National Parks and Provincial Regional Offices of the Ministry of Forestry. The Ministry of Marine Affairs and Fisheries also provides a budget for its activities and activities by District Governments.
- Local governments (Provincial or District), in some cases provides an annual budget for the activities at the local level.
- International and local NGOs have also allocated a budget for activities at site level.
- Grant from international donor countries or agencies (such as GEF) is sometime available.

**6.3.2 Has your country tried to solicit funds from, or seek partnerships with, other Governments, major donor organisations, industry, private sector, foundations or NGOs for marine turtle conservation activities? [IND]**

YES  NO

- The Government of Indonesia is seeking financial assistance from the GEF through Marginal Fisheries Communities Development Project that focuses on marine biodiversity conservation and specific focus on marine turtles. For this purpose Conservation International (CI) has pledged to provide matching funds;
- Some NGOs have also allocated budgets specifically for marine turtle conservation in several sites in Indonesia.

**6.3.3 Describe any initiatives made to explore the use of economic instruments for the conservation of marine turtles and their habitats. [BPR]**

None formal yet, but some are being developed:

- Marine Conservation Agreement (Incentive Agreement/Conservation Easement) for communities co-exist with the major turtle populations (e.g. Birdsheed West Papua)
- Partnership with tourism industries for turtle based tourism e.g. in Bali
- Yayasan Pulau Banyak is exploring the possibility in partnership with CSIRO (Australia) and Advanced Conservation Strategies (U.S.A) to introduce environmental mortgages for local communities linked with coral reefs and nesting beaches.

**6.4.1 Has your country designated a lead agency responsible for coordinating national marine turtle conservation and management policy? If not, when is this information expected to be communicated to the IOSEA MoU Secretariat? [IND]**

YES  NO

The Directorate General of Forest Protection and Nature Conservation is a government agency given the mandate to develop and undertake conservation and management policies for marine turtles.

The Ministry of Marine Affairs and Fisheries also has in its mandate conservation activities of marine resources.

The Ministry of Environment is a coordinating Ministry on the general environmental issues, including conservation.

**6.4.2 Are the roles and responsibilities of all government agencies related to the conservation and management of marine turtles and their habitats clearly defined? [IND]**

YES  NO  UNSURE

The Directorate General of Forest Protection and Nature Conservation (PHKA) is the leading agency for policy making. The implementing agencies under PHKA are National Parks authorities and Provincial Offices of the Ministry of Forestry.

The Ministry of Marine Affairs and Fisheries, has in its mandate conservation of marine species, including marine turtles, especially those which relate to the coastal and small islands management.

The Ministry of Environment is the coordinating body for the policy development at the national level on the conservation and environment issues.

**6.4.3 Has your country ever conducted a review of agency roles and responsibilities? If so, when, and what was the general outcome? If not, is such a review planned and when? [SAP],**

YES  **NO**  UNSURE

The arrangement of the mandate for each agency is already clear and at least for the time being, it does not need further review.

**Comments/suggestions to improve the present reporting format:**

**Additional information not covered above:**



## Indian Ocean – South-East Asian Marine Turtle Memorandum of Understanding

### Malaysia

#### GENERAL INFORMATION

**Agency or institution primarily responsible for the preparation of this report:**

THIS UNOFFICIAL REPORT IS SUBJECT TO FURTHER REVIEW AND COMPLETION BY THE MALAYSIAN FOCAL POINT.

**Other agencies, institutions, or NGOs that have provided input:**

Turtle Conservation Centre, Terengganu, Malaysia  
Sarawak Forestry Corporation  
WWF Malaysia

**Designated Focal Point:**

Mr. Gulamsarwar bin Jan Mohammad  
Director  
Licensing and Resource Management Malaysia  
Level 1, Tower Block 4G2, Wisma Tani, Precinct 4,  
Federal Government Administrative Centre,  
62628 Putrajaya, Malaysia  
Tel: +603-8870 4406 / ext: 4407  
Fax: +603-8889 1233  
E-mail: gulamsawar@dof.gov.my

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#### **OBJECTIVE I. REDUCE DIRECT AND INDIRECT CAUSES OF MARINE TURTLE MORTALITY**

##### **1.1 Introduction to marine turtle populations and habitats, challenges and conservation efforts. [INF]**

Malaysia is comprised of Peninsular Malaysia, located in the southern-most part of the Malay Peninsula; and East Malaysia (Sabah and Sarawak) on the island of Borneo.

Four species of marine turtles (leatherback, green turtle, hawksbill, and olive ridley) are found in Malaysia. 1 Current statistics indicate that the leatherback and olive ridley turtle populations are nearing extinction in Malaysia; while other species, with the exception of the green turtles of the Sabah Turtle Islands, are in steady decline.

The leatherback turtle (*Dermochelys coriacea*) nests mainly along a 15 km stretch of beach centred in Rantau Abang, Terengganu. Records show that nesting density in the 1950's exceeded 10,000 but have plummeted to near zero in recent years. When once Rantau Abang was regarded as one of the world's most important nesting sites for leatherbacks, the 99.9% decline has brought the species to extinction in Malaysia.

The olive ridley turtle (*Lepidochelys olivacea*) nests in northern Terengganu, Penang, possibly Perak and Sarawak. It has suffered the same fate as the leatherback turtles. In the mid 1980s, 500 nests were deposited annually in Terengganu, but the species has not been seen nesting at Terengganu since 2005. Notwithstanding, remnant numbers may still occur in Penang and Perak and Sarawak.

The hawksbill turtle (*Eretmochelys imbricata*) nests in the Sabah Turtle Islands, Melaka and to a lesser degree in Redang Island, Terengganu. Declines have not been as dramatic as the leatherback and olive ridley turtles. In Sabah, where current nesting density is registered at around 450 nests per annum, a 25% decline has been registered over the last ten years. According to available data, the Melaka nesting density has fluctuated from 208 – 471 nests per annum. However it is not possible to comment on the trend as yearly nesting data is not available. In Terengganu, a 70%

decline has been registered in the last 20 years. Currently, about a dozen nests are deposited annually.

The green turtle (*Chelonia mydas*) is a widely distributed species with significant nesting populations occurring in Sabah, Sarawak and Terengganu. The population in Sabah staged a recovery from 1987-2000. An average of 6549 nests per annum has been recorded from 2004-2008, compared to the 9071 annual nests deposited from 1994-1998. In 2009, over 13,000 nests were deposited. The Sarawak population has declined from over 13,000 nests per year in the 1950s to about 2,000 in recent years, giving a decline of 85%. Nesting data for Terengganu from the mid 1980s to 2008 show a decline of 25% from over 3,000 nests in the 1980s to the average of 2355 nests annually from 2004-2008.

Population decline is attributed to a long history of egg exploitation, poaching of local populations by illegal fishing boats from neighbouring countries, fishing mortality (incidental catch, ghost fishing and destructive fishing methods), loss of nesting and marine habitats, marine pollution, and negative impacts of tourism and climate change.

Although Marine turtle conservation in Malaysia has occurred for decades, it needs to be upgraded through education, legislation, and coordinated among the various states and agencies of Malaysia. Conservation efforts through development of hatcheries were started in Terengganu in 1961, Kelantan in 1964, Pahang in 1971, Malacca in 1987 and Perak in 1990. Existing egg incubation programmes should be expanded and in-situ incubation of nests should be more widely practiced where possible.

Most of the major nesting beaches in Malaysia are now protected as sanctuaries where commercial egg collection is prohibited. In some of these sanctuaries, especially in Terengganu, more stringent supervision of the management of the sanctuaries is needed. Commercial sale of turtle eggs should be banned throughout Malaysia to put a stop to the rampant smuggling of eggs from East Malaysia into West or Peninsular Malaysia and to curb the appetite for turtle eggs among many Malaysians.

Fisheries regulations need review and up-dating. Currently, several regulations are in place: Fisheries (Prohibition of Methods of Fishing) Regulations 1990 (bans the use of drift nets/ gillnets with mesh sizes greater than 10 inches); Fisheries (Prohibited Area) Regulations 1991 (waters off Merchang to Kampung Kuala Abang (Tanjung Jara, Terengganu) declared a prohibited area).

Poaching of local populations by foreign vessels has emerged as one of the most serious threats that needs to be addressed.

Through the BOBLME project, Malaysia is participating with neighbouring countries to improve marine turtle conservation.

Source:

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Chan, E.H. 2009. Population trends in South East Asian sea turtles. Pp 11-12 and 33-42 In: Chan, E.H., N. Pilcher and K. Hiew. Report of the Workshop on Regional Cooperation to Address Direct Capture of Sea Turtles 1-3 June 2009, Kuala Terengganu. Penerbit UMT, Universiti Malaysia Terengganu.

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Chan, E.H., N. Pilcher and K. Hiew. 2009. Report of the Workshop on Regional Cooperation to Address Direct Capture of Sea Turtles 1-3 June 2009, Kuala Terengganu. Penerbit UMT, Universiti Malaysia Terengganu.

Liew, H. C. 2002. Status of marine turtle conservation and research in Malaysia. Pp. 51-56. In: Proceedings of the Western Pacific Sea Turtle Cooperative Research and Management Workshop, February 5-8, 2002, Honolulu, Hawaii, USA.

Pilcher, N. J. 2010. Threats to marine turtles in Malaysia. Opinion paper written for WWF Malaysia in support of the Memorandum to the Most Honourable Prime Minister of Malaysia, Dato' Sri Mohd Najib bin Tun Abdul Razak Re Enactment of Comprehensive Federal Legislation for Turtles.

Shanker, K. 2004. Marine turtle status and conservation in the Indian Ocean. Papers Presented at the Expert

**1.2.1 Describe any protocol or approaches practiced in your country, which you consider exemplary, for minimising threats to marine turtle populations and their habitats, which may be suitable for adaptation and adoption elsewhere. [BPR]**

- Conversion of major nesting beaches into sanctuaries where eggs collection is prohibited.
- Involving local NGOs and university groups to help manage some of the nesting sanctuaries
- Creating volunteer programs to help monitor nesting beaches and help make marine turtle conservation self-sufficient.

**1.3.1 Describe any socio-economic studies or activities that have been conducted among communities that interact with marine turtles and their habitats. [BPR, INF]**

A study of consumption and trade of marine turtle egg in Malaysia (WWF 2009) was focused in the vicinity of Terengganu but the results may be relevant to other areas of the country, at least until further studies are conducted. Eggs are regularly consumed by a wide spectrum of the population. It appears that the market is very large. Typically eggs are obtained from re-sellers but cost plays an important part in use.

See: WWF 2009. Survey of Marine Turtle Egg Consumption and Trade in Malaysia Report prepared by TRAFFIC Southeast Asia for WWF-Malaysia March 2009 WWF – World Wide Fund for Nature (formerly World Wildlife Fund), Petaling Jaya, Malaysia.

**1.3.2 Which of these adverse economic incentives are underlying threats to marine turtles in your country? [TSH]**

- High prices earned from turtle products relative to other commodities
- Lack of affordable alternatives to turtle products
- Ease of access to the turtle resource (eg. by virtue of proximity or ease of land/water access)**
- Low cost of land near nesting beaches
- Low penalties against illegal harvesting
- Other1:
- Other2:
- Other3:
- None of the above or Not Applicable

**1.3.3 Has your country has taken any measures to try to correct these adverse economic incentives? [BPR]**

- YES  NO  NOT APPLICABLE (no adverse economic incentives exist)

**1.4.1 Indicate, and describe in more detail, the main fisheries occurring in the waters of your country, as well as any high seas fisheries in which flag vessels of your country participate, that could possibly interact with marine turtles. [INF]**

**a) Shrimp trawls:**  YES  NO

The otter trawl net is the main fishing gear used to catch a large number of demersal finfish from deep water and penaeid prawn resources, particularly on the west coast of Peninsular Malaysia.

**b) Set gill nets:**  YES  NO

Set gill nets are used by the coastal fishermen mainly catch demersal fish species like marine catfish and jewfish.

**c) Anchored Fish Aggregating Devices (FADs):**

No information available

**d) Purse seine (with or without FADs):**  YES  NO

The purse seine net is used to catch pelagic fishes. Two main types of purse-seine nets are used. Small pelagic fish are caught using the fish purse seine (operated with or without fish aggregating devices (FADs)) and anchovies are caught using the anchovy purse-seine.

**e) Longline (shallow or deepset):**  YES  NO

Longlines are used in both shallow and deep water and are quite effective in catching turtles.

**f) Driftnet:**  YES  NO

Drift and gill nets are used in the coastal fisheries. Two main types are used: one for finfish and trammel nets for penaeid prawns. Coastal fishermen use set gill nets to catch demersal fish species. Large-meshed bottom gillnets used to catch stingrays are very destructive as they are effective in catching marine turtles that often drown in the nets.

**g) Other1:**

Other traditional fishing gear employed by the coastal fishermen include hook-and-line, bag nets, lift nets, seine nets, traps, barrier nets and scoop nets.

**h) Other2:**

The deep-sea fishing vessels operate beyond 30 nautical miles from the shoreline. The fishing vessels are fairly large. Basically, commercial gear such as trawls, purse seines and hook-and line are used.

None of the above

**1.4.2 Please indicate the relative level of fishing effort and perceived impact of each of the above fisheries on marine turtles (e.g. in terms of by-catch). [TSH]**

**a) Shrimp trawls**

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source:

**b) Set gill nets**

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source:

**c) Anchored Fish Aggregating Devices (FADs)**

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source:

**d) Purse seine (with or without FADs)**

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source:

**e) Longline (shallow or deepset)**

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source:

**f) Driftnet**

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source:

**g) Other1 (from 1.4.1): Traditional fishing gears**

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source:

**h) Other2 (from 1.4.1): The deep-sea fishing vessels**

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source: Based on Country Profile Malaysia, Project Global (Global bycatch assessment of long-lived species).

Marine turtle by-catch is a significant problem (at least in some areas); the impact of fishing efforts also varies by

species by area.

**1.4.3 Describe any illegal fishing that is known to occur in or around the waters of your country that may impact marine turtles. Describe the measures being taken to deal with this problem and any difficulties encountered in this regard. [TSH]**

Illegal use of large-meshed bottom gill-nets for catching stingrays that frequently catch turtles

Illegal harvesting of marine turtles by foreign fishing vessels (esp from Hainan and Vietnam) in the territorial waters of Malaysia

Measures: patrols by enforcement agencies, but need to be stepped up. Turtles are caught in remote areas and perpetrators often escape detection and apprehension.

**1.4.4 Which of the following methods are used by your country to minimise incidental capture/mortality of marine turtles in fishing activities? [IND]**

a) **Appropriate handling** of incidentally caught turtles (e.g. resuscitation or release by fishers using equipment such as de-hooking, line cutting tools and scoop nets)

YES  NO  NOT APPLICABLE

b) **Devices that allow the escape of marine turtles** (e.g. turtle excluder devices (TEDs) or other measures that are comparable in effectiveness)

YES  NO  NOT APPLICABLE

But not to any significant extent. TEDs are required but regulations are weakly enforced (Pitcher, 2006).

c) **Measures to avoid encirclement** of marine turtles in purse seine fisheries

YES  NO  NOT APPLICABLE

d) **Appropriate combinations** of hook design, type of bait, depth, gear specifications and fishing practices

YES  NO  NOT APPLICABLE

e) **Monitoring and recovery of fish aggregating devices** (FADs)

YES  NO  NOT APPLICABLE

f) **Net retention and recycling schemes**

YES  NO  NOT APPLICABLE

g) **Spatial and temporal control of fishing** (e.g. seasonal closures of fishing activities)

YES  NO  NOT APPLICABLE

"For the purpose of regulating the fishing activities the marine waters are divided into four fishing zones (FAO 2009). For each Zone the optimum number of fishing vessels has been determined based on estimation of maximum sustainable yield. The issuance of new fishing licences for the inshore waters has been suspended. A limited number of licences is still being issued annually to offshore vessels" (FAO 2009).

"A series of marine parks has been established in the coastal waters. Fishing within two n. miles from the marine parks boundaries is prohibited. Surplus fishermen are diverted to the tourism sector, ferrying tourists to the parks, acting as tour or dive guides." (FAO 2009)

FAO (2009). Fishery and Aquaculture Country Profiles: Malaysia. FAO. FID/CP/MYS (On-line).

h) **Effort management control**

YES  NO  NOT APPLICABLE

Other (list and explain):

None of the above

**1.4.5 Which of the following programmes has your country developed - in consultation with the fishing industry and fisheries management organisations - to promote implementation of measures to minimise incidental capture and mortality of turtles in national waters and in the high seas? [IND]**

**Onboard observer programmes**

**YES**  NO  NOT APPLICABLE

But limited.

There is no reference to observers in the literature on Malaysian fisheries. No observer scheme is currently in place in Malaysian fisheries according to Flewwelling and Hosch (2006).

Source: Flewwelling, P. and Hosch, G. (2006) Country Review: Malaysia. In: De Young, C. (ed.) Review of the state of world marine capture fisheries management: Indian Ocean. FAO Fisheries Technical Paper. No. 488. Rome, FAO. 2006. 458p.

**Vessel monitoring systems**

**YES**  NO  NOT APPLICABLE

But limited.

**Inspections** (i.e. at sea, in port, at landing sites)

YES  **NO**  NOT APPLICABLE

**Training programmes / workshops** to educate fishers

**YES**  NO  NOT APPLICABLE

"The Department of Fisheries conducts hands-on courses, both long-term and short-term on various aspects of fishing technologies, aquaculture and fish processing" (FAO 2009).

**Informative videos, brochures, printed guidelines** etc.

YES  NO  NOT APPLICABLE

Unknown

**Other (list and explain):**

YES  NO  NOT APPLICABLE

None of the above

**1.4.6 Are the mitigation measures described in 1.4.4 and 1.4.5, periodically reviewed and evaluated for their efficacy? [SAP]**

YES  NO  UNSURE

**1.4.7 In your country, what types of data collection, research and development have been undertaken to support the reduction of marine turtle incidental catch (while taking into consideration the impact of various mitigation measures on other species)? [SAP]**

**1.4.8 Has your country exchanged information and provided technical assistance (formally or informally) to other Signatory States to promote the activities described in 1.4.4, 1.4.5 and 1.4.7 above? [SAP]**

YES  NO  UNSURE

Malaysia is not an IOSEA Signatory State but is involved in the BOBLME project.

**1.4.9 What legislative and practical measures has your country taken in support of UN General Assembly Resolution 46/215 concerning the moratorium on the use of large-scale driftnets? [SAP]**

None

**1.5.1 Does your country have legislation to prohibit direct harvest and domestic trade in marine turtles, their eggs, parts and products; and to protect important turtle habitats? [IND]**

YES  NO  UNSURE

Control of fishing gear and fishing areas through legislation as well as regulation of direct take:

Wildlife Protection Act (1990-Federal); Fisheries Regulations (1990-Prohibition of method of fishing, Federal); Wildlife Protection Ordinance (1999, Article 26(3)-Federal); Fisheries Regulations (1991-Prohibited Areas, Rantau Abang); Fisheries Rules (1984-Turtles and turtle eggs, Johor); Fisheries Rules (1989-Turtles and turtle eggs, Malacca); Wildlife Protection Ordinance (1990-Sarawak); Amendments to the Turtle Enactment 1951 (1987, 1989-Sabah). Signed the Association of South East Asian Nations (ASEAN) Sea Turtle Memorandum of Understanding (MoU) in 1997.

Based on :

Shanker, K. 2004. Marine turtle status and conservation in the Indian Ocean. Papers Presented at the Expert Consultation on Interactions between Sea Turtles and Fisheries within an Ecosystem Context, Rome, 9-12 March 2004. FAO Fisheries Report No. 738, Supplement, p. 85-134.

Survey of Marine Turtle Egg Consumption and Trade in Malaysia Report prepared by TRAFFIC Southeast Asia for WWF-Malaysia March 2009

**1.5.2 Which, among the following list, are economic uses and cultural values of marine turtles in your country? Please rate the relative prevalence / importance of each consumptive or non-consumptive use. [INF]**

**USES / VALUES**

**RELATIVE PREVALENCE / IMPORTANCE**

**Meat consumption**

YES  NO

HIGH  MODERATE  LOW  UNKNOWN

**Egg consumption**

YES  NO

HIGH  MODERATE  LOW  UNKNOWN

**Shell products**

YES  NO

HIGH  MODERATE  LOW  UNKNOWN

**Fat consumption**

YES  NO

HIGH  MODERATE  LOW  UNKNOWN

**Traditional medicine**

YES  NO

HIGH  MODERATE  LOW  UNKNOWN

Some use of eggs, as medication.

**Eco-tourism programmes**

YES  NO

HIGH  MODERATE  LOW  UNKNOWN

**Cultural / traditional significance**

YES  NO

HIGH  MODERATE  LOW  UNKNOWN

**Other**

**1.5.3 Please indicate the relative level and impact of traditional harvest on marine turtles and their eggs. [IND, TSH]**

**Level of harvest:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Impact of harvest:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source of information:

Egg harvest has varied over time and at different beaches. On some beaches nearly every egg was removed; whereas on others removal was not complete. The cumulative impact of harvest (in conjunction with other sources of mortality) has been to decrease and deplete the recruitment into the reproductive part of the population.

**1.5.4 Have any domestic management programmes been established to limit the levels of intentional harvest? [SAP]**

YES  NO  UNKNOWN

Some protected areas have been established where egg collection is prohibited and some areas of restricted access for fishing vessels have also been established. In some areas enforcement is a problem.

**1.5.5 Describe any management agreements negotiated between your country and other States in relation to sustainable levels of traditional harvest, to ensure that such harvest does not undermine conservation efforts. [BPR]**

Malaysia is a party to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), and the Convention on Biological Diversity (CBD).

**1.6.1 First, select one of the options at left to indicate whether or not your country has any of the following measures in place to minimise the mortality of eggs, hatchlings and nesting females. If yes, then estimate the relative effectiveness of these measures. [IND, SAP]**

MEASURES	RELATIVE EFFECTIVENESS
<b>Monitoring/protection programmes</b>	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> EXCELLENT <input type="checkbox"/> GOOD <input checked="" type="checkbox"/> LOW <input type="checkbox"/> UNKNOWN
<b>Education/awareness programmes</b>	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> EXCELLENT <input type="checkbox"/> GOOD <input checked="" type="checkbox"/> LOW <input type="checkbox"/> UNKNOWN
<b>Egg relocation/hatcheries</b>	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> EXCELLENT <input checked="" type="checkbox"/> GOOD <input type="checkbox"/> LOW <input type="checkbox"/> UNKNOWN
<b>Predator control</b>	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> EXCELLENT <input type="checkbox"/> GOOD <input type="checkbox"/> LOW <input checked="" type="checkbox"/> UNKNOWN
<b>Vehicle / access restrictions</b>	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> EXCELLENT <input type="checkbox"/> GOOD <input checked="" type="checkbox"/> LOW <input type="checkbox"/> UNKNOWN
<b>Removal of debris / clean-up</b>	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> EXCELLENT <input checked="" type="checkbox"/> GOOD <input type="checkbox"/> LOW <input type="checkbox"/> UNKNOWN
<b>Re-vegetation of frontal dunes</b>	
<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> EXCELLENT <input type="checkbox"/> GOOD <input type="checkbox"/> LOW <input type="checkbox"/> UNKNOWN
<b>Building location/design regulations</b>	
<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> EXCELLENT <input type="checkbox"/> GOOD <input type="checkbox"/> LOW <input type="checkbox"/> UNKNOWN
<b>Light pollution reduction</b>	

YES  NO  N/A

EXCELLENT  GOOD  LOW  UNKNOWN

**Other (list and rate them)**

YES  NO  N/A

**1.6.2 Has your country undertaken any evaluation of its nest and beach management programmes? [SAP]**

YES  NO  NOT APPLICABLE

**OBJECTIVE II. PROTECT, CONSERVE AND REHABILITATE MARINE TURTLE HABITATS**

**2.1.1 What is being done to protect critical habitats *outside* of established protected areas? (NB: It is assumed that legislation relating to established protected areas will have been described in Section 1.5.1) [BPR, SAP]**

Most important marine turtle habitats outside protected areas are not protected.

**2.1.2 Are assessments routinely made of the environmental impact of marine and coastal development on marine turtles and their habitats? [IND, SAP]**

YES  NO  NOT APPLICABLE

No information available at this time.

**2.1.3 Is marine water quality (including marine debris) monitored near turtle habitats? If yes, describe the nature of this monitoring and any remedial measures that may have been taken. [SAP]**

YES  NO  NOT APPLICABLE

No information available at this time.

**2.1.4 Are measures in place to prohibit the use of poisonous chemicals and explosives? [SAP]**

YES  NO  NOT APPLICABLE

But enforcement is poor.

**2.2.1 Are efforts being made to recover degraded coral reefs? If yes, give details (location, duration, effectiveness, lessons learned, future plans etc). [IND, SAP]**

YES  NO  NOT APPLICABLE (no degraded coral reefs)

No information available at this time.

**2.2.2 Are efforts being made to recover degraded mangrove habitats that are important for turtles? If yes, give details (location, duration, effectiveness, lessons learned, future plans etc.) [IND, SAP]**

YES  NO  NOT APPLICABLE (no mangrove habitats important for turtles)

No information available at this time.

**2.2.3 Are efforts being made to recover degraded sea grass habitats? If yes, give details (location, duration, effectiveness, lessons learned, future plans etc.). [IND, SAP]**

YES  NO  NOT APPLICABLE (no degraded sea grass habitats)

No information available at this time.

**OBJECTIVE III. IMPROVE UNDERSTANDING OF MARINE TURTLE ECOLOGY AND POPULATIONS THROUGH RESEARCH, MONITORING AND INFORMATION EXCHANGE**

**3.1.1 Give a list of available literature that includes baseline information from studies carried out in your country on marine turtle populations and their habitats. [INF]**

Chan, E. H. 2010. Malaysian turtles in crisis. Opinion paper written for WWF Malaysia in support of the Memorandum to the Most Honourable Prime Minister of Malaysia, Dato' Sri Mohd Najib bin Tun Abdul Razak Re Enactment of Comprehensive Federal Legislation for Turtles.

Chan, E.H. 2009. Population trends in South East Asian sea turtles. Pp 11-12 and 33-42 in: Chan, E.H., N. Pilcher and K. Hiew. Report of the Workshop on Regional Cooperation to Address Direct Capture of Sea Turtles 1-3 June 2009, Kuala Terengganu. Penerbit UMT, Universiti Malaysia Terengganu.

Chan, E.H., N. Pilcher and K. Hiew. 2009. Report of the Workshop on Regional Cooperation to Address Direct Capture of Sea Turtles 1-3 June 2009, Kuala Terengganu. Penerbit UMT, Universiti Malaysia Terengganu.

Chan, E.H. 2004. Turtles in Trouble. Siri Syarahan Inaugural KUSTEM : 7 (2004). Kolej Universiti Sains dan Teknologi Malaysia (now known as Universiti Malaysia Terengganu). ISBN 983-2888-07-7. Pdf available at :<http://www.turtleconservationcentre.org/wp-content/uploads/TurtlesInTrouble.pdf>

Chan, E. H. (1988). "A note on the feeding of leatherback (*Dermochelys coriacea*) hatchlings." *Pertanika* 11(1): 147-149.

Chan, E. H. (1989). "White spot development, incubation and hatching success of leatherback turtle (*Dermochelys coriacea*) eggs from Rantau Abang, Malaysia." *Copeia* 1989(1): 42-47.

Chan, E. H. (2006). "Marine turtles in Malaysia: On the verge of extinction?" *Aquatic Ecosystem Health and Management* 9: 175-184.

Chan, E. H. (2010). "A 16-year record of green and hawksbill turtle nesting activity at Chagar Hutang Turtle Sanctuary, Redang Island, Malaysia " *Indian Ocean Turtle Newsletter* 12(1).

Chan, E. H., J. Joseph, et al. (1999). "A study on the hawksbill turtles (*Eretmochelys imbricata*) of Pulau Guilisaan, Turtle Islands Park, Sabah, Malaysia." *Sabah Parks Nature Journal* 2: 11-22.

Chan, E. H. and H. C. Liew (1988). "A review of the effects of oil-based activities and oil pollution on sea turtles." *Proceedings of the 11th Annual Seminar of the Malaysian Society of Marine Sciences* 1988: 159-167.

Chan, E. H. and H. C. Liew (1995). "Incubation temperatures and sex-ratios in the Malaysian leatherback turtle (*Dermochelys coriacea*)." *Biological Conservation* 1995(74): 169-174.

Chan, E. H. and H. C. Liew (1999). "Hawksbill turtles, *Eretmochelys imbricata*, nesting on Redang Island, Terengganu, Malaysia from 1993-1997." *Chelonian Conservation and Biology* 3(2): 326-329.

Chan, E. H., H. C. Liew, et al. (1988). "The Incidental Capture of Sea Turtles in Fishing Gear in Terengganu, Malaysia." *Biological Conservation* 43: 1-7.

Chan, E. H., H. U. Salleh, et al. (1985). "Effects of handling on hatchability of eggs of the leatherback turtle, *Dermochelys coriacea* (L.)." *Pertanika* 8(2): 265-271.

Chan, E. H. and C. R. Shepherd (2002). "Marine Turtles: the scenario in southeast Asia." *Tropical Coasts*.

Chan, E. H. and S. E. Solomon (1989). "The structure and function of the eggshell of the leatherback turtle (*Dermochelys coriacea*) from Malaysia, with notes on infective fungal forms." *Animal Technology*, 40 (2), pp. 91-102.

Chan, E.-H. a. H.-C. L. (1996). "Decline of the leatherback population in Terengganu, Malaysia, 1956-1995." *Chelonian Conservation and Biology* 2(2): 196-203.

Chua, T. H. (1988). "Nesting population and frequency of visits in (*Dermochelys coriacea*) in Malaysia." *Journal of Herpetology* 22(2): 192-207.

Chua, T. H. and J. I. Furtado (1988). "Nesting frequency and clutch size in (*Dermochelys coriacea*) in Malaysia." *Journal of Herpetology* 22(2): 208-218.

de Silva, G. S. (1982). "Protected areas and turtle eggs in Sabah, East Malaysia." *Proceedings of the World Congress on National Parks, Indonesia 1982(11-22 Oct)*: 154-159.

IOSEA (2005). "Caring for the Turtles of Redang Island, Malaysia." IOSEA

Leh, C. (1989). "The green turtle, (*Chelonia mydas*) (L.) in Sarawak: is there a future?" *Proceedings of the 12th Annual Seminar of the Malaysian Society of Marine Sciences 1989*: 219-225.

Liew, H. and E. Chan (1994). Biotelemetric studies on the green turtles of Pulau Redang, Malaysia. *Proceedings of the Fourteenth Annual Symposium on Sea Turtle Biology and Conservation*. K. A. C. Bjorndal, A. B. C. Bolten, D. A. C. Johnson and P. J. C. Eliazar. Miami, U.S. Department of Commerce National Marine Fisheries Service: 75-75.

Liew, H. C., E. H. Chan, et al. (1995). "Satellite tracking data on Malaysian Green Turtle migration." *Rend. Fis. Acc. Lincei* 6: 239-246.

Limpus, C. (1993). "Recommendations for conservation of marine turtles in peninsula Malaysia. Report to the Department of Fisheries, Ministry of Agriculture, Malaysia."

Mortimer, J. A. (1988). "Recommendations for a national strategy on sea turtle conservation in Malaysia-with suggestions for management of the nesting beach at Ratau Aban, Terengganu and of the turtle hatchery at Pulau Besar, Melaka. Unpublished Manuscript." A Report to WWF/Malaysia and WWF/USA: 1-11.

Mortimer, J. A. (1990). "Recommendations for the management of the green turtle (*Chelonia mydas*) population nesting at the turtle islands of Sarawak." Produced under WWF Project 3868 WWF MALAYSIA.

Mortimer, J. A., Z. Ahmad, et al. (1993). "The Status of the Hawksbill *Eretmochelys imbricata* and Green Turtle *Chelonia mydas* of Melaka and Negeri Sembilan." *Malayan Nature Journal* 46: 243 - 253.

Mortimer, J. A. and D. B. DAUD (1991). "Study of nesting density at the Rhu Kudung, Tanjung Batu, Cakar Hutan and Ma' Daerah beaches of Terengganu with recommendations for management of the turtle populations." A Report Produced Under WWF Malaysia Projects Nos. MYS/91/106, 3868 and MYS/86/90.

Mortimer, J. A., A. Zaid, et al. (1992). "Evaluation of the practice of splitting sea turtle egg clutches under hatchery conditions in Malaysia." Unpub Report to WWF and the Turtle Sanctuary Advisory Council of Terengganu.

Polunin, N. V. C. (1975). "Sea turtles: reports on Thailand, West Malaysia and Indonesia, with a synopsis of data on the 'conservation status' of sea turtles in the Indo-West Pacific Region." 1-113.

Siow, K. T. (1978). "Leathery turtle (*Dermochelys coriacea*) conservation program in Rantau Abang, the state of Terengganu, Malaysia." *First Marine Science Conference "Our Seas In Perspective"*, Universiti Pertanian Malaysia 1978(5-6 Aug): 1-11.

**3.1.2 Have long-term monitoring programmes (i.e. of at least 10 years duration) been initiated or planned for priority marine turtle populations frequenting the territory of your country? [IND, BPR]**

YES  NO  UNSURE

**3.1.3 Has the genetic identity of marine turtle populations in your country been characterised? [INF, PRI]**

YES  NO  UNSURE

But not all nesting populations of all species.

**3.1.4 Which of the following methods have been or are being used to try to identify migration routes of turtles? Use the text boxes to provide additional details. [INF, PRI]**

Tagging  YES  NO

Fliper tagging. But not all nesting populations of all species.

See Citations listed in Section 3.1.1

**Satellite tracking**  YES  NO

See:

Benson, S. R., Dutton, P. H., Hitipeuw, C., Samber, B., Bakarbesy, J., and Parker, D. (2007). "Post-nesting migrations of leatherback turtles (*Dermochelys coriacea*) from Jamursba-Medi, Bird's Head Peninsula, Indonesia." *Chelonian Conservation and Biology* 6(1): 150-154.

Liew, H., Chan, E., Luschi, P., and Papi, F. (1995). "Satellite tracking data on Malaysian Green Turtle migration." *Rend. Fis. Acc. Lincei* 6: 239-246.

van de Merwe, J. P., K. Ibrahim, et al. (2009). "Habitat use by green turtles (*Chelonia mydas*) nesting in Peninsular Malaysia: local and regional conservation implications." *Wildlife Research* 36(7): 637-645.

Zaidnuddin, I., Kamarruddin, I., Zahari, A., Ahmad, A., Mohd, L., and Mohd, S. (2003). Satellite tracking of female green turtles *Chelonia mydas* at Ma'Daerah Turtle Sanctuary, Malaysia. *Proceedings on the 4th SEASTAR2000 Workshop (2003)* 15 -19.

Other

None of the above

**3.1.5 Have studies been carried out on marine turtle population dynamics and survival rates (e.g. including studies into the survival rates of incidentally caught and released turtles)?** [INF, PRI]

YES  NO  UNSURE

At specific sites; see details in cited publications.

See also:

Chan EH, Liew HC, Mazlan AG. 1988. The incidental capture of sea turtles in fishing gear in Terengganu, Malaysia. *Biological Conservation* 43: 1-7.

Chan, E.H. & Liew, H.C. 1996. Decline of the leatherback population in Terengganu, Malaysia 1956-1995. *Chelonian Conservation Biology*, 2: 196-203.

Liew, H.C. 2002. Status of marine turtle conservation and research in Malaysia. In Kinan, I. (ed.). *Proceedings of the Western Pacific Sea Turtle Co-operative Research and Management Workshop*, 5-8 February 2002, Pp. 51-65. Honolulu, Hawaii, USA. Honolulu: Western Pacific Regional Fishery Management Council.

Shanker, K. (2004). Marine turtle status and conservation in the Indian Ocean. *Papers Presented at the Expert Consultation on Interactions between Sea Turtles and Fisheries within an Ecosystem Context*, Rome, 9-12 March 2004. *FAO Fisheries Report No. 738, Supplement*, p. 85-134.

**3.1.6 Has research been conducted on the frequency and pathology of diseases in marine turtles?** [INF, PRI]

YES  NO  UNSURE

**3.1.7 Is the use of traditional ecological knowledge in research studies being promoted?** [BPR, PRI]

YES  NO  UNSURE

Possibly at the local information level during field studies.

**3.2.1 List any regional or sub-regional action plans in which your country is already participating, which may serve the purpose of identifying priority research and monitoring needs. [INF]**

Malaysia is participating in the BOBLME project. There are other actions plans and agreements to the east of the BoBLME area.

**3.2.2 On which of the following themes have collaborative studies and monitoring been conducted? Use the text boxes to describe the nature of this international collaboration or to clarify your response. Answer 'NO' if the studies/monitoring undertaken do not involve international collaboration. [INF, PRI]**

**a) Genetic Identity**  YES  NO  NOT APPLICABLE

Joseph, J. and E. H. Chan (2001). Studies on the population genetics of hawksbill turtles (*Eretmochelys imbricata*) in Malaysia using microsatellite DNA markers. 21st Annual Symposium on Sea Turtle Biology and Conservation, 24-28 Feb. 2001, Philadelphia, USA.

Joseph, J. and P. W. Shaw (2011). "Multiple paternity in egg clutches of hawksbill turtles (*Eretmochelys imbricata*)."  
Conservation Genetics 12(2): 601-605.

See Also for summary:

Shanker, K. (2004). Marine turtle status and conservation in the Indian Ocean. FAO Fisheries Report. Supplement Rome, 9-12 March 2004 FAO. 738: 238p.

**b) Conservation status**  YES  NO  NOT APPLICABLE

**c) Migrations**  YES  NO  NOT APPLICABLE

**d) Other biological and ecological aspects**  YES  NO  NOT APPLICABLE

Other

**3.3.1 List, in order of priority, the marine turtle populations in your country in need of conservation actions, and indicate their population trends. [PRI]**

All marine turtle populations in Malaysia are declining or have declined in recent times.

- Leatherback turtle populations have declined by more than 99.9%
- Olive ridley turtle populations have declined by more than 95%
- Green turtles - Some populations in Malaysia appear to be stable currently. Others (Terengganu & Sarawak) have decreased significantly (more than two fold)
- Hawksbill turtle populations in Sabah & Malacca appear to be stabilizing in the short term.

For overview see: Shanker, K. (2004). Marine turtle status and conservation in the Indian Ocean. FAO Fisheries Report. Supplement Rome, 9-12 March 2004, FAO. 738: 238p.

**3.3.2 Are research and monitoring activities, such as those described above in Section 3.1 periodically reviewed and evaluated for their efficacy? [SAP]**

YES  NO  UNSURE

**3.3.3 Describe how research results are being applied to improve management practices and mitigation of threats (in relation to the priority populations identified in 3.3.1, among others). [SAP]**

Documentation of the decline in leatherback turtles nesting at Terengganu helped stop egg collecting and near shore fishing. Other information has contributed to developing fisheries legislation (but enforcement is weak).

**3.4.1 Has your country undertaken any initiatives (nationally or through collaboration with other Range States) to standardise methods and levels of data collection? [BPR, INF]**

YES  NO  UNSURE

Use of standard methods is voluntary but most researchers use widely accepted published methods.

**3.4.2 To what extent does your country exchange scientific and technical information and expertise with other Range States? [SAP, IND]**

OFTEN (SYSTEMATICALLY)  OCCASIONALLY  RARELY  NEVER

**3.4.3 If your country shares scientific and technical information and expertise with other Range States, what mechanisms have commonly been used for this purpose? Comment on any positive benefits/outcomes achieved through these interactions. [INF]**

Symposia and published papers.

Through the establishment of the Turtle Islands Heritage Protected Area (TIHPA) between Sabah and the Philippines. Annual meetings are held for information exchange and updates.

**3.4.4 Does your country compile and make available to other countries data on marine turtle populations of a regional interest? [INF]**

YES  NO  UNSURE

Mainly through Symposia and published papers and use of web pages.

**OBJECTIVE IV. INCREASE PUBLIC AWARENESS OF THE THREATS TO MARINE TURTLES AND THEIR HABITATS, AND ENHANCE PUBLIC PARTICIPATION IN CONSERVATION ACTIVITIES**

**4.1.1 Describe the educational materials, including mass media information programmes that your country has collected, developed and/or disseminated. [INF, PRI]**

Some information for fishermen and tourists has been developed.

A book entitled "Little Turtle Messenger" written by Chan Eng Heng was published in 2010 by MPH. It has a clear message in education children not to eat turtle eggs. The Malay version entitled "Duta Kecil Penyu" was sponsored by WWF Malaysia and disseminated widely to elementary school children in Terengganu.

A long-term volunteer program to help monitor nesting activity at the Chagar Hutang Turtle Sanctuary developed by Chan Eng Heng and Liew Hock Chark in 1998 has helped increase public awareness in turtle conservation.

Annual turtle camps for primary school children of Redang Island initiated in 1996 continues to this day.

**4.1.2 Which of the following groups have been the targets of these focused education and awareness programmes described in above in Section 4.1.1? [PRI, INF]**

- Policy makers
- Fishing industry**
- Local/Fishing communities
- Indigenous groups
- Tourists**
- Media
- Teachers**

■ **Students**

- Military, Navy, Police
- Scientists
- Other:
- None of the above

**4.1.3 Have any community learning / information centres been established in your country? [BPR, SAP]**

■ YES  NO

**4.2 Alternative livelihood opportunities [IND, BPR] Describe initiatives already undertaken or planned to identify and facilitate alternative livelihoods (including income-generating activities) for local communities.**

Local villagers are employed to help monitor nesting activity in Redang Island.

Information about other sites is not available at this time.

**4.3.1 Describe initiatives already undertaken or planned by your country to involve local communities, in particular, in the planning and implementation of marine turtle conservation programmes. Please include details of any incentives that have been used to encourage public participation, and indicate their efficacy. [BPR, IND]**

This information is not available at this time.

**4.3.2 Describe initiatives already undertaken or planned to involve and encourage the cooperation of Government institutions, NGOs and the private sector in marine turtle conservation programmes. [IND, BPR]**

This information is not available at this time.

**OBJECTIVE V. ENHANCE NATIONAL, REGIONAL AND INTERNATIONAL COOPERATION**

**5.1.1 Has your country undertaken a national review of its compliance with Convention on International Trade in Endangered Species (CITES) obligations in relation to marine turtles? [SAP]**

YES  NO  NOT APPLICABLE

This information is not available at this time.

**5.1.2 Does your country have, or participate/cooperate in, CITES training programmes for relevant authorities? [SAP]**

■ YES  NO  NOT APPLICABLE

**5.1.3 Does your country have in place mechanisms to identify international illegal trade routes (for marine turtle products etc.)? Please use the text box to elaborate on how your country is cooperating with other States to prevent/deter/eliminate illegal trade. [SAP]**

■ YES  NO  NOT APPLICABLE

**5.1.4 Which international compliance and trade issues related to marine turtles has your country raised**

for discussion (e.g. through the IOSEA MoU Secretariat, at meetings of Signatory States etc.)? [INF]

Unknown

**5.1.5 Describe measures in place to prevent, deter and eliminate domestic illegal trade in marine turtle products, particularly with a view to enforcing the legislation identified in Section 1.5.1. [INF]**

Legislation is in place but enforcement is weak. Training and capacity building are required.

**5.2.1 Has your country already developed a national action plan or a set of key management measures that could eventually serve as a basis for a more specific action plan at a national level? [IND]**

YES  NO

A National Action Plan of Action for Conservation and management of sea turtles has been published by the Department of Fisheries, Ministry of Agriculture and Agro-based Industry, Malaysia.

**5.2.2 From your country's perspective, which conservation and management activities, and/or which particular sites or locations, ought to be among the highest priorities for action? [PRI]**

Ban the commercial sale of marine turtle eggs throughout Malaysia

Patrolling of feeding grounds of green and hawksbill turtles in remote areas to control illegal poaching of marine turtles and to apprehend and arrest perpetrators.

Protection of nesting sites and nests of hawksbill turtles in Melaka and Sabah Turtle Islands to maximize hatchling production for return to the oceans

Protection of nesting sites and nests of green turtles in Sabah, Sarawak, Terengganu, Perak, Pahang and Johor to maximize hatchling production for return to the oceans

Control fishing activity to reduce turtle mortality

Survey of Western coast to assess nesting and foraging populations

**5.2.3 Please indicate, from your country's standpoint, the extent to which the following local management issues require international cooperation in order to to achieve progress. [PRI]**

- |   |  |
|---|--|
| <b>Illegal fishing in territorial waters</b>        | <input checked="" type="checkbox"/> <b>ESSENTIAL</b> <input type="checkbox"/> IMPORTANT <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL |
| <b>Incidental capture by foreign fleets</b>         | <input checked="" type="checkbox"/> <b>ESSENTIAL</b> <input type="checkbox"/> IMPORTANT <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL |
| <b>Enforcement/patrolling of territorial waters</b> | <input checked="" type="checkbox"/> <b>ESSENTIAL</b> <input type="checkbox"/> IMPORTANT <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL |
| <b>Hunting/harvest by neighboring countries</b>     | <input checked="" type="checkbox"/> <b>ESSENTIAL</b> <input type="checkbox"/> IMPORTANT <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL |
| <b>Poaching, illegal trade in turtle projects</b>   | <input checked="" type="checkbox"/> <b>ESSENTIAL</b> <input type="checkbox"/> IMPORTANT <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL |
| <b>Development of gear technology</b>               | <input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL |
| <b>Oil spills, pollution, marine debris</b>         | <input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL |
| <b>Training / capacity-building</b>                 | <input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL |
| <b>Alternative livelihood development</b>           | <input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL |
| <b>Identification of turtle populations</b>         | <input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL |
| <b>Identification of migration routes</b>           | <input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL |

**Tagging / satellite tracking**  ESSENTIAL  **IMPORTANT**  LIMITED  NOT AT ALL

**Habitat studies**  **ESSENTIAL**  IMPORTANT  LIMITED  NOT AT ALL

**Genetics studies**  ESSENTIAL  **IMPORTANT**  LIMITED  NOT AT ALL

**5.3.1 Identify existing frameworks/organisations that are, or could be, useful mechanisms for cooperating in marine turtle conservation at the sub-regional level. Please comment on the strengths of these instruments, their capacity to take on a broader coordinating role, and any efforts your country has made to enhance their role in turtle conservation. [INF, BPR]**

Turtle Islands Heritage Protected Area

**5.3.2 Has your country developed, or is it participating in, any networks for cooperative management of shared turtle populations? [BPR, INF]**

**YES**  NO  NOT APPLICABLE

**5.3.3 What steps has your country taken to encourage Regional Fishery Bodies (RFBs) to adopt marine turtle conservation measures within Exclusive Economic Zones (EEZs) and on the high seas? [SAP]**

Unknown

**5.4.1 Describe your country's needs, in terms of human resources, knowledge and facilities, in order to build capacity to strengthen marine turtle conservation measures. [PRI]**

Capacity building would be improved by within and among country information exchange.

**5.4.2 Describe any training provided in marine turtle conservation and management techniques (e.g. workshops held, training manuals produced etc.), and indicate your plans for the coming year. [PRI, INF]**

Information not available.

**5.4.3 Specifically in relation to capacity-building, describe any partnerships developed or planned with universities, research institutions, training bodies and other relevant organisations. [BPR]**

Information not available.

**5.5.1 National policies and laws concerning the conservation of marine turtles and their habitats will have been described in Section 1.5.1. Please indicate their effectiveness, in terms of their practical application and enforcement. [SAP, TSH]**

In general, national policies are effective in many areas and not in others. Local involvement is necessary and must be developed.

Enforcement is still an issue.

**5.5.2 Has your country conducted a review of policies and laws to address any gaps, inconsistencies or impediments in relation to marine turtle conservation? If not, indicate any obstacles encountered in this regard and when this review is expected to be done. [SAP]**

YES  NO  UNSURE

Legislation is occasionally reviewed and up-dated (e.g. fisheries regulations).

**5.5.3 From the standpoint of law enforcement, has your country experienced any difficulties achieving cooperation to ensure compatible application of laws across and between jurisdictions? [TSH]**

YES  NO  UNSURE

Across boundary cooperation and enforcement varies, depending on the issue and the boundary.

## **OBJECTIVE VI. PROMOTE IMPLEMENTATION OF THE MoU INCLUDING THE CONSERVATION AND MANAGEMENT PLAN**

**6.1.1 What has your country already done, or will it do, to encourage other States to sign the IOSEA MoU? [INF]**

**6.1.2 Is your country **currently** favourable, in principle, to amending the MoU to make it a legally binding instrument? [INF]**

YES  NO  NO VIEW

**6.1.3 Would your country be favourable, over a **longer time horizon**, to amending the MoU to make it a legally-binding instrument? [INF]**

YES  NO  NO VIEW

### **6.2 Secretariat and Advisory Committee**

**6.2.1 What efforts has your country made, or can it make, to secure funding to support the core operations of the IOSEA MoU (Secretariat and Advisory Committee, and related activities)? [IND]**

**6.3.1 What funding has your country mobilised for domestic implementation of marine turtle conservation activities related to the IOSEA Marine Turtle MoU? Where possible, indicate the specific monetary values attached to these activities/programmes, as well as future plans. [IND]**

**6.3.2 Has your country tried to solicit funds from, or seek partnerships with, other Governments, major donor organisations, industry, private sector, foundations or NGOs for marine turtle conservation activities? [IND]**

YES  NO

**6.3.3 Describe any initiatives made to explore the use of economic instruments for the conservation of marine turtles and their habitats. [BPR]**

**6.4.1 Has your country designated a lead agency responsible for coordinating national marine turtle conservation and management policy? If not, when is this information expected to be communicated to the IOSEA MoU Secretariat? [IND]**

YES  NO

**6.4.2 Are the roles and responsibilities of all government agencies related to the conservation and management of marine turtles and their habitats clearly defined? [IND]**

YES  NO  UNSURE

**6.4.3 Has your country ever conducted a review of agency roles and responsibilities? If so, when, and what was the general outcome? If not, is such a review planned and when? [SAP],**

YES  NO  UNSURE

**Comments/suggestions to improve the present reporting format:**

**Additional information not covered above:**



## Indian Ocean – South-East Asian Marine Turtle Memorandum of Understanding

### Maldives

#### GENERAL INFORMATION

**Agency or institution primarily responsible for the preparation of this report:**

**Other agencies, institutions, or NGOs that have provided input:**

**Designated Focal Point:**

Director  
Fisheries Management Agency  
Fisheries Division  
Ministry of Fisheries and Agriculture  
Ghaazee Building, Ameer Ahmed Magu,  
Male  
Republic of Maldives

Tel: (+960) 3322526  
Fax: (+960) 3326558  
E-mail: hussain.sinan@fishagri.gov.mv

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**This report was last updated:** 7 September 2011

#### **OBJECTIVE I. REDUCE DIRECT AND INDIRECT CAUSES OF MARINE TURTLE MORTALITY**

##### **1.1 Introduction to marine turtle populations and habitats, challenges and conservation efforts. [INF]**

The Maldives is a chain of 26 coral atolls, containing 1192 islands, that extends approximately 860km from latitude 7°06'35"N to 0°42'24"S, and between longitude 72°33'19"E to 73°46'13"E (Woodroffe 1989, Ali 2004). The islands vary in size (approx. 0.5 km<sup>2</sup> - approx. 5.0 km<sup>2</sup>) and in shape (small sandbanks with sparse vegetation - elongated strip islands). Approximately 80% of the land area of the Maldives is less than 1 meter above mean high tide level (maximum height about 3 meters) (MHAHE, 1999).

A nationwide ban on harvesting adult and juvenile turtles was began 1995; in addition, a 10 year moratorium on the harvesting of turtle eggs was started. A new 10 year moratorium began on January 1, 2006 (Maldivian Fisheries Law, Clause 10, Law No. 5/87).

The only compiled report about the sea turtles of Maldives is in the "Marine Research Bulletin" published from Marine Research Center (Frazier et al. 2000, Zahir 2000). Adult and immature green turtles (*Chelonia mydas*) forage throughout the archipelago; nesting occurs on many islands (Kunfunadhoo and Maadhoo Islands (Baa), Hukuruelhi (now changed to Hukurudhoo) Island (Ari), Gaadhoo, Hithadhoo and Isdhoo islands (Laamu)). Adult and immature hawksbill turtles (*Eretmochelys imbricata*) forage throughout the archipelago. Nesting occurs on Kunfunadhoo (Baa) and Baros (North Malé). Nesting, at least in small numbers, occurs on most uninhabited islands of the atolls (Frazier et al. 2000, Zahir 2000, Zahir 2006).

Three other marine turtle species have been reported from the archipelago: The olive ridley (*Lepidochelys olivacea*), the loggerhead (*Caretta caretta*), and the leatherback (*Dermodochelys coriacea*) (Frazier et al. 2000, Zahir 2000, Zahir 2006). These species are not common; information concerning their occurrence and distribution (including nesting) is scant. A more current assessment is needed.

Although eggs of both green and hawksbill turtles were eaten in the past; the level of current consumption is unknown. The same is true concerning the local consumption of meat, which traditionally focuses on green turtles. There is a history of commercial use of hawksbill shell but this has been legislated against. However, collection of turtle eggs is allowed in view of their traditional importance as a protein source. As a result, the stocks are considered depleted until better data provide a clearer picture of their status.

Based on Ali, M. (2004). The Maldives: National Report. Status and developmental potential of the coastal and marine resources of the Maldives and their threats. GEF PDF Block B Phase of FAO/BOBLME Programme Sustainable Management of the Bay of Bengal Large Marine Ecosystem (BOBLME) GCP/RAS/179/WBG

Liew, Hock-Chark (2009). Turtle Conservation Plan for Gan Island. Maldives component in the Regional Programme for Participatory and Integrated Agriculture, Forestry and Fisheries Development for Long-term Rehabilitation and Development in Tsunami-affected Areas (GCP/RAS/218/JPN).

MHAHE (Ministry of Home Affairs Housing and Environment), (1999) Second National Environment Action Plan NEAP II, Male' Maldives.

Woodroffe, C. (1989) Maldives and Sea Level Rise: An Environmental Perspective. University of Wollongong, Australia.

Zahir, H. (2006). Sea turtles in the Maldives: Status, threats and management. Workshop on Assessing the relative importance of sea turtle mortality due to fisheries Zanzibar, 25-28 April 2006. (PowerPoint presentation).

See also references listed in Section 3.1.1

**1.2.1 Describe any protocol or approaches practiced in your country, which you consider exemplary, for minimising threats to marine turtle populations and their habitats, which may be suitable for adaptation and adoption elsewhere. [BPR]**

To minimize threats to marine turtle populations, a blanket ban on taking live turtles within the EEZ of Maldives was imposed under clause 10 of the Fisheries Law of the Maldives for a period of 10 years from 1995. This ban was extended a further 10 years from 2006 and live capture of turtles and harvesting eggs was banned completely from 13 Islands around the Maldives. However, there is a serious concern about this management approach as the demand for harvesting turtle eggs has continued to rise. Work has started to develop a status report and a management plan for the conservation of marine turtle in the Maldives.

**1.3.1 Describe any socio-economic studies or activities that have been conducted among communities that interact with marine turtles and their habitats. [BPR, INF]**

Fishing and tourism are the greatest contributors to the development of the Maldives. Work has started to develop a status report and a management plan for the conservation of marine turtles in the Maldives.

**1.3.2 Which of these adverse economic incentives are underlying threats to marine turtles in your country? [TSH]**

**High prices earned from turtle products relative to other commodities**

Lack of affordable alternatives to turtle products

**Ease of access to the turtle resource (eg. by virtue of proximity or ease of land/water access)**

Low cost of land near nesting beaches

**Low penalties against illegal harvesting**

Other1: Lack of awareness

Other2: Lack of initiatives from enforcement agencies

Other3:

None of the above or Not Applicable

**1.3.3 Has your country has taken any measures to try to correct these adverse economic incentives? [BPR]**

YES  NO  NOT APPLICABLE (no adverse economic incentives exist)

**1.4.1 Indicate, and describe in more detail, the main fisheries occurring in the waters of your country, as well as any high seas fisheries in which flag vessels of your country participate, that could possibly interact with marine turtles. [INF]**

**a) Shrimp trawls:**

N/A

**b) Set gill nets:**

N/A

**c) Anchored Fish Aggregating Devices (FADs):**  YES  NO

Tuna are caught around Fish Aggregating Devices (FADs), as well as in open water and associated with drifting flotsam and sometimes along the outer reef edge.

**d) Purse seine (with or without FADs):**

N/A

**e) Longline (shallow or deepset):**  YES  NO

Long-line minimum depth for main line is 60m (target: yellow fin and big eye tuna in deep water).

**f) Driftnet:**

**g) Other1:**

The tuna fishery is the major fishery and utilizes three techniques:

- 1) Pole and line fishery (skipjack and small yellow fin tuna),
- 2) Hand-line fishery (large yellow fin tuna), and
- 3) Long-line fishery (listed above)

**h) Other2:**

Ghost nets from international sources catch and kill turtles in the waters of the Maldives.

See: Anderson, R. C., Zahir, H., Jauharee, R., Sakamoto, T., Sakamoto, I., and Johnson, G. (2009). Entanglement of Olive Ridley Turtles *Lepidochelys olivacea* in ghost nets in the equatorial Indian Ocean IOTC-2009-WPEB-07.

**None of the above**

**1.4.2 Please indicate the relative level of fishing effort and perceived impact of each of the above fisheries on marine turtles (e.g. in terms of by-catch). [TSH]**

**a) Shrimp trawls**

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  **NONE**  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  **NONE**  UNKNOWN

Source: FMA (Fisheries Management Agency). No shrimp trawl fishery exist in the Maldives.

***b) Set gill nets***

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  **NONE**  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  **NONE**  UNKNOWN

Source: FMA (Fisheries Management Agency). No set gillnet fishery exist in the Maldives.

***c) Anchored Fish Aggregating Devices (FADs)***

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  **NONE**  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  **NONE**  UNKNOWN

Source: FMA (Fisheries Management Agency). There are no reported cases of turtles being caught near the FADs.

***d) Purse seine (with or without FADs)***

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source: FMA (Fisheries Management Agency). No purse seine fishery exist in the Maldives.

***e) Longline (shallow or deepset)***

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  **NONE**  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  **NONE**  UNKNOWN

Source: FMA (Fisheries Management Agency). Currently, deep water long-line fishery is in the experimental phase. No cases of turtles being captured have been reported so far.

***f) Driftnet***

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source: FMA (Fisheries Management Agency). No drift net fishery exists in the Maldives.

***g) Other1 (from 1.4.1):***

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source:

**h) Other2 (from 1.4.1):**

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source:

**1.4.3 Describe any illegal fishing that is known to occur in or around the waters of your country that may impact marine turtles. Describe the measures being taken to deal with this problem and any difficulties encountered in this regard. [TSH]**

Illegal purse seiners poaching from Maldivian waters are believed to be the illegal fishery that would most affect maine turtle populations.

A growing problem is the "entanglement and mortality of turtles in "ghost nets": nets or bits of net that have been lost or jettisoned. These include both bits of gillnet and drifting FADs." (Anderson et al., 2009).

(Anderson, R. C., Zahir, H., Jauharee, R., Sakamoto, T., Sakamoto, I., and Johnson, G. (2009). Entanglement of Olive Ridley Turtles *Lepidochelys olivacea* in ghost nets in the equatorial Indian Ocean IOTC-2009-WPEB-07.)

**1.4.4 Which of the following methods are used by your country to minimise incidental capture/mortality of marine turtles in fishing activities? [IND]**

a) **Appropriate handling** of incidentally caught turtles (e.g. resuscitation or release by fishers using equipment such as de-hooking, line cutting tools and scoop nets)

**YES**  NO  NOT APPLICABLE

b) **Devices that allow the escape of marine turtles** (e.g. turtle excluder devices (TEDs) or other measures that are comparable in effectiveness)

YES  NO  **NOT APPLICABLE**

c) **Measures to avoid encirclement** of marine turtles in purse seine fisheries

YES  NO  **NOT APPLICABLE**

d) **Appropriate combinations** of hook design, type of bait, depth, gear specifications and fishing practices

**YES**  NO  NOT APPLICABLE

See: Adam, M. Shiham (2006). Country review: Maldives. Pp. 383-391. In: De Young, C. (ed.) (2006). Review of the state of world marine capture fisheries management: Indian Ocean. FAO Fisheries Technical Paper. No. 488. Rome, FAO. 2006. 458p.

e) **Monitoring and recovery of fish aggregating devices** (FADs)

**YES**  NO  NOT APPLICABLE

f) **Net retention and recycling schemes**

YES  NO  **NOT APPLICABLE**

g) **Spatial and temporal control of fishing** (e.g. seasonal closures of fishing activities)

YES  NO  **NOT APPLICABLE**

'No' for tuna and bait commercial fisheries but 'Yes' for shark fishery

See: Adam, M. Shiham (2006). Country review: Maldives. Pp. 383-391. In: De Young, C. (ed.) (2006). Review of the state of world marine capture fisheries management: Indian Ocean. FAO Fisheries Technical Paper. No. 488. Rome, FAO. 2006. 458p.

h) **Effort management control**

YES  NO  **NOT APPLICABLE**

Other (list and explain):

None of the above

**1.4.5 Which of the following programmes has your country developed - in consultation with the fishing industry and fisheries management organisations - to promote implementation of measures to minimise incidental capture and mortality of turtles in national waters and in the high seas? [IND]**

**Onboard observer programmes**

**YES**  NO  NOT APPLICABLE

**Vessel monitoring systems**

**YES**  NO  NOT APPLICABLE

Only for the EEZ component of the fishery

See: Adam, M. Shiham (2006). Country review: Maldives. Pp. 383-391. In: De Young, C. (ed.) (2006). Review of the state of world marine capture fisheries management: Indian Ocean. FAO Fisheries Technical Paper. No. 488. Rome, FAO. 2006. 458p.

**Inspections** (i.e. at sea, in port, at landing sites)

**YES**  NO  NOT APPLICABLE

**Training programmes / workshops** to educate fishers

**YES**  NO  NOT APPLICABLE

**Informative videos, brochures, printed guidelines** etc.

**YES**  NO  NOT APPLICABLE

**Other (list and explain):**

YES  NO  NOT APPLICABLE

None of the above

**1.4.6 Are the mitigation measures described in 1.4.4 and 1.4.5, periodically reviewed and evaluated for their efficacy? [SAP]**

YES  NO  UNSURE

**1.4.7 In your country, what types of data collection, research and development have been undertaken to support the reduction of marine turtle incidental catch (while taking into consideration the impact of various mitigation measures on other species)? [SAP]**

1. Marine Research Center has conducted data collection surveys on selected islands to determine the number of nesting and the amount of nesting islands and foraging areas. (These islands were selected based on the historical reports of nesting per Island per annum).

2. The research unit of the Ministry of Fisheries and Agriculture also collects data from all the islands separately, which helps to determine turtle population, diversity, and the changes to the turtle population.

**1.4.8 Has your country exchanged information and provided technical assistance (formally or informally) to other Signatory States to promote the activities described in 1.4.4, 1.4.5 and 1.4.7 above? [SAP]**

YES  NO  UNSURE

**1.4.9 What legislative and practical measures has your country taken in support of UN General Assembly Resolution 46/215 concerning the moratorium on the use of large-scale driftnets? [SAP]**

N/A

**1.5.1 Does your country have legislation to prohibit direct harvest and domestic trade in marine turtles, their eggs, parts and products; and to protect important turtle habitats? [IND]**

YES  NO  UNSURE

In recognition of the fate of the turtle populations, the Ministry of Fisheries and Agriculture (MOFA), under clause 10 of the Fisheries Law of the Maldives (Law no. 5/87), declared and enforced a total ban, effective from the 25th June 1995, on any fishing activity involving killing, capturing and harming of any turtle species within the national territory and exclusive economic zone (EEZ) of the Republic of Maldives. The presidential decree was imposed for 10 years and later extended to another 10 years from 2006. Also MOFA has implemented total ban on egg harvest from 13 islands.

**1.5.2 Which, among the following list, are economic uses and cultural values of marine turtles in your country? Please rate the relative prevalence / importance of each consumptive or non-consumptive use. [INF]**

**USES / VALUES**

**RELATIVE PREVALENCE / IMPORTANCE**

**Meat consumption**

YES  NO

HIGH  MODERATE  LOW  UNKNOWN

**Egg consumption**

YES  NO

HIGH  MODERATE  LOW  UNKNOWN

**Shell products**

YES  NO

HIGH  MODERATE  LOW  UNKNOWN

**Fat consumption**

YES  NO

HIGH  MODERATE  LOW  UNKNOWN

**Traditional medicine**

YES  NO

HIGH  MODERATE  LOW  UNKNOWN

**Eco-tourism programmes**

YES  NO

HIGH  MODERATE  LOW  UNKNOWN

**Cultural / traditional significance**

YES  NO

HIGH  MODERATE  LOW  UNKNOWN

**Other**

Production and export of any products, or products made using parts of turtles, are prohibited by law.

**1.5.3 Please indicate the relative level and impact of traditional harvest on marine turtles and their eggs.**  
**[IND, TSH]**

**Level of harvest:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Impact of harvest:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source of information:

Turtle Research Programme (Mr. Hussain Zahir, Marine Research Center)

**1.5.4 Have any domestic management programmes been established to limit the levels of intentional harvest?** **[SAP]**

YES  NO  UNKNOWN

Total 13 Islands from Maldives have selected based on the number of nesting sited per year and have banned from harvesting eggs and catching live turtles from the selected islands. Those Islands are also monitored regularly to minimize intentional harvesting.

Also See:

Liew, Hock-Chark (2009). Turtle Conservation Plan for Gan Island. Maldives component in the Regional Programme for Participatory and Integrated Agriculture, Forestry and Fisheries Development for Long-term Rehabilitation and Development in Tsunami-affected Areas (GCP/RAS/218/JPN).

1.5.5 Describe any management agreements negotiated **between your country and other States** in relation to sustainable levels of traditional harvest, to ensure that such harvest does not undermine conservation efforts. [BPR]

N/A

1.6.1 **First, select one of the options at left** to indicate whether or not your country has any of the following measures in place to minimise the mortality of eggs, hatchlings and nesting females. **If yes, then estimate the relative effectiveness** of these measures. [IND, SAP]

MEASURES	RELATIVE EFFECTIVENESS
<b>Monitoring/protection programmes</b>	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> EXCELLENT <input type="checkbox"/> GOOD <input type="checkbox"/> LOW <input checked="" type="checkbox"/> UNKNOWN
<b>Education/awareness programmes</b>	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> EXCELLENT <input type="checkbox"/> GOOD <input checked="" type="checkbox"/> LOW <input type="checkbox"/> UNKNOWN
<b>Egg relocation/hatcheries</b>	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> EXCELLENT <input checked="" type="checkbox"/> GOOD <input type="checkbox"/> LOW <input type="checkbox"/> UNKNOWN
<b>Predator control</b>	
<input type="checkbox"/> YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> N/A	<input type="checkbox"/> EXCELLENT <input type="checkbox"/> GOOD <input type="checkbox"/> LOW <input type="checkbox"/> UNKNOWN
<b>Vehicle / access restrictions</b>	
<input type="checkbox"/> YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> N/A	<input type="checkbox"/> EXCELLENT <input type="checkbox"/> GOOD <input type="checkbox"/> LOW <input type="checkbox"/> UNKNOWN
<b>Removal of debris / clean-up</b>	
<input type="checkbox"/> YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> N/A	<input type="checkbox"/> EXCELLENT <input type="checkbox"/> GOOD <input type="checkbox"/> LOW <input type="checkbox"/> UNKNOWN
<b>Re-vegetation of frontal dunes</b>	
<input type="checkbox"/> YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> N/A	<input type="checkbox"/> EXCELLENT <input type="checkbox"/> GOOD <input type="checkbox"/> LOW <input type="checkbox"/> UNKNOWN
<b>Building location/design regulations</b>	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> EXCELLENT <input checked="" type="checkbox"/> GOOD <input type="checkbox"/> LOW <input type="checkbox"/> UNKNOWN
<b>Light pollution reduction</b>	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	

**Other (list and rate them)**

YES  NO  N/A

**1.6.2 Has your country undertaken any evaluation of its nest and beach management programmes? [SAP]**

YES  NO  NOT APPLICABLE

Maldives Marine Research Center has actively carried out the evaluation of nesting sites through their research programme, but a beach management programme has not yet been carried out. However, it is expected to be addressed in the Marine Turtle Management plan programmed for this year from Fisheries Management Agency.

**OBJECTIVE II. PROTECT, CONSERVE AND REHABILITATE MARINE TURTLE HABITATS**

**2.1.1 What is being done to protect critical habitats *outside* of established protected areas? (NB: It is assumed that legislation relating to established protected areas will have been described in Section 1.5.1) [BPR, SAP]**

No protected areas have been established specifically for turtles; a series of 25 protected marine areas exists throughout the archipelago.

**2.1.2 Are assessments routinely made of the environmental impact of marine and coastal development on marine turtles and their habitats? [IND, SAP]**

YES  NO  NOT APPLICABLE

**2.1.3 Is marine water quality (including marine debris) monitored near turtle habitats? If yes, describe the nature of this monitoring and any remedial measures that may have been taken. [SAP]**

YES  NO  NOT APPLICABLE

**2.1.4 Are measures in place to prohibit the use of poisonous chemicals and explosives? [SAP]**

YES  NO  NOT APPLICABLE

**2.2.1 Are efforts being made to recover degraded coral reefs? If yes, give details (location, duration, effectiveness, lessons learned, future plans etc). [IND, SAP]**

YES  NO  NOT APPLICABLE (no degraded coral reefs)

Angell, C.L. 2004. Review of Critical Habitats: Mangroves and Coral Reefs. Unpublished report prepared for the BOBLME Programme. Unedited version.

**2.2.2 Are efforts being made to recover degraded mangrove habitats that are important for turtles? If yes, give details (location, duration, effectiveness, lessons learned, future plans etc.) [IND, SAP]**

YES  NO  NOT APPLICABLE (no mangrove habitats important for turtles)

Angell, C.L. 2004. Review of Critical Habitats: Mangroves and Coral Reefs. Unpublished report prepared for the BOBLME Programme. Unedited version.

**2.2.3 Are efforts being made to recover degraded sea grass habitats? If yes, give details (location, duration, effectiveness, lessons learned, future plans etc.). [IND, SAP]**

YES  NO  NOT APPLICABLE (no degraded sea grass habitats)

**OBJECTIVE III. IMPROVE UNDERSTANDING OF MARINE TURTLE ECOLOGY AND POPULATIONS THROUGH RESEARCH, MONITORING AND INFORMATION EXCHANGE**

**3.1.1 Give a list of available literature that includes baseline information from studies carried out in your country on marine turtle populations and their habitats. [INF]**

Anon. (2005). MALDIVES: Post-Tsunami Environmental Assessment. United Nations Environment Programme.

Anderson, R. C., Zahir, H., Jauharee, R., Sakamoto, T., Sakamoto, I., and Johnson, G. (2009). Entanglement of Olive Ridley Turtles *Lepidochelys olivacea* in ghost nets in the equatorial Indian Ocean IOTC-2009-WPEB-07.

Didi, N. T. Hassan. 1983. Sea Turtles in the Maldives. In: Annual Fisheries , Report, No.3. Ministry of Fisheries, Male. pp 174-177.

Frazier, J. (1980) Exploitation of marine turtles in the Indian Ocean. *Human Ecology*, 8: 329–370.

Frazier J; Salas S; Didi, N. T. H. (1984). Marine Turtles of Maldive Archipelago. In: Marine Turtles of the Maldives Archipelago published in 2000. *Marine Research Bulletin*, 4: 5-42.

Liew, Hock-Chark (2009). Turtle Conservation Plan for Gan Island. Maldives component in the Regional Programme for Participatory and Integrated Agriculture, Forestry and Fisheries Development for Long-term Rehabilitation and Development in Tsunami-affected Areas (GCP/RAS/218/JPN).

Zahir, H (2000). Status of Sea Turtles in Maldives. In: Marine Turtles of the Maldives Archipelago published in 2000. *Marine Research Bulletin*; 4: 43 -61.

Zahir, H (2000). Preliminary Findings of the Survey of the Nesting Beaches in Haa Alifu Atoll, Maldives. *Marine Research Bulletin* 4: 2-66.

Zahir, H (2006). Status of leatherback turtles in Maldives. Indian Ocean – South-East Asian Leatherback Turtle Assessment. IOSEA Marine Turtle MoU –83

Zahir, H. (2006). Sea turtles in the Maldives: Status, threats and management. Workshop on Assessing the relative importance of sea turtle mortality due to fisheries Zanzibar, 25-28 April 2006. (PowerPoint presentation).

**3.1.2 Have long-term monitoring programmes (i.e. of at least 10 years duration) been initiated or planned for priority marine turtle populations frequenting the territory of your country? [IND, BPR]**

YES  NO  UNSURE

See Zahir (2006) for trend data.

Zahir, H. (2006). Sea turtles in the Maldives: Status, threats and management. Workshop on Assessing the relative importance of sea turtle mortality due to fisheries Zanzibar, 25-28 April 2006. (PowerPoint presentation).

**3.1.3 Has the genetic identity of marine turtle populations in your country been characterised? [INF, PRI]**

YES  NO  UNSURE

**3.1.4 Which of the following methods have been or are being used to try to identify migration routes of turtles? Use the text boxes to provide additional details. [INF, PRI]**

Tagging  YES  NO

The turtle conservation project run by Banyan Tree Maldives continues to monitor turtles released to the wild. In order to know each turtle better they have introduced uniquely identifiable method which includes carapace marking and titanium branding tags.

They are based on the designed used for cattle branding and carry a return address which allows any one who encounters the turtle to contact our project and let us know of the turtles fate and where its travels had taken it.

**Satellite tracking**  YES  NO

Banyan Tree Maldives has satellite-tracked six green turtles from 2002 -2007. Project details can be found in the IOSEA Satellite Tracking Metadatabase.

Other

None of the above

**3.1.5 Have studies been carried out on marine turtle population dynamics and survival rates (e.g. including studies into the survival rates of incidentally caught and released turtles)?** [INF, PRI]

YES  NO  UNSURE

**3.1.6 Has research been conducted on the frequency and pathology of diseases in marine turtles?** [INF, PRI]

YES  NO  UNSURE

**3.1.7 Is the use of traditional ecological knowledge in research studies being promoted?** [BPR, PRI]

YES  NO  UNSURE

**3.2.1 List any regional or sub-regional action plans in which your country is already participating, which may serve the purpose of identifying priority research and monitoring needs.** [INF]

IOSEA, BOBLME

**3.2.2 On which of the following themes have collaborative studies and monitoring been conducted? Use the text boxes to describe the nature of this international collaboration or to clarify your response. Answer 'NO' if the studies/monitoring undertaken do not involve international collaboration.** [INF, PRI]

a) Genetic Identity  YES  NO  NOT APPLICABLE

b) Conservation status  YES  NO  NOT APPLICABLE

c) Migrations  YES  NO  NOT APPLICABLE

**d) Other biological and ecological aspects**

YES  NO  NOT APPLICABLE

Other

**3.3.1 List, in order of priority, the marine turtle populations in your country in need of conservation actions, and indicate their population trends. [PRI]**

1. Green turtle

From: Zahir H. (2006). Sea turtles in the Maldives: Status, threats and management. Workshop on Assessing the relative importance of sea turtle mortality due to fisheries Zanzibar, 25-28 April 2006. (PowerPoint presentation).

2. Hawksbill turtle

From: Zahir H. (2006). Sea turtles in the Maldives: Status, threats and management. Workshop on Assessing the relative importance of sea turtle mortality due to fisheries Zanzibar, 25-28 April 2006. (PowerPoint presentation).

**3.3.2 Are research and monitoring activities, such as those described above in Section 3.1 periodically reviewed and evaluated for their efficacy? [SAP]**

YES  NO  UNSURE

**3.3.3 Describe how research results are being applied to improve management practices and mitigation of threats (in relation to the priority populations identified in 3.3.1, among others). [SAP]**

Results derived from data collected through Island offices and Marine Research Center are used to make recommendations to the Fisheries Minister and the Cabinet regarding the status of the turtle population. Results have also been used to increase awareness among students.

**3.4.1 Has your country undertaken any initiatives (nationally or through collaboration with other Range States) to standardise methods and levels of data collection? [BPR, INF]**

YES  NO  UNSURE

**3.4.2 To what extent does your country exchange scientific and technical information and expertise with other Range States? [SAP, IND]**

OFTEN (SYSTEMATICALLY)  OCCASIONALLY  RARELY  NEVER

**3.4.3 If your country shares scientific and technical information and expertise with other Range States, what mechanisms have commonly been used for this purpose? Comment on any positive benefits/outcomes achieved through these interactions. [INF]**

N/A. Because turtle data and the projects were handled directly from Marine Research Center we do not have clear idea about the exchange of scientific data; no summary report has been compiled.

**3.4.4 Does your country compile and make available to other countries data on marine turtle populations of a regional interest? [INF]**

YES  NO  UNSURE

## THEIR HABITATS, AND ENHANCE PUBLIC PARTICIPATION IN CONSERVATION ACTIVITIES

### 4.1.1 Describe the educational materials, including mass media information programmes that your country has collected, developed and/or disseminated. [INF, PRI]

- Powerpoint presentation for students
- Handbooks
- Annual visit for primary school kids to the Banyan Tree Maldives Turtle Conservation site, to facilitate better understanding of what's being done to protect turtle population

### 4.1.2 Which of the following groups have been the targets of these focused education and awareness programmes described in above in Section 4.1.1? [PRI, INF]

- Policy makers
- Fishing industry
- Local/Fishing communities**
- Indigenous groups
- Tourists**
- Media**
- Teachers
- Students**
- Military, Navy, Police
- Scientists
- Other:
- None of the above

### 4.1.3 Have any community learning / information centres been established in your country? [BPR, SAP]

- YES  **NO**

## 4.2 Alternative livelihood opportunities [IND, BPR] Describe initiatives already undertaken or planned to identify and facilitate alternative livelihoods (including income-generating activities) for local communities.

Turtle meat and eggs were considered as delicacy and consumption is more culturally oriented, rather than for gaining economic benefits. Hence no alternative livelihood opportunities were provided when the turtle ban started in 1995 and there is no plan to provide alternative livelihood options for local communities.

### 4.3.1 Describe initiatives already undertaken or planned by your country to involve local communities, in particular, in the planning and implementation of marine turtle conservation programmes. Please include details of any incentives that have been used to encourage public participation, and indicate their efficacy. [BPR, IND]

N/A

### 4.3.2 Describe initiatives already undertaken or planned to involve and encourage the cooperation of Government institutions, NGOs and the private sector in marine turtle conservation programmes. [IND, BPR]

Several conservation initiatives are being undertaken among government institutions and NGOs. The private sector, particularly resorts promoting eco-tourist islands, has taken initiatives to develop turtle conservation programs. One of the most successful marine turtle conservation programs was initiated by "Banyan Tree Maldives". They started turtle conservation programmes in 2005-2010 and the Ministry has extended their permit for another 5 years. The quote below is from the introduction of their program.

"The Marine Turtle conservation program involves a "head start" project for green turtles, which is based on sound scientific methods, and a community and guest education program. The project aims to rear a small sample of turtle hatchlings for one year until they reach a size at which they are too big to be eaten except by the largest of predators. The project also ensures 90% of hatchlings continue their normal journey when they hatch to minimise deleterious effects

due to intervention to their life cycle. The education component involves Maldivian school children and guests from Banyan Tree and Angsana resort. Through a series of lectures and visits, school children are provided with valuable information of marine turtles and their conservation needs, a message that is spread throughout the nation. Guests are encouraged to learn and have an opportunity to understand the turtles' behaviour while being part of a long term conservation programme."

This program relocates nests in order to provide maximum protection and provide two distinct enclosures in which to develop through their early life stages.

## **OBJECTIVE V. ENHANCE NATIONAL, REGIONAL AND INTERNATIONAL COOPERATION**

**5.1.1 Has your country undertaken a national review of its compliance with Convention on International Trade in Endangered Species (CITES) obligations in relation to marine turtles? [SAP]**

YES  NO  NOT APPLICABLE

**5.1.2 Does your country have, or participate/cooperate in, CITES training programmes for relevant authorities? [SAP]**

YES  NO  NOT APPLICABLE

**5.1.3 Does your country have in place mechanisms to identify international illegal trade routes (for marine turtle products etc.)? Please use the text box to elaborate on how your country is cooperating with other States to prevent/deter/eliminate illegal trade. [SAP]**

YES  NO  NOT APPLICABLE

**5.1.4 Which international compliance and trade issues related to marine turtles has your country raised for discussion (e.g. through the IOSEA MoU Secretariat, at meetings of Signatory States etc.)? [INF]**

N/A

**5.1.5 Describe measures in place to prevent, deter and eliminate domestic illegal trade in marine turtle products, particularly with a view to enforcing the legislation identified in Section 1.5.1. [INF]**

To prevent domestic illegal trade in marine turtle products, it is prohibited by law to display or sell any turtle product from local shops.

It is illegal to consume or sell turtle meat or turtle eggs.

**5.2.1 Has your country already developed a national action plan or a set of key management measures that could eventually serve as a basis for a more specific action plan at a national level? [IND]**

YES  NO

**5.2.2 From your country's perspective, which conservation and management activities, and/or which particular sites or locations, ought to be among the highest priorities for action? [PRI]**

**5.2.3 Please indicate, from your country's standpoint, the extent to which the following local management issues require international cooperation in order to to achieve progress. [PRI]**

<b>Illegal fishing in territorial waters</b>	<input checked="" type="checkbox"/> <b>ESSENTIAL</b> <input type="checkbox"/> IMPORTANT <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL
<b>Incidental capture by foreign fleets</b>	<input type="checkbox"/> ESSENTIAL <input type="checkbox"/> IMPORTANT <input type="checkbox"/> LIMITED <input checked="" type="checkbox"/> <b>NOT AT ALL</b>
<b>Enforcement/patrolling of territorial waters</b>	<input checked="" type="checkbox"/> <b>ESSENTIAL</b> <input type="checkbox"/> IMPORTANT <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL
<b>Hunting/harvest by neighboring countries</b>	<input type="checkbox"/> ESSENTIAL <input type="checkbox"/> IMPORTANT <input type="checkbox"/> LIMITED <input checked="" type="checkbox"/> <b>NOT AT ALL</b>
<b>Poaching, illegal trade in turtle projects</b>	<input type="checkbox"/> ESSENTIAL <input type="checkbox"/> IMPORTANT <input type="checkbox"/> LIMITED <input checked="" type="checkbox"/> <b>NOT AT ALL</b>
<b>Development of gear technology</b>	<input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL
<b>Oil spills, pollution, marine debris</b>	<input type="checkbox"/> ESSENTIAL <input type="checkbox"/> IMPORTANT <input checked="" type="checkbox"/> <b>LIMITED</b> <input type="checkbox"/> NOT AT ALL
<b>Training / capacity-building</b>	<input checked="" type="checkbox"/> <b>ESSENTIAL</b> <input type="checkbox"/> IMPORTANT <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL
<b>Alternative livelihood development</b>	<input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL
<b>Identification of turtle populations</b>	<input checked="" type="checkbox"/> <b>ESSENTIAL</b> <input type="checkbox"/> IMPORTANT <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL
<b>Identification of migration routes</b>	<input checked="" type="checkbox"/> <b>ESSENTIAL</b> <input type="checkbox"/> IMPORTANT <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL
<b>Tagging / satellite tracking</b>	<input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL
<b>Habitat studies</b>	<input checked="" type="checkbox"/> <b>ESSENTIAL</b> <input type="checkbox"/> IMPORTANT <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL
<b>Genetics studies</b>	<input type="checkbox"/> ESSENTIAL <input type="checkbox"/> IMPORTANT <input checked="" type="checkbox"/> <b>LIMITED</b> <input type="checkbox"/> NOT AT ALL

**5.3.1 Identify existing frameworks/organisations that are, or could be, useful mechanisms for cooperating in marine turtle conservation at the sub-regional level. Please comment on the strengths of these instruments, their capacity to take on a broader coordinating role, and any efforts your country has made to enhance their role in turtle conservation. [INF, BPR]**

**5.3.2 Has your country developed, or is it participating in, any networks for cooperative management of shared turtle populations? [BPR, INF]**

YES  **NO**  NOT APPLICABLE

**5.3.3 What steps has your country taken to encourage Regional Fishery Bodies (RFBs) to adopt marine turtle conservation measures within Exclusive Economic Zones (EEZs) and on the high seas? [SAP]**

Maldives has voiced our concern about the increasing purse seine fishing with the floating FADs at the technical committee meeting of IOTC.

We have encouraged and include as many measures as possible in the fisheries regulations to minimize effects on the turtle population.

We have also raised our concern and encouraged small nations like us to do pole-and-line fishing which is better sustainable fishery.

**5.4.1 Describe your country's needs, in terms of human resources, knowledge and facilities, in order to build capacity to strengthen marine turtle conservation measures. [PRI]**

In terms of human resources and capacity, we have only limited resources. We would need more international funding and technical assistance to develop and implement a marine turtle management plan. Also, we would need financial assistance to run a community awareness programme through local NGOs.

**5.4.2 Describe any training provided in marine turtle conservation and management techniques (e.g. workshops held, training manuals produced etc.), and indicate your plans for the coming year. [PRI, INF]**

The plans for year 2011 include developing a Marine Turtle Management Plan and to initiate its implementation, to conduct awareness programs through TV, radio, and to conduct awareness sessions at the province level.

**5.4.3 Specifically in relation to capacity-building, describe any partnerships developed or planned with universities, research institutions, training bodies and other relevant organisations. [BPR]**

We would be glad to participate and cooperate, if there is any opportunity for capacity building, but we do not have any partnership developed at the moment.

**5.5.1 National policies and laws concerning the conservation of marine turtles and their habitats will have been described in Section 1.5.1. Please indicate their effectiveness, in terms of their practical application and enforcement. [SAP, TSH]**

The policies and laws are not very effective because the law enforcement agencies are not as effective as they should be. However, the turtle product trade is completely stopped from tourist shops and locally.

**5.5.2 Has your country conducted a review of policies and laws to address any gaps, inconsistencies or impediments in relation to marine turtle conservation? If not, indicate any obstacles encountered in this regard and when this review is expected to be done. [SAP]**

YES  NO  UNSURE

**5.5.3 From the standpoint of law enforcement, has your country experienced any difficulties achieving cooperation to ensure compatible application of laws across and between jurisdictions? [TSH]**

YES  NO  UNSURE

**OBJECTIVE VI. PROMOTE IMPLEMENTATION OF THE MoU INCLUDING THE CONSERVATION AND MANAGEMENT PLAN**

**6.1.1 What has your country already done, or will it do, to encourage other States to sign the IOSEA MoU? [INF]**

**6.1.2 Is your country currently favourable, in principle, to amending the MoU to make it a legally binding instrument? [INF]**

YES  NO  NO VIEW

**6.1.3 Would your country be favourable, over a longer time horizon, to amending the MoU to make it a legally-binding instrument? [INF]**

YES  NO  NO VIEW

**6.2 Secretariat and Advisory Committee**

**6.2.1 What efforts has your country made, or can it make, to secure funding to support the core operations of the IOSEA MoU (Secretariat and Advisory Committee, and related activities)? [IND]**

**6.3.1 What funding has your country mobilised for domestic implementation of marine turtle conservation activities related to the IOSEA Marine Turtle MoU? Where possible, indicate the specific monetary values attached to these activities/programmes, as well as future plans. [IND]**

**6.3.2 Has your country tried to solicit funds from, or seek partnerships with, other Governments, major donor organisations, industry, private sector, foundations or NGOs for marine turtle conservation activities? [IND]**

YES  NO

**6.3.3 Describe any initiatives made to explore the use of economic instruments for the conservation of marine turtles and their habitats. [BPR]**

N/A

**6.4.1 Has your country designated a lead agency responsible for coordinating national marine turtle conservation and management policy? If not, when is this information expected to be communicated to the IOSEA MoU Secretariat? [IND]**

YES  NO

**6.4.2 Are the roles and responsibilities of all government agencies related to the conservation and management of marine turtles and their habitats clearly defined? [IND]**

YES  NO  UNSURE

The two leading government agencies responsible for conservation and management of marine turtles and their habitats are the Fisheries Management Agency and the Environment Protection Agency (EPA).

**6.4.3 Has your country ever conducted a review of agency roles and responsibilities? If so, when, and what was the general outcome? If not, is such a review planned and when? [SAP],**

YES  NO  UNSURE

**Comments/suggestions to improve the present reporting format:**

**Additional information not covered above:**



## Indian Ocean – South-East Asian Marine Turtle Memorandum of Understanding

### Myanmar

#### GENERAL INFORMATION

##### Agency or institution primarily responsible for the preparation of this report:

Department of Fisheries, Ministry of Livestock and Fisheries, Government of the Union of Myanmar

##### Other agencies, institutions, or NGOs that have provided input:

Forest Department, Ministry of Forestry  
FREDA (Forest Resource Environment Development and Conservation Association)

##### Designated Focal Point:

Mr. (U) Maung Maung Lwin,  
Senior Fisheries Officer,  
Environment and Endangered Aquatic Species Conservation and Management Unit,  
Department of Fisheries,  
Sinmin Road, Ahlone Township,  
Yangon, Myanmar.  
E mail: fisheries@myanmar.com.mm; akthar10160@gmail.com;  
Fax: + 95-1-228258

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**Effective Date:** 1 September 2001

**This report was last updated:** 7 September 2011

#### OBJECTIVE I. REDUCE DIRECT AND INDIRECT CAUSES OF MARINE TURTLE MORTALITY

##### 1.1 Introduction to marine turtle populations and habitats, challenges and conservation efforts. [INF]

The Union of Myanmar is situated between longitude 90deg-108deg East and latitude 10deg- 28deg North. It has coastline of 2832 km, which is divided into three regions: the Rakhine region to the north, facing Myanmar's most prolific shrimp grounds in the Bay of Bengal and bordering with Bangladesh; the Gulf of Mottama region (or "Ayeyarwady"), in the centre; and the Tanintharyi region to the south, facing the 800-island Myeik archipelago of the Andaman Sea and bordering with Thailand.

The continental shelf spreads over some 228,751 km<sup>2</sup>, and the exclusive economic zone (EEZ) has a surface area of almost half a million square kilometres (486000 km<sup>2</sup>). The territorial sea of Myanmar extends 12 nautical miles from the base line towards the sea and EEZ covers all areas of territorial sea and extend 200 nautical miles from the base line to seawards.

Turtle nesting occurs around the Andaman Sea, Gulf of Mottama (Gulf of Mattaban), Thameehla Island, and Bay of Bengal. In 1963, the Department of Fisheries (DoF) began a project to propagate and conserve sea turtles on Thameehla Island (Diamond Island) in Ngaputaw Township, Ayeyarwady Division. Then in 1986-87, the project was fully revived and a hatchery was established with skillful technicians (Aung and Maung, 1999; Lwin and Myo, 2003).

Conservation and research activity increased when Myanmar became a member of Southeast Asian Fisheries Development Center (SEAFDEC) in 1999. As a member, Myanmar was able to participate in training and workshops related to conservation and enhancement of turtle conducted by SEAFDEC. At present, Myanmar is cooperating and collaborating with many institutions namely ASEAN-SEAFDEC, and Memorandum of Understanding on Conservation and Management of Marine Turtles and their Habitats in Indian Ocean and Southeast Asia (IOSEA-MoU).

Three species of sea turtles are commonly seen in Myanmar and nest regularly: olive ridley (Leik Hlaung), green turtle (Pyin Tha Leik), and hawksbill (Leik Kyet Tu Yway). Two other species (the loggerhead (Leik Khway) and leatherback

(Leik Zaung Lyar) turtles) are reported seldom by fishermen from some parts of the Taninthayi and are totally absent in the Mon, Rakhine and Ayeyarwady Delta Coastal areas.

Olive ridley turtles are found in the Mon and Ayeyarwady divisions, Lampi Island in Taninthayi Division and Thameehla Island. Hawksbill turtles are found in the Taninthayi and Rakhine Coastal areas, and green turtles in the Mon, Taninthayi, Rakhine, Ayeyarwady and Coco Island. Other Islands in Bogalay Township in Ayeyarwaddy Division are important for marine turtles.

Summary of nesting sites and feeding habitats for sea turtles in Myanmar:

Taninthayi Division 97deg to 98deg 45 ' E 10deg 30 ' to 15deg N  
Mon State 97deg to 97deg 45 ' E 15deg to 16deg 30 ' N  
Rakhine State 92deg 15 ' to 94deg 45 ' E 17deg 15 ' to 21deg N  
Ayeyarwaddy Division 94deg to 96deg E 15deg 30 ' to 16deg N  
Yangon Division ( Coco Island ) 93deg 30' to 94deg 06 ' E 14deg to 15deg N

The reasons for the decreasing sea turtle population in Myanmar can be summarised as follows:

- (a) Human habitation on beaches used by turtles;
- (b) Poaching of turtles eggs without reserve for the sustainability of turtles;
- (c) Incidental catch in the sea by fishing gears;
- (d) Direct catch on some islands for traditional beliefs;
- (e) Destruction of routes to hatching areas and nesting places;
- (f) Destruction of nesting beaches by urban construction works and negative impacts introduced by human beings;
- (g) Insufficient legislative measures and weak law enforcement.

Based on:

Anon (2003). Sea Turtles Threats, Conservation and Management in Myanmar. ASEAN / SEAFDEC Regional Technical Consultation on Management and Conservation of Sea Turtle in Southeast Asia, Kuala Lumpur, Malaysia, 16-18 September 2003.

Pe, M. (2003). National Report Of Myanmar on the Sustainable Management of The Bay of Bengal Large Marine Ecosystem (BOBLME). GCP/RAS/179/WBG.

Thorbjarnarson, J. B., Platt, S.G. and Khaing, S.T. (2000). "Sea Turtles in Myanmar: Past and Present." Marine Turtle Newsletter 88: 10-11.

### **1.2.1 Describe any protocol or approaches practiced in your country, which you consider exemplary, for minimising threats to marine turtle populations and their habitats, which may be suitable for adaptation and adoption elsewhere. [BPR]**

Because the preservation of sea turtles and their prosperity in Myanmar waters depends on the interest and the participation of the people, education programmes have been initiated targeting the fishery communities and the local people along the coastline.

To enhance effective conservation activities, the Ministry of Livestock and Fisheries prohibits the catching, killing and any other forms of harmful behavior towards sea turtles, not only on noted turtle islands but also along the Myanmar coastline. In addition to this, a notification has been issued on (20-2-1986) prohibiting the digging, transporting, carrying, storing and marketing of turtles, eggs and their habitats.

Large-scale turtle mortality occurs as the result of incidental catch in fishing gear. Disease, migration fatigue, and marine pollution are other causes of deaths. To counteract these factors, quantitative information or observed captures of sea turtles and the rate of mortality in these individual offshore fishing operations is absolutely essential.

In the interim, strict enforcement of the Myanmar Marine Fisheries Law (1990), which prohibits any kind of mechanized fishing within five miles of the shore along the coast, is needed. A blanket ban on near shore-mechanized fishing should significantly reduce turtle mortality.

A second step towards minimizing mortality would be the mandatory use of Turtle Excluder Devices (TEDs) in trawl nets. However, the use of TEDs alone will not mitigate all turtle mortality resulting from fisheries. Additional factors, which must be considered, are that in areas of high fishing intensity, turtles that are captured and released several times may die. Turtles are also caught and drowned in gill nets. Therefore strict enforcement of the existing law, prohibiting near shore-mechanized fishing seems to be the best short-term solution to reduce turtle mortality.

Fishermen have been instructed to release sea turtles unharmed, if turtles are caught accidentally in their fishing gear. The Department of Fisheries has also prohibited the use of fishing gear having harmful effects on sea turtles and the digging of sand on turtle banks. It is important that fishery workers develop and learn to use a type of fishing gear that

will be effective in catching fish but harmless for turtles.

In addition, DOF directs two types of turtle egg protection and hatching: (1) Hatching in their original natural nests. (2) Hatching man-made nest by transferring the eggs after they lay (Transplanting) at several locations.

Based on:

Anon (2003). Sea Turtles Threats, Conservation and Management in Myanmar. ASEAN / SEAFDEC Regional Technical Consultation on Management and Conservation of Sea Turtle in Southeast Asia, Kuala Lumpur, Malaysia, 16-18 September 2003.

**1.3.1 Describe any socio-economic studies or activities that have been conducted among communities that interact with marine turtles and their habitats. [BPR, INF]**

In some nesting beaches, Department of Fisheries allows the fishermen who participate in Marine Turtle Conservation to fish nearby nesting beaches.

**1.3.2 Which of these adverse economic incentives are underlying threats to marine turtles in your country? [TSH]**

- High prices earned from turtle products relative to other commodities
- Lack of affordable alternatives to turtle products
- Ease of access to the turtle resource (eg. by virtue of proximity or ease of land/water access)
- Low cost of land near nesting beaches
- Low penalties against illegal harvesting
- Other1:
- Other2:
- Other3:
- None of the above or Not Applicable

Myanmar has very strict law enforcement for turtle conservation.

**1.3.3 Has your country has taken any measures to try to correct these adverse economic incentives? [BPR]**

- YES  NO  NOT APPLICABLE (no adverse economic incentives exist)

No action has been taken in this context (not applicable).

**1.4.1 Indicate, and describe in more detail, the main fisheries occurring in the waters of your country, as well as any high seas fisheries in which flag vessels of your country participate, that could possibly interact with marine turtles. [INF]**

**a) Shrimp trawls:**  YES  NO

Otter bottom trawl nets are the main fishing gear used to catch demersal finfish and penaeid prawns (FAO 2006). The following is the number of trawl fishing vessels registered for operating in Myanmar waters.

991 trawl fishing vessels were registered (2007-2008 fiscal year).

205 foreign trawl fishing vessels were operating (1 April to 22 July 2008).

786 local trawl fishing vessels were operating (1 September 2007 to 22 July 2008).

**b) Set gill nets:**  YES  NO

**c) Anchored Fish Aggregating Devices (FADs):**  YES  NO

FADs are not used in Myanmar.

**d) Purse seine (with or without FADs):**  YES  NO

The following information is the number of purse seine fishing vessels registered for operating in Myanmar waters.

163 purse seine fishing vessels were registered (2007-2008 fiscal year).

12 foreign purse seine fishing vessels were operating (1 April to 22 July 2008).

151 local purse seine fishing vessels were operating (1 September 2007 to 22 July 2008).

**e) Longline (shallow or deepset):**  YES  NO

One local longline fishing vessels was operating from 1 September 2007 to 22 July 2008 in Myanmar waters.

**f) Driftnet:**  YES  NO

159 local driftnet fishing vessels were operating from 1 September 2007 to 22 July 2008 in Myanmar waters.

**g) Other1:**

155 local traps were operating from 1 September 2007 to 22 July 2008 in Myanmar waters.

**h) Other2:**

From 1 September 2007 to 22 July 2008, 571 sets of local stow nets were used in Myanmar waters.

None of the above

#### 1.4.2 Please indicate the relative level of **fishing effort** and **perceived impact** of each of the above fisheries on marine turtles (e.g. in terms of by-catch). [TSH]

**a) Shrimp trawls**

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source: DoF, Myanmar (based on information from local people)

**b) Set gill nets**

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source: DoF, Myanmar (based on information from local people)

**c) Anchored Fish Aggregating Devices (FADs)**

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source: Gear type is not used in Myanmar.

**d) Purse seine (with or without FADs)**

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source: DoF, Myanmar (based on information from local people)

**e) Longline (shallow or deepset)**

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source: DoF, Myanmar (based on information from local people)

**f) Driftnet**

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source: DoF, Myanmar (based on information from local people)

**g) Other1 (from 1.4.1): Trap**

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source: DoF, Myanmar (based on information from some fishermen)

**h) Other2 (from 1.4.1): Stow net**

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source: DoF, Myanmar (based on information from some fishermen)

**1.4.3 Describe any illegal fishing that is known to occur in or around the waters of your country that may impact marine turtles. Describe the measures being taken to deal with this problem and any difficulties encountered in this regard. [TSH]**

Sometimes illegal trawl fishing occurs in Myanmar waters; however, information is lacking about its impact on marine turtles. Most fishermen do not follow the laws, regulations, and notifications in remote areas; such activity is very difficult to control.

**1.4.4 Which of the following methods are used by your country to minimise incidental capture/mortality of marine turtles in fishing activities? [IND]**

a) **Appropriate handling** of incidentally caught turtles (e.g. resuscitation or release by fishers using equipment such as de-hooking, line cutting tools and scoop nets)

**YES**  NO  NOT APPLICABLE

DoF has issued directives (awareness tools) requiring release of marine turtles caught incidentally in fishing vessels. DoF conducts education and awareness activities for fishermen on "appropriate handling of marine turtles caught incidentally in fishing vessels", particularly on foraging grounds.

b) **Devices that allow the escape of marine turtles** (e.g. turtle excluder devices (TEDs) or other measures that are comparable in effectiveness)

YES  **NO**  NOT APPLICABLE

Application is only in research stage. Some training has been given to township fishery officers and fishermen. Current regulations require the release of turtles caught accidentally and require use of Turtle Excluder Device (TEDs) in all fishing areas (FAO 2006).

c) **Measures to avoid encirclement** of marine turtles in purse seine fisheries

**YES**  NO  NOT APPLICABLE

DoF has issued directives requiring release marine turtles caught incidentally in fishing nets. Monitoring compliance is difficult.

d) **Appropriate combinations** of hook design, type of bait, depth, gear specifications and fishing practices

YES  **NO**  NOT APPLICABLE

e) **Monitoring and recovery of fish aggregating devices** (FADs)

YES  NO  **NOT APPLICABLE**

Not applicable (FADs are not being used in Myanmar.)

f) **Net retention and recycling schemes**

**YES**  NO  NOT APPLICABLE

Used fishing net businesses are common in Myanmar (used nets are employed for fencing and decoration).

g) **Spatial and temporal control of fishing** (e.g. seasonal closures of fishing activities)

**YES**  NO  NOT APPLICABLE

1. Fishing season, fishing areas, and fishing gear are controlled by DoF notification and law. Fishing vessels operate in national water only and the DoF has already promulgated protection laws in their respect. A fishing license is required and it stipulates how, when and where a fishing activity can be carried out.

2. Closed area (to conserve juvenile aquatic animals to avoid conflict between artisanal fishermen and trawlers). Trawlers are not allowed to fish in these closed areas:

Rakhine State: 5 miles from the shoreline  
Ayeyarwaddy Division: 10 miles from the shoreline  
Tanintharyi coast: 10 miles from the shoreline

3. Shark fishing in Myanmar has already been banned.

4. Mesh size of trawl nets for shrimp and fish must be larger than 2 inches and 2.5 inches respectively. For small and large driftnets, the mesh size must be larger than 3.5 inches and 8 inches, respectively.

5. Fishing by using explosives, chemicals, drugs, electricity, and pumps has already been banned.

Based on:

Pe, M. (2003). National Report Of Myanmar on the Sustainable Management of The Bay of Bengal Large Marine Ecosystem (BOBLME). GCP/RAS/179/WBG.

#### h) **Effort management control**

**YES**  NO  NOT APPLICABLE

Fishing season, areas, and gear are controlled by DoF notification.

Other (list and explain):

None of the above

### **1.4.5 Which of the following programmes has your country developed - in consultation with the fishing industry and fisheries management organisations - to promote implementation of measures to minimise incidental capture and mortality of turtles in national waters and in the high seas? [IND]**

#### **Onboard observer programmes**

**YES**  NO  NOT APPLICABLE

Onboard observers are deployed only occasionally, because of insufficient staff and lack of inspection boats.

Ad hoc inspections and security undertakings at sea are made in collaboration with the Myanmar navy.

#### **Vessel monitoring systems**

YES  **NO**  NOT APPLICABLE

Not yet, however some information is collected from fishermen and local people interested in sea turtle conservation.

#### **Inspections** (i.e. at sea, in port, at landing sites)

**YES**  NO  NOT APPLICABLE

Inspections are conducted by inspection teams in ports and at landing sites since 1995. Port check point inspection teams are formed from relevant agencies (e.g., DoF, Customs, Police). These also ensure the use of port facilities for the disposal of ship-borne waste.

#### **Training programmes / workshops** to educate fishers

**YES**  NO  NOT APPLICABLE

Training and workshops are being conducted regularly by DoF to educate fishermen and coastal communities.

[Informative videos, brochures, printed guidelines](#) etc.

**YES**  NO  NOT APPLICABLE

Pamphlet, VCD, Identification chart, Wall poster were produced and distributed (in Myanmar language).

**Other (list and explain):** TV Programs, talks on conservation and management

**YES**  NO  NOT APPLICABLE

**None of the above**

**1.4.6 Are the mitigation measures described in 1.4.4 and 1.4.5, periodically reviewed and evaluated for their efficacy?** [\[SAP\]](#)

**YES**  NO  UNSURE

The mitigation measures are not very effective due to the poor socio-economic status of the fishery community.

**1.4.7 In your country, what types of data collection, research and development have been undertaken to support the reduction of marine turtle incidental catch (while taking into consideration the impact of various mitigation measures on other species)?** [\[SAP\]](#)

Data are collected from DoF offices in Township/ District / State and Division in coastal areas. DoF and SEAFDEC/Training Division are cooperating and collaborating to conduct training courses on TEDs for fishermen and researchers in Myanmar waters.

**1.4.8 Has your country exchanged information and provided technical assistance (formally or informally) to other Signatory States to promote the activities described in 1.4.4, 1.4.5 and 1.4.7 above?** [\[SAP\]](#)

**YES**  NO  UNSURE

Our country has exchanged information with SEAFDEC but has not provided technical assistance, as yet, to other Signatory States to promote these activities.

**1.4.9 What legislative and practical measures has your country taken in support of UN General Assembly Resolution 46/215 concerning the moratorium on the use of large-scale driftnets?** [\[SAP\]](#)

Large-scale driftnets are not used in Myanmar national waters.

**1.5.1 Does your country have legislation to prohibit direct harvest and domestic trade in marine turtles, their eggs, parts and products; and to protect important turtle habitats?** [\[IND\]](#)

**YES**  NO  UNSURE

Myanmar has already enacted legislation to prohibit direct harvest and domestic trade in marine turtles, their eggs, parts and products.

Sea turtle conservation programme started in Myanmar in 1905 under the Burma Fisheries Act (III - 1905). Protection for turtle hatching areas and turtles was included; also, trespassing on those areas without official consent was prohibited.

Since then, the government has enacted several laws to protect marine turtles. More recently, in 1990, Myanmar promulgated the Marine Fisheries Law (DoF), under which no person shall search for and collect any marine products without a license (Section 40). In Chapter 1, Section (2), Subsection (r) it is mentioned that "Marine Products mean fishes obtained from the sea, aquatic organisms, excrete, scales, bones, skins, plants, etc." The expression also includes marine turtles and eggs, Crocodiles and eggs, Crab, Ambergris, Oyster, Shell, Clam shell, Mussel, Coral, Sea sponges,

Seaweed, Moss, and Algae. In 1993, the Department of Fisheries declared Notification No. 2/93 for "Sea Turtle Conservation".

The new protection of Wildlife, Wild Plants and Conservation of Natural Areas Law (replacing the old Myanmar Wildlife Protection Act of 1936) was enacted in 1994 (Forest Department).

See: Pe, M. (2003). National Report Of Myanmar on the Sustainable Management of The Bay of Bengal Large Marine Ecosystem (BOBLME). GCP/RAS/179/WBG

**1.5.2 Which, among the following list, are economic uses and cultural values of marine turtles in your country? Please rate the relative prevalence / importance of each consumptive or non-consumptive use. [INF]**

USES / VALUES	RELATIVE PREVALENCE / IMPORTANCE
<b>Meat consumption</b>	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	<input type="checkbox"/> HIGH <input type="checkbox"/> MODERATE <input type="checkbox"/> LOW <input checked="" type="checkbox"/> UNKNOWN
<b>Egg consumption</b>	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	<input type="checkbox"/> HIGH <input type="checkbox"/> MODERATE <input checked="" type="checkbox"/> LOW <input type="checkbox"/> UNKNOWN
<b>Shell products</b>	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	<input type="checkbox"/> HIGH <input type="checkbox"/> MODERATE <input checked="" type="checkbox"/> LOW <input type="checkbox"/> UNKNOWN
<b>Fat consumption</b>	
<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> HIGH <input type="checkbox"/> MODERATE <input type="checkbox"/> LOW <input type="checkbox"/> UNKNOWN
<b>Traditional medicine</b>	
<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> HIGH <input type="checkbox"/> MODERATE <input type="checkbox"/> LOW <input type="checkbox"/> UNKNOWN
<b>Eco-tourism programmes</b>	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	<input type="checkbox"/> HIGH <input checked="" type="checkbox"/> MODERATE <input type="checkbox"/> LOW <input type="checkbox"/> UNKNOWN
<b>Cultural / traditional significance</b>	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	<input type="checkbox"/> HIGH <input type="checkbox"/> MODERATE <input checked="" type="checkbox"/> LOW <input type="checkbox"/> UNKNOWN
<b>Other</b>	

**1.5.3 Please indicate the relative level and impact of traditional harvest on marine turtles and their eggs. [IND, TSH]**

**Level of harvest:**

RELATIVELY HIGH    MODERATE    RELATIVELY LOW    NONE    UNKNOWN

**Impact of harvest:**

RELATIVELY HIGH     MODERATE     RELATIVELY LOW     NONE     **UNKNOWN**

Source of information:

At present, the population of marine turtles is decreasing year after year. The causes of population decrease are: taking the meat and eggs as delicacy, incidental catch by fishing gear, and poaching by subsistence fishermen at the time of laying eggs.

Kadon Galay Island and Kaing Thaug Island in Ayeyarwady are the most popular nesting beaches. Human settlement began around 1972 and both islands are at present fully occupied. About 80 turtle nests are found annually on Gayet Gyi Island, but only 47 nests were reported in Gayet Gyi Island in 2003.

200-250 families inhabit the smaller island located east of Kadon Galay Island for over 50 years. According to the local villagers, the number of sea turtle beaches is rapidly declining. Though over a hundred nests could be harvested per night during the nesting season in Kadon Galay in 1985, only 46 nests could be harvested in 2003.

Similarly, only 1-2 turtles nested in a year on Kaing Thaug Island, and no nesting occurred at Htaung Gyi Tan beach. Nowadays, the largest concentration of nesting occurs only on Thameehla Island beach where the island is strictly protected under the management of DoF.

In some remote areas in Mon State and Taninthayi Division, a lower number of eggs was collected; some were consumed by the collectors' families and the surpluses were sold in the villages.

In some islands in Taninthayi Division, the indigenous villagers traditionally believe in offering live turtles to the spirits and they eat them later during the festivals. (Mi Mi Maw, 2004).

**1.5.4 Have any domestic management programmes been established to limit the levels of intentional harvest? [SAP]**

**YES**    NO    UNKNOWN

Fishermen and local communities are being educated on the significance of marine turtles in the marine ecosystem.

**1.5.5 Describe any management agreements negotiated between your country and other States in relation to sustainable levels of traditional harvest, to ensure that such harvest does not undermine conservation efforts. [BPR]**

Not yet.

**1.6.1 First, select one of the options at left to indicate whether or not your country has any of the following measures in place to minimise the mortality of eggs, hatchlings and nesting females. If yes, then estimate the relative effectiveness of these measures. [IND, SAP]**

**MEASURES**

**RELATIVE EFFECTIVENESS**

**Monitoring/protection programmes**

**YES**    NO    N/A

EXCELLENT    GOOD    **LOW**    UNKNOWN

Enforcement of laws and regulations is needed to reduce losses of eggs and hatchlings by feral animals, such as beach sand crabs, ground rats, sea finder and domestic animals such as dogs.

**Education/awareness programmes**

**YES**    NO    N/A

EXCELLENT    **GOOD**    LOW    UNKNOWN

**Egg relocation/hatcheries**

**YES**    NO    N/A

EXCELLENT    **GOOD**    LOW    UNKNOWN

Although Myanmar has many islands and sandy sea turtle banks, the Department of Fisheries is conducting sea turtle hatching and a hatchling release program only in Ayeyarwady delta areas at present, due to lack of staff and budget.

DoF is conducting turtle hatching based on conditions of rookeries in nesting areas:

- (a) Hatching in their original natural nests (In-situ)
- (b) Hatching in man-made nests after transferring the eggs from natural nests (transplanting)

Systematic sea turtle hatching practice is being implemented at some islands in Ayeyarwaddy Division. Hatching in their original natural nests consists of marking the exact spot where female turtles laid their eggs and letting the eggs hatch in natural conditions. Hatching this way has the risk of having too much rain and the rising tide which can lead to rotting of eggs, and leaving the eggs to the mercy of scavengers.

Transferring the eggs to man-made hatcheries consists of collecting the newly laid eggs by digging them up from their natural holes and transferring them to a safe place from natural weather conditions. Incubation period in a hatchery hole takes round about 50 days.

Thameehla Island (Diamond Island) of Ngaputaw Township, Ayeyarwady Division is used year-round for nesting by sea turtles. The hatching area of Thameehla Island is one mile in length and half a mile in breadth. DoF, Ministry of Livestock and Fisheries, has undertaken sea turtle nursery and research program on that island since June 1986, hosting the nesting green turtle and olive ridley turtle. Data on hatchling releases are available.

Beginning in 1989 under the supervision of Department of Fisheries, volunteers carried out turtle hatching activities; these activities were continued by the Department of Fisheries technicians as of 2005.

Two small islands, Gayet Gyi and Kadongalay Islands, situated at the mouths of Ayeyarwaddy and Bogalay Rivers, respectively, host the nesting by olive ridley turtles from September to March every year. The nesting area of Gayet Gyi Island is 3 miles in length and half a mile in breadth and Kadon Galay Island is 5 miles in length and three-quarters mile in breadth.

DoF is also undertaking a hatchling release program and research activities on Gayet Gyi Island and Kadon Galay Island in 1997-1998. Data on hatchlings released from that island are available.

In late 2001, DoF established nine new nesting area projects for sea turtles: at Nga Mann Thaug beach, Ma Sein Yon beach, Nget U Thaug beach, Ashaet Phya beach, Min Ga Lar Thaug Tan beach and Htaung Gyi Tan beach in Bogalay Township and Maydar Ai beach, Wargone beach and Khone Gyi beach in Ngaputaw Township and Amattgyi beach in Lutputta Township. Data on hatchlings released from that island are also available. From September 1986 to January 2006, 494,788 Green turtle and 482,437 Olive ridley turtle hatchlings were released.

#### **Predator control**

**YES**  NO  N/A  EXCELLENT  **GOOD**  LOW  UNKNOWN

Sand crabs, crows, other carnivorous birds and wild birds are a constant threat as they are found to eat the turtle eggs and hatchlings. The sand crabs eat turtle eggs lying superficially and the wild dogs eat most of the eggs. Hatchlings are eaten by the birds as they travel towards the sea after hatching. The predators are scared away to protect the eggs and baby turtles.

#### **Vehicle / access restrictions**

YES  NO  **N/A**  EXCELLENT  GOOD  LOW  UNKNOWN

#### **Removal of debris / clean-up**

**YES**  NO  N/A  EXCELLENT  GOOD  **LOW**  UNKNOWN

Efforts to remove debris that impedes turtle nesting and hatchling production has been made only in the Conservation Area in Ayeyarwady Division.

#### **Re-vegetation of frontal dunes**

YES  NO  **N/A**  EXCELLENT  GOOD  LOW  UNKNOWN

Technology is needed, as well as funding to re-vegetate frontal dunes at nesting beaches.

#### Building location/design regulations

YES  NO  N/A  EXCELLENT  GOOD  LOW  UNKNOWN

All nesting areas are protected by DOF. Extension of urban development on the nesting areas is not permitted.

#### Light pollution reduction

YES  NO  N/A  EXCELLENT  GOOD  LOW  UNKNOWN

#### Other (list and rate them)

YES  NO  N/A

#### 1.6.2 Has your country undertaken any evaluation of its nest and beach management programmes? [SAP]

YES  NO  NOT APPLICABLE

In conservation areas only. The programmes were started in 1986 and continue at several sites.

### OBJECTIVE II. PROTECT, CONSERVE AND REHABILITATE MARINE TURTLE HABITATS

#### 2.1.1 What is being done to protect critical habitats *outside* of established protected areas? (NB: It is assumed that legislation relating to established protected areas will have been described in Section 1.5.1) [BPR, SAP]

There are no incentive programmes yet, but awareness/education programmes, and laws and regulations are in place.

#### 2.1.2 Are assessments routinely made of the environmental impact of marine and coastal development on marine turtles and their habitats? [IND, SAP]

YES  NO  NOT APPLICABLE

Assessments have yet to be made owing to lack of funding and lack of capability.

Beaches and islands are the focal points for recreation and tourism and a major source of income for many countries and Myanmar is not an exception. Tourism is one of the fastest growing industries in Myanmar, especially since 1996 when the Myanmar Government launched 'Visit Myanmar Year' in 1996.

At present, the tourism industry in Myanmar is still in an infant stage compared to her neighboring countries. Environmental impacts arising from tourism in the coastal are not significant. However, due to rapid development of tourism in recent years, appropriate countermeasures are needed to consider avoiding tourism impact on marine ecosystems and living resources.

#### 2.1.3 Is marine water quality (including marine debris) monitored near turtle habitats? If yes, describe the nature of this monitoring and any remedial measures that may have been taken. [SAP]

YES  NO  NOT APPLICABLE

In Myanmar, environmental degradation is still minimal and DoF staff has monitored water quality near turtle habitats only in Ayeyarwady Division.

There are eight major ports in Myanmar coastal areas, namely Sittwe, Than Dwe, Kyauk Phyu, Yangon, Mawlamyaing, Dawei, Myeik and Kawthoung. Ports and shipping operations are inherently hazardous to the marine environment. Fortunately, there has been no significant pollution incident recorded at these ports.

Major marine sources of pollution include ship-borne pollution and land based pollution. Land-based pollutants originate from municipal, agricultural and industrial activities. Hence, major land-based sources of pollution are domestic sewage, solid wastes, agricultural wastes, and industrial effluents and wastes.

Under normal operations, most cargo and oil/gas ports are not major sources of pollution. Fishing ports exist in every coastal area and they are usually near to major urban areas, thus making it difficult to separate the contribution from the two sources.

There are probably over 23,000 fishing boats of various sizes registered and being operated in Myanmar coastal waters. All of the discharged oil is believed to be discharged into the sea. In addition, leaks and spills of fuel (diesel) oil during filling and transfer occur but amount cannot be estimated. Marine accidents, although still low in frequency, could release significant amounts of oil into the sea. However, no data are currently being collected to accurately assess the impact of oil pollution on the marine and coastal environment and its living resources.

#### **2.1.4 Are measures in place to prohibit the use of poisonous chemicals and explosives? [SAP]**

YES  NO  NOT APPLICABLE

Poisonous fishing and dynamite fishing are already banned in Myanmar Marine Fishing Law (1990).

#### **2.2.1 Are efforts being made to recover degraded coral reefs? If yes, give details (location, duration, effectiveness, lessons learned, future plans etc). [IND, SAP]**

YES  NO  NOT APPLICABLE (no degraded coral reefs)

Not yet: technology is needed, as well as funding.

See:

Pe, M. (2003). National Report Of Myanmar on the Sustainable Management of The Bay of Bengal Large Marine Ecosystem (BOBLME). GCP/RAS/179/WBG

Soe Tun, San Tha Htun, Mu Mu Aye, Ni Ni Win, Lei Lei Win & Masao Ohno (2001). Notes on seagrass along Myanmar Coastal Region.

#### **2.2.2 Are efforts being made to recover degraded mangrove habitats that are important for turtles? If yes, give details (location, duration, effectiveness, lessons learned, future plans etc.) [IND, SAP]**

YES  NO  NOT APPLICABLE (no mangrove habitats important for turtles)

Forest Department and some NGOs are rehabilitating degraded mangroves in Rakhine State, Ayeyarwaddy Division, and Mon State, Tanintharyi Division. In the aftermath of Cyclone Nargis most of the mangrove forests were damaged or destroyed.

See:

Pe, M. (2003). National Report Of Myanmar on the Sustainable Management of The Bay of Bengal Large Marine Ecosystem (BOBLME). GCP/RAS/179/WBG

#### **2.2.3 Are efforts being made to recover degraded sea grass habitats? If yes, give details (location, duration, effectiveness, lessons learned, future plans etc.). [IND, SAP]**

YES  NO  NOT APPLICABLE (no degraded sea grass habitats)

See:

Pe, M. (2003). National Report Of Myanmar on the Sustainable Management of The Bay of Bengal Large Marine Ecosystem (BOBLME). GCP/RAS/179/WBG

Soe Tun, San Tha Htun, Mu Mu Aye, Ni Ni Win, Lei Lei Win & Masao Ohno (2001). Notes on seagrass along Myanmar Coastal Region.

## POPULATIONS THROUGH RESEARCH, MONITORING AND INFORMATION EXCHANGE

### 3.1.1 Give a list of available literature that includes baseline information from studies carried out in your country on marine turtle populations and their habitats. [INF]

Aung, C. H. (2003). Emergence success of national nests for olive ridley on sandy beach, Kadongalay Island in Myanmar. Proceedings on the 4th SEASTAR2000 Workshop (2003): 51-54.

Ewing-Chow, M. (2007). First Do No Harm: Myanmar Trade Sanctions and Human Rights. Northwestern University School of Law Northwestern Journal of International Human Rights 5(2): 153-180.

Lwin, M. M. and Khin Myo Myo (2003). Country paper of Sea Turtles Threats, Conservation and Management in Myanmar. ASEAN - SEAFDEC Regional Technical Consultation on Management and Conservation of Sea Turtles in Southeast Asia, Kuala Lumpur, Malaysia, 16-18 September 2003.

Lwin, M. M. (2004). Sea turtle (*Chelonia mydas*) Nesting and Conservation activity in Thameehla Island, Myanmar International Symposium on SEASTAR-2000 and Bio-Logging Science, 11-15 December 2004, Bangkok, Thailand.

Lwin, M. M. (2005). Inconel and PIT Microchips Tagging on Green Turtle in Thameehla Island, Myanmar International Symposium on SEASTAR-2000 and Bio-Logging Science, 13-14 December 2005, Bangkok, Thailand.

Lwin, M. M. and Thein Than, (2007). Current Status of Sea Turtle Conservation and Management in Myanmar. FAO-SEAFDEC Workshop on Assessing the Relation of Sea Turtle Mortality due to Fisheries in Southeast Asia, 19-23 March 2007, Bangkok, Thailand.

Lwin, M. M. (2007). Tagging activities of olive ridley turtle at Gadongalay and Gayetgyi Islands, Bogalay Township in Ayeyarwady division, Myanmar. Proceedings of the 4th International Symposium on SEASTAR2000 and Asian Bio-logging Science (The 8th SEASTAR2000 workshop) (2007): 3-6.

Lwin, M. M., (2008). Captured green turtles released from Thameehla Island, 13 Nov 2008, IOSEA e-News for December 2008.

Lwin, M. M. (2008). Overview of Interacting of Fisheries with Marine Turtles and Conservation. On-site Training for Introduction of C-hook for Bottom Longline in Myanmar, In Collaboration with SEAFDEC and DOF, Myanmar, 14-16 November 2008, Yangon, Myanmar.

Lwin, M. M. (2009). Tagging Study on Green Turtle (*Chelonia mydas*) at Thameehla Island, Myanmar. Proceedings of the 5th International Symposium on SEASTAR2000 and Asian Bio-logging Science (The 9th SEASTAR2000 workshop) (2009): 15-19.

Lwin, M. M. (2009). Green turtle (*Chelonia mydas*) nesting and conservation activity in Thameehla Island, Myanmar. Indian Ocean Turtle Newsletter 10: 14-18.

Maxwell, F.D (1911). Report on the turtle banks of the Irrawaddy Division.

Mi Mi Maw (2004). Preliminary Survey on Sea Turtles and Tortoises in Southern Myanmar.

Ohn Maung and Cho Hla Aung (1999). Country paper of Sea Turtle Conservation in Myanmar, the SEAFDEC - ASEAN Regional Workshop on Sea Turtle Conservation and Management.

Sann Aung and Christof Hahn (2001). Final Report of Marine Turtle Conservation Pilot Project in Northern Rakhine State.

Thorbjarnarson, J. B., Platt, S.G. and Khaing, S.T. (2000). Sea Turtles in Myanmar: Past and Present. Marine Turtle Newsletter 88: 10-11.

Win Maung (1999). Preliminary study on the species composition and population dynamics of marine turtle in some parts of Taninthayi and Ayeyarwady Division with respect to Wildlife Conservation.

### 3.1.2 Have long-term monitoring programmes (i.e. of at least 10 years duration) been initiated or planned for priority marine turtle populations frequenting the territory of your country? [IND, BPR]

YES  NO  UNSURE

In order to conserve sea turtles and to rehabilitate their habitats, the Department of Fisheries has already produced following guidelines in its Thirty-Year Fishery Development Program (initiated in 2002):

(a) The potential sea turtle nesting beaches are to be identified.

- (b) According to the existing fisheries law, appropriate action will be taken against anyone involved in the collection of turtle eggs and/or killing the turtle for any purpose.
- (c) Turtle nesting beaches and islands are to be conserved and protected.
- (d) Protected areas will be established in certain areas to eliminate loss of sea turtle habitats.
- (e) Sea turtle hatcheries will be constructed in appropriate areas and juvenile turtles will be released into the sea for resource enhancement.
- (f) Cooperating and collaborating with international and regional organizations to implement management activities will be encouraged.

### 3.1.3 Has the genetic identity of marine turtle populations in your country been characterised? [INF, PRI]

YES  NO  UNSURE

Study of Marine Turtles population genetics and tagging are being done in co-operation with SEAFDEC-MFRDMD (on-going stage).

- In Coco Island and Thameehla Island, 30 tissue samples of green turtles each were obtained and dispatched to SEAFDEC/ MFRDMD for DNA analysis. In collaboration with DoF and SEAFDEC/MFRDMD the 'On-Site Training for Tissue Sampling and Tagging of Sea Turtle Course' was conducted from (29.10.2005) to (3.11.2005) at Ayeyawady Division, Ngaputaw Township, and Thameehla Island. Nine trainees from DoF and 2 Experts from MFRDMD were involved. In this training course 9 participants from the Department of Fisheries took part.

- Hawksbill Turtles Tissue Samples Collecting Activity is ongoing stage in Myanmar.

### 3.1.4 Which of the following methods have been or are being used to try to identify migration routes of turtles? Use the text boxes to provide additional details. [INF, PRI]

**Tagging**  YES  NO

In spite of having many islands and turtle beaches, tagging activities are being carried out at only four turtle beaches at present. They are: Thameehla Island and Khone Gyi beach in Ngaputaw Township, and Gayet Gyi Island and Kadongalay Island in Bogalay Township.

Myanmar participated in the Second Meeting on Regional Tagging Programme and Population Statistics on Sea Turtle held in Kuala Terengganu in Malaysia from 20 to 22 November 2000. In that workshop a resolution was passed to provide Myanmar and Cambodia with applicators and Inconel Tags (Numbers MM-0001 to MM-3000) by Marine Fisheries Resources Development and Management Department (MFRDMD) under SEAFDEC.

In order to successfully carry out the activity of tagging and tracking of sea turtles, applicators and Inconel Tags were received by DoF Myanmar in November 2001. Accordingly, the applicators and Inconel Tags were sent to Bogalay and Ngaputaw Townships Sea Turtle Conservation Centers in Ayeyarwady Division where nesting turtles were tagged starting 23 December 2001.

At present, Myanmar tagging activities are still at an early stage. Under this program, 339 green turtles, 273 olive ridley turtles, 12 hawksbill turtles, and 18 loggerhead turtles (some of these are suspected to be olive ridley turtles) have been tagged. Serial numbers of tags used on the green, olive ridley and hawksbill turtles and data on tag recoveries in Gayet Gyi Island and Kadon Galay Island of Bogalay Township, Amatt Gyi Beach and War Taw Gone Beach of Lutputta Township, Thameehla Island of Ngaputaw Township, Ayeyarwady Division were recorded.

The DoF has also received PIT Microchips and scanners from SEAFDEC through MFRDMD in April 2003. PIT tagging activities were started in March 2004 on 25 green turtles at Thameehla Island (Diamond Island). Data on recovered PIT-tagged sea turtles in Thameehla Island of Ngaputaw Township, Ayeyarwady Division was also recorded.

In summary, 25 PITs, and 3,000 Inconel Tags were provided by SEAFDEC-MFRDMD. Studies are on-going, and DoF Myanmar has distributed a Notification about "Tag Wanted" to local people and fishermen through State/ Division/ District/Township DoF Officers.

See: references listed in section 3.1.1

**Satellite tracking**  YES  NO

In line with the Japanese Trust Fund IV, a PTT was installed on an Olive Ridley Turtle in Kadon Galay Island on 1st January 2007. At the same time the research officer from MFRDMD conducted training on Turtle Conservation and Installation of PTTs (from 24-12-2006 to 28-12-2006). But the transmitter stopped giving signal on 14 January 2007. The

last position was 15 degree 24minute 47 second N; 94 degree 36 minute 00 second E, according to SEAFDEC-MFRDMD researcher.

See: references listed in section 3.1.1

Other

None of the above

**3.1.5 Have studies been carried out on marine turtle population dynamics and survival rates (e.g. including studies into the survival rates of incidentally caught and released turtles)? [INF, PRI]**

YES  NO  UNSURE

DoF has distributed questionnaires about the interaction between marine turtles and fishing activities to State/Division/District/Township fishery officers for collecting data and information from fishermen and coastal communities.

**3.1.6 Has research been conducted on the frequency and pathology of diseases in marine turtles? [INF, PRI]**

YES  NO  UNSURE

Not yet.

**3.1.7 Is the use of traditional ecological knowledge in research studies being promoted? [BPR, PRI]**

YES  NO  UNSURE

Lack of technician in this area.

**3.2.1 List any regional or sub-regional action plans in which your country is already participating, which may serve the purpose of identifying priority research and monitoring needs. [INF]**

Myanmar has participated in ASEAN regional action plans:

- Study on Migratory Route(Inconel Tag/PITs/ PTTs)
- Population Genetic (Tissue sampling)
- Monitory on sea grass & corals
- Socio-economic

Myanmar has been cooperating with SEASTAR2000.

**3.2.2 On which of the following themes have collaborative studies and monitoring been conducted? Use the text boxes to describe the nature of this international collaboration or to clarify your response. Answer 'NO' if the studies/monitoring undertaken do not involve international collaboration. [INF, PRI]**

**a) Genetic Identity**  YES  NO  NOT APPLICABLE

Study of marine turtle population genetic and tagging has been done in collaboration with SEAFDEC-MFRDMD since 2005. The first study was conducted on Coco Island and Tharmeehla Island by sending 30 tissue samples each to SEAFDEC-MFRDMD for DNA analysis. Later on the on-site training for tissue sampling and tagging of sea turtle course was conducted from 29 October 2005 to 3 November 2005 at Ayeyawady Division, Ngaputaw Township, and Thameehla Island. Nine trainees from DoF and two experts from MFRDMD were involved. DoF staff continues to survey the nesting ground and foraging ground of Hawksbill turtles for tissue sampling for population genetics study.

See: references listed in section 3.1.1

**b) Conservation status**     YES     **NO**     NOT APPLICABLE

On-going activities include: hatchling releasing, training, workshop, information gathering, awareness programme, and surveying programme.

**c) Migrations**                     **YES**     NO     NOT APPLICABLE

In collaboration with SEAFDEC-MFRDMD, Myanmar was provided applicators and Inconel Tags (Numbers MM-0001 to MM-3000). In November 2001, the applicators and Inconel Tags were sent to Bogalay and Ngaputaw Townships Sea Turtle Conservation Centers in Ayeyarwady Division where nesting turtles were tagged starting 23 December 2001.

At present, Myanmar tagging activities are still at an early stage. Under this program, 339 green turtles, 273 olive ridley turtles, 12 hawksbill turtles, and 18 loggerhead turtles (these may be olive ridley-suspected) have been tagged so far.

The DoF has also received PIT Microchips and scanners from SEAFDEC through MFRDMD in April 2003. PIT tagging activities were started in March 2004 on 25 green turtles at Thameehla Island (Diamond Island). Data on recovered PIT-tagged sea turtles in Thameehla Island of Ngaputaw Township, Ayeyarwady Division was also recorded.

On 3 January 2007, in line with the Japanese Trust Fund IV, PTTs were already installed on Olive Ridley turtles in Kadon galay Island by DoF staff. However, the transmitter stopped giving signal on 14 January 2007. The last position was 15 degree 24minute 47 second N; 94 degree 36 minute 00 second E, according to SEAFDEC-MFRDMD researcher.

**d) Other biological and ecological aspects**     YES     NO     NOT APPLICABLE

None

**Other**

**3.3.1 List, in order of priority, the marine turtle populations in your country in need of conservation actions, and indicate their population trends. [PRI]**

Data on nesting, hatching, tagging are being analyzed by DoF staff. Populations of marine turtles have been decreasing year after year over the last two decades.

**3.3.2 Are research and monitoring activities, such as those described above in Section 3.1 periodically reviewed and evaluated for their efficacy? [SAP]**

**YES**     NO     UNSURE

Staff from turtle stations have to report monthly about the turtle nesting, hatching, incubation etc.

**3.3.3 Describe how research results are being applied to improve management practices and mitigation of threats (in relation to the priority populations identified in 3.3.1, among others). [SAP]**

Research on hatching and tagging, and TED results, are being applied to improve management practices and mitigation of threats.

**3.4.1 Has your country undertaken any initiatives (nationally or through collaboration with other Range States) to standardise methods and levels of data collection? [BPR, INF]**

**YES**     NO     UNSURE

DoF (Headquarters) has distributed the format for data collection to the staff from Conservation areas.

Additionally, SEAFDEC-MFRDMD has distributed a standardised methodology and levels of data collection (database) to

ASEAN countries .

**3.4.2 To what extent does your country exchange scientific and technical information and expertise with other Range States? [SAP, IND]**

OFTEN (SYSTEMATICALLY)                       **OCCASIONALLY**                       RARELY                       NEVER

**3.4.3 If your country shares scientific and technical information and expertise with other Range States, what mechanisms have commonly been used for this purpose? Comment on any positive benefits/outcomes achieved through these interactions. [INF]**

Myanmar researchers are giving paper presentations in workshops on Marine Turtle conservation.

**3.4.4 Does your country compile and make available to other countries data on marine turtle populations of a regional interest? [INF]**

**YES**    NO    UNSURE

Compilation of data is not yet up to a satisfactory state.

Country report was presented on the Regional Meeting on the Progress of Research on Stock Enhancement of Sea Turtle, 28 to 29 November, 2006 , Kuala Terengganu, Malaysia (ASEAN-SEAFDEC).

**OBJECTIVE IV. INCREASE PUBLIC AWARENESS OF THE THREATS TO MARINE TURTLES AND THEIR HABITATS, AND ENHANCE PUBLIC PARTICIPATION IN CONSERVATION ACTIVITIES**

**4.1.1 Describe the educational materials, including mass media information programmes that your country has collected, developed and/or disseminated. [INF, PRI]**

The public needs to be educated and informed about the need for conservation and protection of sea turtles. For this purpose the Ministry of Livestock and Fisheries distributes pamphlets, inserting educational programmes in newspapers, magazines, Journals and television. Other awareness tools include: Videos, CD, identification charts and Posters.

Since sea turtles tagged in Myanmar can reach remote lying islands and beaches, which are out of the range of DoF, the Department of Fisheries has endeavored to gather information, and distribute pamphlets and a "Tag wanted notification 1/2004" to fisherman living in the coastal regions to immediately inform the nearest DoF office with complete record of the turtles with tags. The DoF has also requested the media and TV to assist in these ventures.

**4.1.2 Which of the following groups have been the targets of these focused education and awareness programmes described in above in Section 4.1.1? [PRI, INF]**

- Policy makers
- Fishing industry**
- Local/Fishing communities**
- Indigenous groups**
- Tourists
- Media**
- Teachers**
- Students**
- Military, Navy, Police**
- Scientists
- Other:DoF Staff**
- None of the above

In Myanmar, a turtle conservation and management course was conducted for the first time from 21-31 December 2001 at Gayet Gyi Conservation Station with the participation of 17 trainees. In that course basic principles and practical application of tags were demonstrated.

Also sea turtle conservation and management was introduced in the Inspector Course No. 6/2003 conducted by DoF,

Myanmar at the Institute of Fishing Technology (IFT) in Yangon.

In Ayeyarwady Division, District and Township Officers and Staffs of DoF held a workshop on sea turtles to draw public awareness on 7 October 2004.

Similarly during the fish replenishing ceremony on 7 October 2004 DoF also held talks about Sea Turtle Conservation for the Armed Forces, members of Union Solidarity and Development Association, and students in Patheingyi township, Ayeyarwady Division.

On 30 December 2004, DoF held talks about Sea Turtle Conservation and Management for 37 teachers and students from Patheingyi University in Ayeyarwady Divisional Fishery Office.

On 8 December 2004, DoF gave a lecture relevant to Sea Turtle Conservation and Management to 17 of Second Year Zoology Students and Teachers from Yangon University.

A Sea Turtle Conservation and Research Course was conducted from 21 February 2005 to 2 March 2005 at Gayet Gyi Conservation Station, Ayeyarwady with the participation of 27 trainees from DoF, Forest Department and University.

Environment and Endangered Aquatic Animal Conservation and Management Training Course was conducted from 15 to 28 February 2008 Kadongalay Conservation Station, Ayeyarwady with the participation of 24 trainees from DoF, Forest Department and University.

For the commemoration of Year of The Turtle 2006 in Myanmar, the IOSEA (MoU) Secretariat provided funding which the Department of Fisheries utilized for implementing the following activities:

- a. National Workshop on Marine Turtle Conservation and Management, In Commemoration of the Year of the Turtle was held on 6, November, 2006 and attended by 103 participants.
- b. Training on Marine Turtle Conservation and Management: Two training sessions were conducted at Sittwe, Rakhine State and Myeik, Tanintharyi Division on 18 to 25 January 2007 and 20 to 26 February 2007, respectively.
- c. Marine Turtle Conservation Signboards were distributed to State and Division of Coastal Areas.
- d. Wall poster about Marine Turtle Conservation and Protection were distributed to State and Division.
- e. Pamphlet for Marine Turtle Conservation and Protection.
- f. Distributed Marine Turtle Conservation and Protection VCD.
- g. Radio talks about Marine Turtle Conservation and Protection.
- h. Survey activities were carried out on islands where it was learnt that turtles once nested. The places surveyed were:
  - Coco Island, Yangon Division.
  - Thinn pan kyun (Oyster Island), Rakhing State.
  - Lampi Island, Tanintharyi Division.
  - Done Kyun Island, Tanintharyi Division.
  - Makyunnkalet Island, Tanintharyi Division.
  - Kadan Island, Tanintaryi

#### **4.1.3 Have any community learning / information centres been established in your country? [BPR, SAP]**

**YES**  **NO**

An information centre was established at Kadonkani, Bogalaay Township, Ayeyarwaddy Division in 2005. The importance of sea turtles and conservation techniques are being communicated to coastal communities. However, Cyclone Nargis totally destroyed the Information Centre at Kadonkani, Bogalaay Township, Ayeyarwaddy Division.

#### **4.2 Alternative livelihood opportunities [IND, BPR] Describe initiatives already undertaken or planned to identify and facilitate alternative livelihoods (including income-generating activities) for local communities.**

None.

#### **4.3.1 Describe initiatives already undertaken or planned by your country to involve local communities, in**

particular, in the planning and implementation of marine turtle conservation programmes. Please include details of any incentives that have been used to encourage public participation, and indicate their efficacy. [BPR, IND]

Some local people/fishermen/communities are voluntarily participating in implementation of Marine Turtle Conservation on some islands and beaches.

**4.3.2 Describe initiatives already undertaken or planned to involve and encourage the cooperation of Government institutions, NGOs and the private sector in marine turtle conservation programmes. [IND, BPR]**

Universities

## **OBJECTIVE V. ENHANCE NATIONAL, REGIONAL AND INTERNATIONAL COOPERATION**

**5.1.1 Has your country undertaken a national review of its compliance with Convention on International Trade in Endangered Species (CITES) obligations in relation to marine turtles? [SAP]**

YES  NO  NOT APPLICABLE

In Myanmar, authorities are inspecting for trade in flora and fauna. Trade is not allowed, if those species are listed as CITES endangered species.

**5.1.2 Does your country have, or participate/cooperate in, CITES training programmes for relevant authorities? [SAP]**

YES  NO  NOT APPLICABLE

DoF Myanmar participated in CITES CoP13 Meeting in Bangkok in 2005. The status of other international conventions, agreements and conduct related to marine environment is summarized in :

Pe, M. (2003). National Report Of Myanmar on the Sustainable Management of The Bay of Bengal Large Marine Ecosystem (BOBLME). GCP/RAS/179/WBG

**5.1.3 Does your country have in place mechanisms to identify international illegal trade routes (for marine turtle products etc.)? Please use the text box to elaborate on how your country is cooperating with other States to prevent/deter/eliminate illegal trade. [SAP]**

YES  NO  NOT APPLICABLE

Not yet, but customs officers and DoF officers from some border areas and every airport in Myanmar are responsible for protection against illegal trade.

**5.1.4 Which international compliance and trade issues related to marine turtles has your country raised for discussion (e.g. through the IOSEA MoU Secretariat, at meetings of Signatory States etc.)? [INF]**

None.

**5.1.5 Describe measures in place to prevent, deter and eliminate domestic illegal trade in marine turtle products, particularly with a view to enforcing the legislation identified in Section 1.5.1. [INF]**

Measures are in place to prevent, deter and eliminate domestic illegal trade in marine turtle products by law, regulation and notification, but these are difficult to control in remote areas at sea.

**5.2.1 Has your country already developed a national action plan or a set of key management measures that could eventually serve as a basis for a more specific action plan at a national level? [IND]**

YES  NO

-In 2002, DoF, Ministry of Livestocks and Fisheries, adopted a 30-year plan for Sea Turtle Conservation and Management Programme.

-The future plan for conservation and protection includes the following elements:

- (a) To Find Funding for Marine Turtle Conservation
- (b) To Evaluate the Status of Marine Turtle
- (c) Regional and International Cooperation and Collaboration
- (d) Community Participation in Conservation Activities
- (e) Capacity Building
- (f) Integrated Management of Sustainable Marine Turtle
- (g) Research and Monitoring

**5.2.2 From your country's perspective, which conservation and management activities, and/or which particular sites or locations, ought to be among the highest priorities for action? [PRI]**

- Regional and International Cooperation
- Educational and awareness program
- Capacity Building
- Research and monitoring
- Community Participation
- Eliminate domestic illegal trade
- Eliminate illegal poaching of turtle product by law and regulation enforcement
- Information collection and dissemination
- Socio-economic study on local fishermen
- Set up incentive program

**5.2.3 Please indicate, from your country's standpoint, the extent to which the following local management issues require international cooperation in order to to achieve progress. [PRI]**

<b>Illegal fishing in territorial waters</b>	<input checked="" type="checkbox"/> <b>ESSENTIAL</b> <input type="checkbox"/> IMPORTANT <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL
<b>Incidental capture by foreign fleets</b>	<input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL
<b>Enforcement/patrolling of territorial waters</b>	<input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL
<b>Hunting/harvest by neighboring countries</b>	<input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL
<b>Poaching, illegal trade in turtle projects</b>	<input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL
<b>Development of gear technology</b>	<input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL
<b>Oil spills, pollution, marine debris</b>	<input type="checkbox"/> ESSENTIAL <input type="checkbox"/> IMPORTANT <input checked="" type="checkbox"/> <b>LIMITED</b> <input type="checkbox"/> NOT AT ALL
<b>Training / capacity-building</b>	<input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL
<b>Alternative livelihood development</b>	<input checked="" type="checkbox"/> <b>ESSENTIAL</b> <input type="checkbox"/> IMPORTANT <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL
<b>Identification of turtle populations</b>	<input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL
<b>Identification of migration routes</b>	<input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL
<b>Tagging / satellite tracking</b>	<input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL
<b>Habitat studies</b>	<input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL
<b>Genetics studies</b>	<input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL

Training / capacity building is the most important to achieve progress and to prevent illegal trade, to encourage hatchery best-practices, research activity, and compliance of fishermen with the existing laws and regulations.

**5.3.1 Identify existing frameworks/organisations that are, or could be, useful mechanisms for cooperating in marine turtle conservation at the sub-regional level. Please comment on the strengths of these instruments, their capacity to take on a broader coordinating role, and any efforts your country has made to enhance their role in turtle conservation. [INF, BPR]**

The 2003 ASEAN - SEAFDEC Regional Technical Consultation on Sea Turtle Conservation and Management held by SEAFDEC in Malaysia is subject to regular review.

By systematically promoting the use of appropriate fishing gear in Southeast Asia, the ASEAN member countries may take the leading role in conservation for the long-term benefit to the sea turtle. Thus, it may be of great benefit if the experts in ASEAN countries conduct training courses in ASEAN member countries so that the trainees can impart multiplier courses for the fishery workers, ensuring the participation. This would be an important step towards providing effective protection for sea turtles.

**5.3.2 Has your country developed, or is it participating in, any networks for cooperative management of shared turtle populations? [BPR, INF]**

YES  NO  NOT APPLICABLE

**5.3.3 What steps has your country taken to encourage Regional Fishery Bodies (RFBs) to adopt marine turtle conservation measures within Exclusive Economic Zones (EEZs) and on the high seas? [SAP]**

None, but DoF has announced to fishing vessels and fishermen to report back to the DoF if they catch marine turtles incidentally.

**5.4.1 Describe your country's needs, in terms of human resources, knowledge and facilities, in order to build capacity to strengthen marine turtle conservation measures. [PRI]**

The following capacity/resource needs have to be addressed in Myanmar:

Inadequacy of skilled workers and staff (insufficient technical experience and expertise)

Difficulty to control and educate egg poachers in remote areas.

Communication and transportation problem in reaching rookeries in remote areas.

Requirement for modern equipment and materials, particularly: radio, telephone, boats, engines, generators, freshwater tube wells.

Need for research methodology and literature.

Weakness in feedback system and information.

**5.4.2 Describe any training provided in marine turtle conservation and management techniques (e.g. workshops held, training manuals produced etc.), and indicate your plans for the coming year. [PRI, INF]**

In Myanmar, a turtle conservation and management course was conducted for the first time from 21-31 December 2001 at Gayet Gyi Conservation Station with the participation of 17 trainees. In that course basic principles and practical application of tags were demonstrated.

Also sea turtle conservation and management was introduced in the Inspector Course No. 6/2003 conducted by DoF, Myanmar at the Institute of Fishing Technology (IFT) in Yangon.

In Ayeyarwady Division, District and Township Officers and Staffs of DoF held a workshop on sea turtles to improve public awareness on 7 October 2004.

Similarly, during the fish replenishing ceremony on 7 October 2004, DoF also held talks about Sea Turtle Conservation for the Armed Forces, members of Union Solidarity and Development Association, and students in Patheingyi township, Ayeyarwady Division.

On 30 December 2004, DoF held talks about Sea Turtle Conservation and Management for 37 teachers and students

from Patheingyi University in Ayeyarwady Divisional Fishery Office.

On 8 December 2004, DoF gave a lecture relevant to Sea Turtle Conservation and Management to 17 second Year Zoology Students and Teachers from Yangon University.

A Sea Turtle Conservation and Research Course was conducted from 21 February 2005 to 2 March 2005 at Gayet Gyi Conservation Station, Ayeyarwady with the participation of 27 trainees from DoF, Forest Department and University.

On 25.5.2005, DoF gave talks about Marine Turtle Conservation and Management to 50 local people and DoF staff at Than Dwe District Fisheries office in Rakhine State.

On 25.5.2005, DoF gave talks about Marine Turtle Conservation and Management to 35 Trawl fishermen at Thabyu Chaing fish landing site, Than Dwe Township in Rakhine State.

On 26.5.2005, DoF gave talks about Marine Turtle Conservation and the importance of Marine Turtles to 10 local people and fishermen at Zeephyugon village, Gwa Township in Rakhine State.

On 30.5.2005, DoF gave talks about Marine Turtle Conservation and the importance of Marine Turtles to 50 local people, fishermen and local authorities at, Yahine Kudo village, Gwa Township in Rakhine State.

On 31.5.2005, DoF gave talks about Marine Turtle Conservation and the importance of Marine Turtles to 80 local people, fishermen and local authorities at Magyi Ngu village, Gwa Township in Rakhine State.

On 3.6.2005, DoF gave talks about Marine Turtle Conservation and the importance of Marine Turtles to 30 local people, police force, fishermen and local authorities at Kin Pon village, Gwa Township in Rakhine State.

On 15.9.2005, DoF gave talks about Marine Turtle Conservation and the importance of Marine Turtles to 131 local people, fishermen and local authorities at Kun Pauk village, Lutputta Township in Ayeyarwaddy Division.

On 14.10.2005, DoF gave talks about Marine Turtle Conservation and the importance of Marine Turtles to 38 local people, fishermen and local authorities at Mingalar Thaug Tan village, Lutputta Township in Ayeyarwaddy Division.

On 30.10.2005, DoF gave talks about Marine Turtle Conservation and the importance of Marine Turtles to 70 local people, fishermen and local authorities at Thaug Lay village, Lutputta Township in Ayeyarwaddy Division.

On 19.11.2005, staff from DoF headquarters gave educational talks about marine turtle conservation and management to 25 DoF staff from DoF offices Dawei District in Taninthayi Division.

On 20.11.2005, staff from DoF headquarters gave educational talks about marine turtle conservation and importance of Marine Turtles to 115 members of local communities, fishermen and local authorities at Tha Bot Seik Village, Lounglon Township in Taninthayi Division.

In collaboration between DoF and SEAFDEC/MFRDMD, the on-site training course on Tissue Sampling and Tagging of Sea Turtle was conducted from 29.10.2005 to 3.11.2005 at Ayeyarwady Division, Ngaputaw Township, and Thameehla Island. 9 trainees from DoF and 2 experts from MFRDMD were involved.

The workshop on Marine Turtle Conservation and Management was held on 6.11.2006; 103 participants were attended the workshop. (YoT)

The MFRDMD conducted training course on Turtle Conservation and Installation of PTTs at Kadongalay Conservation Station, Bogalay Township, Ayeyarwady Division from 25.12.2006 to 27.12.2006; 17 participants were attended.

DoF was conducting a training course on Marine Turtle Conservation and Management at Sittwe in Rakhine from 18 to 25 January 2007 and Myeik in Thanintharyi Division from 20 to 26 February 2007. (YoT)

Environment and Endangered Aquatic Animal Conservation and Management Training Course was conducted from 15 to 28 February 2008 Kadongalay Conservation Station, Ayeyarwady with the participation of 24 trainees from DoF, Forest Department and Universities.

**5.4.3 Specifically in relation to [capacity-building](#), describe any partnerships developed or planned with universities, research institutions, training bodies and other relevant organisations. [BPR]**

Universities under Ministry of Education; Forest Department; Local Authorities

**5.5.1 National policies and laws concerning the conservation of marine turtles and their habitats will have been described in Section 1.5.1. Please indicate their effectiveness, in terms of their practical application**

**and enforcement. [SAP, TSH]**

Myanmar laws ban trade in sea turtle products, such as turtle meat, eggs and carapaces. However collecting, eating and marketing of eggs still occurs illegally in remote areas.

Some villagers and fishermen report that when they catch turtles in their fishing nets they try to release them back into the sea. However, if the turtle dies, they will eat the meat and sell the carapace to the market.

The most valuable carapace is that of the Hawksbill Turtle, because its shell is used in making ornaments such as combs, hair pins and brooches. It is known that in some border areas, sea turtle products are still being traded illegally.

**5.5.2 Has your country conducted a review of policies and laws to address any gaps, inconsistencies or impediments in relation to marine turtle conservation? If not, indicate any obstacles encountered in this regard and when this review is expected to be done. [SAP]**

YES  NO  UNSURE

**5.5.3 From the standpoint of law enforcement, has your country experienced any difficulties achieving cooperation to ensure compatible application of laws across and between jurisdictions? [TSH]**

YES  NO  UNSURE

More cooperation and collaboration is needed with Government Agencies and other organizations that are involved in wildlife conservation.

**OBJECTIVE VI. PROMOTE IMPLEMENTATION OF THE MoU INCLUDING THE CONSERVATION AND MANAGEMENT PLAN**

**6.1.1 What has your country already done, or will it do, to encourage other States to sign the IOSEA MoU? [INF]**

None

**6.1.2 Is your country currently favourable, in principle, to amending the MoU to make it a legally binding instrument? [INF]**

YES  NO  NO VIEW

**6.1.3 Would your country be favourable, over a longer time horizon, to amending the MoU to make it a legally-binding instrument? [INF]**

YES  NO  NO VIEW

**6.2 Secretariat and Advisory Committee**

**6.2.1 What efforts has your country made, or can it make, to secure funding to support the core operations of the IOSEA MoU (Secretariat and Advisory Committee, and related activities)? [IND]**

Since Myanmar is still in developing country status it is not in position to support in cost contribution to the core operation of the IOSEA MoU. But Myanmar will try to conduct marine turtle conservation activities according to our own capability.

**6.3.1 What funding has your country mobilised for domestic implementation of marine turtle conservation activities related to the IOSEA Marine Turtle MoU? Where possible, indicate the specific monetary values attached to these activities/programmes, as well as future plans. [IND]**

Government budget is the main source of funding for implementation of domestic marine turtle conservation activities related to the IOSEA Marine Turtle MoU.

**6.3.2 Has your country tried to solicit funds from, or seek partnerships with, other Governments, major donor organisations, industry, private sector, foundations or NGOs for marine turtle conservation activities? [IND]**

YES  NO

Only SEAFDEC provides equipment, accessories, and technical support for marine turtle conservation. However, for marine turtle conservation activities, Myanmar has not solicited funds yet.

**6.3.3 Describe any initiatives made to explore the use of economic instruments for the conservation of marine turtles and their habitats. [BPR]**

None

**6.4.1 Has your country designated a lead agency responsible for coordinating national marine turtle conservation and management policy? If not, when is this information expected to be communicated to the IOSEA MoU Secretariat? [IND]**

YES  NO

DoF is the lead agency responsible for coordinating national marine turtle conservation and management policy.

**6.4.2 Are the roles and responsibilities of all government agencies related to the conservation and management of marine turtles and their habitats clearly defined? [IND]**

YES  NO  UNSURE

Forestry Department is also concerned with the conservation and management of marine turtle and habitats since it is the focal point for CITES authority.

**6.4.3 Has your country ever conducted a review of agency roles and responsibilities? If so, when, and what was the general outcome? If not, is such a review planned and when? [SAP],**

YES  NO  UNSURE

Not yet. But very near future, DoF has plan to conduct a review of agency roles and responsibilities.

**Comments/suggestions to improve the present reporting format:**

Regarding to 1.4.2, IOSEA (MoU) Advisory Committee should consider standardizing the methodology used in determining the level/status because the fishing effort and impact on marine turtles are different from country to country.

**Additional information not covered above:**



## Indian Ocean – South-East Asian Marine Turtle Memorandum of Understanding

### Sri Lanka

#### GENERAL INFORMATION

**Agency or institution primarily responsible for the preparation of this report:**

Department of Wildlife Conservation, Sri Lanka (DWC)

**Other agencies, institutions, or NGOs that have provided input:**

IUCN - The World Conservation Union,  
Sri Lanka Country Office (IUCN-SL)  
Turtle Conservation Project of Sri Lanka (TCP)  
National Aquatic Resources Research and Development Agency (NARA)  
Marine Pollution Prevention Authority (MPPA)  
Ministry of Fisheries and Aquatic Resources  
Department of Customs, Ministry of Finance.

**Designated Focal Point:**

Mr. H.D. Rathnayake  
Director General  
Department of Wildlife Conservation  
No. 5811/A Jayanthipura Road, Battaramulla  
WESTERN  
Sri Lanka

E-mail: dayawanratnayake@yahoo.com  
Tel: (+94 11) 2888581 Fax: (+94 11) 2883355

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**This report was last updated:** 7 September 2011

#### **OBJECTIVE I. REDUCE DIRECT AND INDIRECT CAUSES OF MARINE TURTLE MORTALITY**

**1.1 Introduction to marine turtle populations and habitats, challenges and conservation efforts. [INF]**

The island Republic of Sri Lanka is located southeast of India ( 5°55' and 9°51' N latitude, and 79°41' and 81°53' E longitude) and has a coastline of about 1,620 km.

Five species of marine turtles (the Loggerhead (*Caretta caretta*), the Green (*Chelonia mydas*), the Olive ridley (*Lepidochelys olivacea*, the Leatherback (*Dermochelys coriacea*), and the Hawksbill (*Eretmochelys imbricata*) nest along the coastal belt of Sri Lanka.

Turtle nesting beaches are distributed all around the coast, except in Puttalam and Gampaha districts. Turtles still occasionally use beaches near Colombo, in Kalutara and Matara districts.

The primary nesting beaches are distributed on the western, southwestern, and southern coasts of the island where the human population density is very high.

Induruwa: Green Turtle, Olive Ridley Turtle and Leatherback Turtle;  
Kosgoda: Loggerhead Turtle, Hawksbill Turtle, Green Turtle, Olive Ridley Turtle and Leatherback Turtle;  
Akurala: Green Turtle;  
Mavela: Green Turtle and Leatherback Turtle;  
Usangoda: Leatherback Turtle.

Ambalantota: Green Turtle and Leatherback Turtle;  
Bundala: Green Turtle, Olive Ridley Turtle, Leatherback Turtle, Loggerhead Turtle and Hawksbill Turtle;  
Yala: Green Turtle, Leatherback Turtle and Olive Ridley Turtle.

Galle and Hambantota districts host the most used nesting beaches. Kosgoda-Induruwa area in Galle district and Rekawa beach in Hambantota district have been identified as turtle rookeries. Foraging areas probably occur around the island wherever appropriate food can be found. Offshore in Kandakuliya, thousands of Olive Ridley Turtles are found every year but no nesting has been found.

In Sri Lanka, it is illegal to capture, kill, injure or possess sea turtles or their eggs. In addition Sri Lanka has banned the international trade of sea turtle products. However, turtles around Sri Lanka face entanglement in small and large mesh gillnet fisheries and tuna long-line fishery. Other than incidental by-catch in fisheries, major threats to marine turtles in Sri Lanka include unquantified egg collection, destruction of nesting and foraging grounds through coastal development, and inappropriate activities at turtle hatcheries.

See:

Joseph, J. (2003). NATIONAL REPORT OF SRI LANKA on the Formulation of a Transboundary Diagnostic Analysis and Strategic Action Plan for the Bay of Bengal Large Marine Ecosystem Programme.

Kapurusinghe, T. (2006). Status and Conservation of Marine Turtles in Sri Lanka. In: Marine turtles of Indian sub-continent: status, threats and conservation, . eds. K. Shanker & B. C. Choudhury, Universities Press, Hyderabad.

Rajakaruna, R. S., Naveen, D.M., Dissanayake, J., Ekanayake, E.M. Lalith, Ranawana, K. B. (2009). Sea turtle conservation in Sri Lanka: assessment of knowledge, attitude and prevalence of consumptive use of turtle products among coastal communities. Indian Ocean Turtle Newsletter 10(1): 1-13.

And citations in Section 3.1.1

### **1.2.1 Describe any protocol or approaches practiced in your country, which you consider exemplary, for minimising threats to marine turtle populations and their habitats, which may be suitable for adaptation and adoption elsewhere. [BPR]**

National Marine Turtle Conservation Action Plan has been developed by DWC in collaboration with stakeholders.

National practices to minimizing threats of turtles

- The National Marine Turtle Conservation Action Plan will be published in 2005 by theDWLC. The working draft was updated at a one day workshop on March in collaboration with all stakeholders.
- Community participation for the turtle conservation - Community around BNP, Rekawa and Kosgoda beach, Kalametiya Wildlife Sanctuary, and Yala.
- National Park involves in beach patrolling and in-situ turtle conservation activities.
- All stake holders were involved to prepare the Management Plan for the BNP.
- Youth participation in turtle conservation
- Community based Eco-Tourism activities in Rekawa and Kosgoda area.
- Fishing communities in down south area are educated to minimize the capturing and by catching of turtles. The following management activities and mitigation measures are taken.
- Promoting long line fishing instead of drift gill nets in offshore fisheries- NARA
- Banning Tammel netting in coral reef areas –NARA
- Banning use of explosives and chemicals in marine fisheries- NARA
- Banning of dynamite fishing –NARA
- Declaration of Hikkaduwa and Pegin Island Marine National Parks and Bar Reef Sanctuary as Marine Protected Areas under theDWLC
- Declared the shallow sea area (10 m depth) from Little Bass to Buthawa point as a fisheries management area in 2002.
- Controlling fishing gear, monitoring landing sites and awareness campaigns for fisherman and general public

Best practices for hatchery management and eco-tourism have not yet been adopted in Sri Lanka. Guidelines are being developed.

### **1.3.1 Describe any socio-economic studies or activities that have been conducted among communities that interact with marine turtles and their habitats. [BPR, INF]**

Socio-economic activities have been conducted at communities that interact with marine turtles and their habitats, for example:

- Rekawa by TCP
- Bundala National Park by DWC
- Kalutara and Galle districts by NARA
- Entire coastline from Tangalle to Pilinnawa (Yala National Park) by IUCN-SL

- At Bundala National Park and Yala National Park trained nest protectors are employed from the surrounding villages

With a focus on Sri Lanka, Clem, T. and C. Wilson (2003) provide a review of the roles hatcheries in relation to tourism and conservation; they provide ideas for gaining benefits while reducing conflicts. See: Clem, T. and C. Wilson (2003). Open-Cycle Hatcheries, Tourism and Conservation of Sea Turtles: Economic and ecological Analysis. Economics, Ecology and the Environment, The University Of Queensland. Working Paper 78.

### 1.3.2 Which of these adverse economic incentives are underlying threats to marine turtles in your country? [TSH]

- High prices earned from turtle products relative to other commodities
- Lack of affordable alternatives to turtle products
- Ease of access to the turtle resource (eg. by virtue of proximity or ease of land/water access)
- Low cost of land near nesting beaches
- Low penalties against illegal harvesting
- Other1:
- Other2:
- Other3:
- None of the above or Not Applicable

Control of development along the costal line, protecting turtle nesting areas against egg collection and predation. Although they are occurring, to some extent, the following activities need to be improved to reduce local threats to marine turtles:

- a) Community participation in conservation activities.
- b) Eco-tourism development.
- c) Regulatory mechanism for hatchery practices.
- d) Training & incentives for animal husbandry for coastal communities.
- e) Protecting turtle nests in situ or by translocating eggs to ex situ facilities.

Economic incentives are needed as part of the program to reduce threats in Sri Lanka.

### 1.3.3 Has your country has taken any measures to try to correct these adverse economic incentives? [BPR]

YES  NO  NOT APPLICABLE (no adverse economic incentives exist)

a) The communities around the Bundala National Park, Rekawa beach and Kosgoda (a critical turtle nesting habitat in Sri Lanka) and Kalametiya Sanctuary areas are involved actively in beach patrolling and in-situ turtle conservation activities. Trained nest protectors are employed from the surrounding villages.

b) There are economic incentives for youth participating in turtle research (as data collectors) in Ussangoda, Kahanda Modara, Wellaodae, Rekawa & Godawaya - Walawa modara areas.

c) Community-based Eco tourism activities in Rekawa by Turtle Conservation Project ([www.tcpsrilanka.org](http://www.tcpsrilanka.org))

### 1.4.1 Indicate, and describe in more detail, the main fisheries occurring in the waters of your country, as well as any high seas fisheries in which flag vessels of your country participate, that could possibly interact with marine turtles. [INF]

a) *Shrimp trawls*:  YES  NO

Approximately 25% (based on tonnage landed) of the total catch (Blue Ocean Institute, Project Global)

Source: BOBLMEP/National Report Sri Lanka

b) *Set gill nets*:  YES  NO

Approximately 17% (based on tonnage landed) of the total catch (Blue Ocean Institute, Project Global)

Source: BOBLMEP/National Report Sri Lanka

**c) Anchored Fish Aggregating Devices (FADs):**

Information not available

**d) Purse seine (with or without FADs):**  YES  NO

Approximately 12% (based on tonnage landed) of the total catch (Blue Ocean Institute, Project Global)

Source: BOBLMEP/National Report Sri Lanka

**e) Longline (shallow or deepset):**  YES  NO

Information not available

**f) Driftnet:**  YES  NO

Approximately 6% (based on tonnage landed) of the total catch (Blue Ocean Institute, Project Global)

Source: BOBLMEP/National Report Sri Lanka

**g) Other1:**

**h) Other2:**

None of the above

**1.4.2 Please indicate the relative level of fishing effort and perceived impact of each of the above fisheries on marine turtles (e.g. in terms of by-catch). [TSH]**

**a) Shrimp trawls**

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source: See citations above

**b) Set gill nets**

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source: See citations above

**c) Anchored Fish Aggregating Devices (FADs)**

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source: See citations above

**d) Purse seine (with or without FADs)**

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source: See citations above

**e) Longline (shallow or deepset)**

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source: See citations above

**f) Driftnet**

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source: See citations above

**g) Other1 (from 1.4.1):**

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source:

**h) Other2 (from 1.4.1):**

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source:

**1.4.3 Describe any illegal fishing that is known to occur in or around the waters of your country that may impact marine turtles. Describe the measures being taken to deal with this problem and any difficulties encountered in this regard. [TSH]**

None. Sri Lanka's Monitoring, Control and Surveillance (MCS) capabilities are rudimentary and leave its waters exposed to poaching by foreign fishing boats. (BOBLMEP/National Report Sri Lanka)

**1.4.4 Which of the following methods are used by your country to minimise incidental capture/mortality of marine turtles in fishing activities? [IND]**

a) **Appropriate handling** of incidentally caught turtles (e.g. resuscitation or release by fishers using equipment such as de-hooking, line cutting tools and scoop nets)

**YES**  NO  NOT APPLICABLE

Resuscitation or release by fishers using equipment such as de-hooking, line cutting tools and scoop nets.

b) **Devices that allow the escape of marine turtles** (e.g. turtle excluder devices (TEDs) or other measures that are comparable in effectiveness)

YES  **NO**  NOT APPLICABLE

c) **Measures to avoid encirclement** of marine turtles in purse seine fisheries

YES  **NO**  NOT APPLICABLE

d) **Appropriate combinations** of hook design, type of bait, depth, gear specifications and fishing practices

YES  NO  NOT APPLICABLE

e) **Monitoring and recovery of fish aggregating devices** (FADs)

YES  NO  NOT APPLICABLE

f) **Net retention and recycling schemes**

YES  NO  NOT APPLICABLE

g) **Spatial and temporal control of fishing** (e.g. seasonal closures of fishing activities)

**YES**  NO  NOT APPLICABLE

Fishing is controlled at national level and at the regional level with a focus on particular stocks through permits; enforcement is often weak. Commercial fisheries (Multiday, longline) are not spatially or temporally restricted but artisanal fishing (18-23' boats, traditional craft, beach seines) has restrictions (Flewelling and Hosch 2006).

See: Flewelling, Peter and Hosch, Gilles (2006). Country review: Sri Lanka. De Young, C. (ed.) Review of the state of world marine capture fisheries management: Indian Ocean. FAO Fisheries Technical Paper. No. 488. Rome, FAO. 2006. 458p.

h) **Effort management control**

**YES**  NO  NOT APPLICABLE

Fisheries Laws and Regulations facilitate fisheries management through stakeholder involvement. Over-exploitation

leading to declining resources, reduced income for communities and loss of biodiversity remain as significant problems that are being addressed. "In Sri Lanka, output control tools such as total allowable catch (TAC) limits, individual transferable quotas (ITQs) or non-transferable quotas have not yet been introduced " (FAO 2006).

See: FAO (2006). Sri Lanka - National Fishery Sector Overview (from NFSO). FAO Fishery and Aquaculture Country Profiles. (on-line)

Other (list and explain):

None of the above

**1.4.5 Which of the following programmes has your country developed - in consultation with the fishing industry and fisheries management organisations - to promote implementation of measures to minimise incidental capture and mortality of turtles in national waters and in the high seas? [IND]**

**Onboard observer programmes**

YES  NO  NOT APPLICABLE

None

**Vessel monitoring systems**

YES  NO  NOT APPLICABLE

None

**Inspections** (i.e. at sea, in port, at landing sites)

**YES**  NO  NOT APPLICABLE

MPPA Act 59 of 1981, presently being implementing by MPPA (ensure the use of port facilities for the disposal of ship-borne waste).

**Training programmes / workshops** to educate fishers

**YES**  NO  NOT APPLICABLE

Promoting long line fishing instead of drift gill nets in offshore fisheries ??? NARA

**Informative videos, brochures, printed guidelines** etc.

**YES**  NO  NOT APPLICABLE

By Government and NGOs

**Other (list and explain):**

**YES**  NO  NOT APPLICABLE

- Banning Tammel netting in coral reef areas - NARA
- Temporary banning of encircling nets in both coastal and offshore areas: 2003 - NARA
- Banning use of explosives and chemicals in marine fisheries (Fisheries & aquatic resources (amendment ) act, no. 4 of 2004).
- Banning of dynamite fishing Temporary baning of encircling fishing.
- Declaration of Hikkaduwa and Pegion island Marine National Parks & Barreef Sanctuary as Marine Protected Areas, under the DWC.
- Declared the shallow sea area(10 m depth) from Little Bass to Buthawa point as a fisheries management area in

2002.

None of the above

**1.4.6 Are the mitigation measures described in 1.4.4 and 1.4.5, periodically reviewed and evaluated for their efficacy? [SAP]**

YES  NO  UNSURE

**1.4.7 In your country, what types of data collection, research and development have been undertaken to support the reduction of marine turtle incidental catch (while taking into consideration the impact of various mitigation measures on other species)? [SAP]**

Data collected depends on the requirements of the study being conducted

See citations in Section 3.1.1

See also:

Hewavisenthi, S. (1990). "Exploitation of marine turtles in Sri Lanka: historic background and their present status." Marine Turtle Newsletter 48: 14-19.

Kapurusinghe, T. (2006). Status and Conservation of Marine Turtles in Sri Lanka. In: Marine turtles of Indian sub-continent: status, threats and conservation. eds . K. Shanker & B. C. Choudhury, Universities Press, Hyderabad.

Kapurusinghe, T. and R. Cooray (2002). Marine turtle by-catch in Sri Lanka. TCP Survey report September 1999 to November 2000. Turtle Conservation Project, Sri Lanka.

Kapurusinghe, T. and M. M. Saman (2002). MARINE TURTLE BY-CATCH IN SRI LANKA. A collection of TCP Research Papers Vol 1. L. Ekanayake, The Turtle conservation Project (TCP) Sri Lanka: 46-49.

**1.4.8 Has your country exchanged information and provided technical assistance (formally or informally) to other Signatory States to promote the activities described in 1.4.4, 1.4.5 and 1.4.7 above? [SAP]**

YES  NO  UNSURE

Exchanged tag data with Indian Turtle tagging programme: with reference to a dead turtle washed off and found in Palatupana beach (Yala National Park) in 2002.

TCP has already distributed its by-catch survey findings internationally and therefore shared the information. These findings were compared with findings we received from many countries through many different organisations.

**1.4.9 What legislative and practical measures has your country taken in support of UN General Assembly Resolution 46/215 concerning the moratorium on the use of large-scale driftnets? [SAP]**

Promoting long line fishing instead of drift gill nets in offshore fisheries - NARA

**1.5.1 Does your country have legislation to prohibit direct harvest and domestic trade in marine turtles, their eggs, parts and products; and to protect important turtle habitats? [IND]**

YES  NO  UNSURE

In Sri Lanka, under the Fauna and Flora Protection Ordinance (FFPO, 1938 amended in 1972, amended in 1993) it is an offence to capture, kill, injure or possess sea turtles or their eggs. The Fauna and Flora Protection Ordinance (Chapter 469) covers the legislative aspects in respect to the protection of sea turtles in Sri Lanka. Section 31(III) was amended to Schedule III to include all other sea turtles.

See; Rajakaruna, Rupika S., Naveen, D.M., Dissanayake, J., Ekanayake, E.M. Lalith, and Ranawana, Kithsiri B. (2009). Sea turtle conservation in Sri Lanka: assessment of knowledge, attitude and prevalence of consumptive use of turtle products among coastal communities Indian Ocean Turtle Newsletter 10(1): 1-13.



Source of information:

R.M.M Chandraratne. 1997. Some reptile bones from the Gedige excavation in 1985, the citadel of Anuradhapura, Sri Lanka. *Lyriocephalus*, 3(2): 7-15.

Prof. Jindas's papers

Site Deraniyagala's papers cross reference in the 1st paper

Turtle egg collection is very high as a traditional harvesting practice in Sri Lanka and therefore having a high impact on turtle populations (pers. com. - TCP)

TCP interviewed old traditional turtle egg collectors and they confirmed that in earlier times there were large numbers of turtles nesting on the local beaches, but today numbers have been dramatically reduced. As an example old egg collectors in Rekawa have mentioned that 20 years ago there were about 40 turtles per night nesting on the beach during the peak season. Today however it has reduced to a maximum of 10-15 in Rekawa.

**1.5.4 Have any domestic management programmes been established to limit the levels of intentional harvest? [SAP]**

YES  NO  UNKNOWN

Community members who were intentionally harvesting turtle eggs are now employed as turtle nest protectors at several beaches such as Kosgoda, Rekawa, and Bundala.

Under the Fauna and Flora Protection Ordinance (FFPO, 1938 amended in 1972, amended 1993), it is an offence to capture, kill, injure or possess sea turtles or their eggs. Also Sri Lanka has banned the international trade of sea turtle products.

See comments and survey results in:

Rajakaruna, Rupika S., Naveen, D.M., Dissanayake, J., Ekanayake, E.M. Lalith, and Ranawana, Kithsiri B. (2009). Sea turtle conservation in Sri Lanka: assessment of knowledge, attitude and prevalence of consumptive use of turtle products among coastal communities *Indian Ocean Turtle Newsletter* 10(1): 1-13.

**1.5.5 Describe any management agreements negotiated between your country and other States in relation to sustainable levels of traditional harvest, to ensure that such harvest does not undermine conservation efforts. [BPR]**

Sri Lanka is working with other BOBLME countries on a regional approach to marine conservation and management. (BOBLMEP/National Report Sri Lanka)

**1.6.1 First, select one of the options at left to indicate whether or not your country has any of the following measures in place to minimise the mortality of eggs, hatchlings and nesting females. If yes, then estimate the relative effectiveness of these measures. [IND, SAP]**

**MEASURES**

**RELATIVE EFFECTIVENESS**

**Monitoring/protection programmes**

YES  NO  N/A

EXCELLENT  GOOD  LOW  UNKNOWN

Night patrolling done by DWC staff in their protected areas and Rekawa beach. Placing of specially designed concrete rings to protect nests by natural predators (wild pig, jackal, mongoose, crabs and water/land monitors) practiced in Bundala National Park.

Night patrolling done by DWC staff in protected areas (Bundala and Yala National Park) and Rekawa beach (a critical turtle nesting habitat in Sri Lanka).

Building construction on the coastal areas has been regulated under the Coast Conservation Act. Artificial lighting which disturbs the wildlife is prohibited under Flora & Fauna Protection Ordinance (FFPO)

Transit of vehicles in Turtle nesting areas is prohibited in Protected areas under FFPO

Yala beach is protected legally and conservation programmes are scheduled. Bundala beach is protected legally, and a community-based programme for in situ conservation by the Department of Wildlife Conservation is continuing. Rekawa,

one of the important nesting beaches, is not legally protected, but in-situ conservation programmes are undertaken by NGOs and the Department of Wildlife Conservation. The DWC has established a "wildlife beat" office at Rekawa beach and regular patrolling is conducted there.

TCP has organised many beach cleaning programmes in Rekawa between 1996 and 2000. Similar programmes have been conducted by TCP on nesting beaches in Tangalle area with the participation of school children.

As a result of the December 2004 tsunami, Kosgoda beach was covered with debris. TCP immediately organised a beach cleaning programme with local community participation and foreign volunteers.

TCP conducts a 24 hour beach patrol in Kosgoda to protect nests from natural predators.

#### **Education/awareness programmes**

**YES**  NO  N/A  EXCELLENT  **GOOD**  LOW  UNKNOWN

Educational and awareness programmes conducting by DWLC in Bundala National Park (for school children, rural communities, government officers).

#### **Egg relocation/hatcheries**

**YES**  NO  N/A  EXCELLENT  **GOOD**  LOW  UNKNOWN

#### **Predator control**

**YES**  NO  N/A  EXCELLENT  GOOD  **LOW**  UNKNOWN

DWLC (Bundala) use concrete cylinders to protect nests from predators. (wild boars, dogs, land monitors)

#### **Vehicle / access restrictions**

**YES**  NO  N/A  EXCELLENT  GOOD  **LOW**  UNKNOWN

Transit of vehicles in Turtle nesting areas is prohibited in Protected areas under FFPO.

It is totally banned to access vehicles in Bundala and Yala national parks areas .

#### **Removal of debris / clean-up**

**YES**  NO  N/A  EXCELLENT  GOOD  **LOW**  UNKNOWN

TCP has organised many beach cleaning programmes in Rekawa between 1996 and 2000. Similar programmes have been conducted by TCP on nesting beaches in Tangalle area with the participation of school children.

As a result of the December 2004 tsunami, Kosgoda beach was covered with debris. TCP immediately organised a beach cleaning programme with local community participation and foreign volunteers. Bundala Natinal Park (DWLC) working with NGOs and rural people, school children and university students for removing debris and to clean the beach of Bundala. Foreign volunteers worked with DWLC (Bundala) removing debris and beach cleaning .

#### **Re-vegetation of frontal dunes**

**YES**  NO  N/A  EXCELLENT  GOOD  **LOW**  UNKNOWN

#### **Building location/design regulations**

**YES**  NO  N/A  EXCELLENT  **GOOD**  LOW  UNKNOWN

Building construction on the coastal areas has been regulated under the Coast Conservation Act. Artificial lighting which disturbs the wildlife is prohibited under Flora & Fauna Protection Ordinance (FFPO).

#### Light pollution reduction

YES  NO  N/A

EXCELLENT  GOOD  LOW  UNKNOWN

#### Other (list and rate them)

YES  NO  N/A

Placing of specially designed concrete rings to protect nests by natural predators (wild pig, jackal, mongoose, crabs and water/land monitors) practiced in Bundala National Park.

#### 1.6.2 Has your country undertaken any evaluation of its nest and beach management programmes? [SAP]

YES  NO  NOT APPLICABLE

The Department of Wildlife conservation has been evaluating the effectiveness of its nest and beach management at Rakewa, Bundala and Yala National Park Since 1999.

TCP has published several research papers on beach management programmes conducted by TCP in Rekawa and Kosgoda. A list of TCP publications is available at TCP website.(www.tcpsrilanka.org).

### OBJECTIVE II. PROTECT, CONSERVE AND REHABILITATE MARINE TURTLE HABITATS

#### 2.1.1 What is being done to protect critical habitats *outside* of established protected areas? (NB: It is assumed that legislation relating to established protected areas will have been described in Section 1.5.1) [BPR, SAP]

Local community members at Rekawa beach (a critical turtle nesting habitat in Sri Lanka) are trained, and given incentives for collecting turtle eggs for the DWLC ex-situ conservation programme.

TCP previously trained Rekawa community members in in-situ nest protection and research techniques and employed them as nest protectors between 1996 and 2000. This programme will be restarted in March 2005.

In-situ Conservation in Bundala National Park, Yala National Park, Rekawa and Kalametita areas are conducted by the DWLC with the assistance of Turtle Conservation Project (TCP).

Training has been given for wildlife officials by TCP and NARA to assure adequate protection. The Department of Wildlife Conservation (DWLC) has trained Bundala community members in in-situ nest protection and employed them as nest protectors since 2000.

Outside BNP along the beach at Hambanthota area is monitor by DWLC to find out other places where turtles nest outside the protected areas.

#### 2.1.2 Are assessments routinely made of the environmental impact of marine and coastal development on marine turtles and their habitats? [IND, SAP]

YES  NO  NOT APPLICABLE

Marine turtle nesting habitat assessment has been conducted under the - RUK Turtle Conservation Project - implemented by IUCN-SL in collaboration with DWC for the beach stretch from Tangalle to Pilinnawa (Yala National Park) in 2005 - a stretch of approximately 96 km. The final report is under preparation.

TCP has conducted a habitat assessment on marine turtles between Tangalle and Hambantota in 1999 (unpublished report is available on request) The journal of Wildlife Department (vol 1) was published about the marine turtle conservation project in Bundala National Park which concerns the number of nesting sites, number of eggs, % of success rate and mortality, etc. of different species of turtle nesting in the Bundala beach.

**2.1.3 Is marine water quality (including marine debris) monitored near turtle habitats? If yes, describe the nature of this monitoring and any remedial measures that may have been taken. [SAP]**

YES  NO  NOT APPLICABLE

Hatchery water quality has been examined by NARA and need improvements with the Central Environmental Authority.

Contact MPPA,CCD for future interventions (ballast water, etc.)

**2.1.4 Are measures in place to prohibit the use of poisonous chemicals and explosives? [SAP]**

YES  NO  NOT APPLICABLE

A majority of critical habitats are within protected areas, and it is strictly prohibited to carry such toxic chemicals into these areas.

Fauna & Flora Protection Ordinance Part V 53 A described that no person shall use any poison, explosive or stupefying substance for the purpose of poisoning , killing or stupefying any animal.

Fisheries & Aquatic Resources (Amendment ) Act, no. 4 of 2004.

Contact CEA & MPPA for details.

**2.2.1 Are efforts being made to recover degraded coral reefs? If yes, give details (location, duration, effectiveness, lessons learned, future plans etc). [IND, SAP]**

YES  NO  NOT APPLICABLE (no degraded coral reefs)

Multiple threats (e.g., Coral mining, Coral bleaching, Destructive fishing practices, High visitor pressure Sedimentation) are impacting coral reefs in Sri Lanka.

Multiple recovery/restoration projects are underway: In Rumassala Reef- since 1998 by NATCOG. (Contact Mr. Prasanna Weerakkody regarding the success of this activity). In Hikkaduwa National Park & Bar Reef Sanctuary by NARA - since 2001 - effective but slow in growth. In Hikkaduwa National Park by University of Ruhuna - Contact Temy or Dr. Ruchira Kumarathunga.

See:

Joseph, L. (2003). National report of Sri Lanka on the Formulation of a Transboundary Diagnostic Analysis and Strategic Action Plan for the Bay of Bengal Large Marine Ecosystem Programme.Unpublished report prepared for the BOBLME Programme. Unedited version at www.BOBLME.org.

Staples, D. 2010). Transboundary Diagnostic Analysis of the Bay of Bengal Large Marine Ecosystem Volume 2: Background and environmental assessment. Bay of Bengal Large Marine Ecosystem Project. Food and Agriculture Organisation of the United Nations.

**2.2.2 Are efforts being made to recover degraded mangrove habitats that are important for turtles? If yes, give details (location, duration, effectiveness, lessons learned, future plans etc.) [IND, SAP]**

YES  NO  NOT APPLICABLE (no mangrove habitats important for turtles)

Multiple threats (e.g., Clearing for security reasons, shrimp culture, urban development, domestic uses) are impacting mangroves in Sri Lanka. Mangrove cover was reduced by about 50% between 1986 and 2002 (Joseph, 2003).

Mangrove recovery programmes:

Mangrove recovery programmes conducted in Rekawa by the Rekawa Development Foundation (RDF).

TCP has replanted mangroves in Rekawa lagoon and in Puttlam lagoon and still maintains these rehabilitated areas. TCP has also conducted many educational programmes on mangrove conservation among the school children and fishing communities.

Contact C. Negambo Lagoon, Chilaw Lagoon and Dr. Mala Amarasinghe (University of Kelaniya)

d.Negambo Lagoon (Kadol Kele) and Kalpitiya by NARA

e.Pambala (Chila), Kirala Kele (Ambalanthota) etc. - By Small Fisheries Federation

Additional comments see:

Joseph, L. (2003). National report of Sri Lanka on the Formulation of a Transboundary Diagnostic Analysis and Strategic Action Plan for the Bay of Bengal Large Marine Ecosystem Programme. Unpublished report prepared for the BOBLME Programme. Unedited version at [www.BOBLME.org](http://www.BOBLME.org).

Staples, D. (2010). Transboundary Diagnostic Analysis of the Bay of Bengal Large Marine Ecosystem Volume 2: Background and environmental assessment. Bay of Bengal Large Marine Ecosystem Project. Food and Agriculture Organisation of the United Nations

**2.2.3 Are efforts being made to recover degraded sea grass habitats? If yes, give details (location, duration, effectiveness, lessons learned, future plans etc.). [IND, SAP]**

YES  NO  NOT APPLICABLE (no degraded sea grass habitats)

Multiple threats (e.g., Destructive fishing / collecting techniques, eutrophication due to excessive nutrients from upstream activities, Sedimentation) are impacting sea grass beds. Unfortunately, no recovery programmes have been implemented on sea grass beds.

Additional comments see:

Joseph, L. (2003). National report of Sri Lanka on the Formulation of a Transboundary Diagnostic Analysis and Strategic Action Plan for the Bay of Bengal Large Marine Ecosystem Programme. Unpublished report prepared for the BOBLME Programme. Unedited version at [www.BOBLME.org](http://www.BOBLME.org).

Staples, D. (2010). Transboundary Diagnostic Analysis of the Bay of Bengal Large Marine Ecosystem Volume 2: Background and environmental assessment. Bay of Bengal Large Marine Ecosystem Project. Food and Agriculture Organisation of the United Nations

**OBJECTIVE III. IMPROVE UNDERSTANDING OF MARINE TURTLE ECOLOGY AND POPULATIONS THROUGH RESEARCH, MONITORING AND INFORMATION EXCHANGE**

**3.1.1 Give a list of available literature that includes baseline information from studies carried out in your country on marine turtle populations and their habitats. [INF]**

For Bibliography to 2005, see: de Silva, A. (2006). An annotated bibliography of publications on marine turtles of Sri Lanka. Indian Ocean Turtle Newsletter 3: 12-26.

TCP will provide all published papers on marine turtles and their habitats.

Amarasooriya, D. (1996). Turtle hatcheries: Is it additional disaster for the turtle fauna of Sri Lanka? In: Proceedings of the International Conference on the Biology and Conservation of the Amphibians and Reptiles of South Asia, Kandy, Sri Lanka.

Amarasooriya, D. and Dayaratne. P. (1997). A survey on the existing turtle hatcheries and mapping of nesting beaches of turtles along the North-west, West, South-west, South and South-east coasts of Sri Lanka. National Aquatic Resources Research and Development Agency. Crow Island, Colombo, Sri Lanka.

Amarasooriya, K. D. and Jayathilaka, M. R. A. (2002). Marine turtle nesting on the beaches of the north-western, western, and southern provinces of Sri Lanka. NOAA Technical Memorandum NMFS-SEFSC 477: 93-95.

Andrews, H. V. (2001). Threatened herpetofauna of the Andaman and Nicobar Islands. In: An overview of the threatened herpetofauna of South Asia. ed. C.N.B Bambaradeniya & V.N.Samarasekara, IUCN Sri Lanka & Asia Regional Biodiversity Programme, Colombo, Sri Lanka. : 39-47.

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- Dattatri, S. And Samarajeeva, D. (1982). The status and conservation of sea turtles in Sri Lanka. Project of the sea turtle rescue fund, Washington, D.C., U.S.A.
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- Ekanayake, E. M. L. a., Ranawana, K.B., et al. (2002). Estimation of the average number of nests for green turtle on the Rekawa Beach in southern Sri Lanka. THREE YEAR STUDY FROM SEPTEMBER 1996 TO SEPTEMBER 1999. A collection of TCP Research Papers Vol 1. L. Ekanayake, The Turtle conservation Project (TCP) Sri Lanka: 43-45.
- Ekanayake, E. M. L. and Ranawana, K.B. (2002). Estimation of sex ratio of green turtle hatchlings at Rekawa turtle rookery in Sri Lanka. A collection of TCP Research Papers Vol 1. L. Ekanayake, The Turtle conservation Project (TCP) Sri Lanka: 50-52.
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Richardson, P. (2002). Tortoise shell industry in Sri Lanka: A SURVEY REPORT 1996. A collection of TCP Research Papers Vol 1. L. Ekanayake, The Turtle conservation Project (TCP) Sri Lanka: 1-15.

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Sasamal, S. K. and Panigraphy, R. C. (2006). Influence of eddies on the migratory routes of the sea turtles in the Bay of Bengal. International Journal of Remote Sensing 27(15): 3115-3122.

Wilkinson, C., D. Souter, et al. (2006). Status of coral reefs in tsunami affected countries: 2005. Status of coral reefs in tsunami affected countries: 2005. i-vi, 1-154.

**3.1.2 Have long-term monitoring programmes (i.e. of at least 10 years duration) been initiated or planned for priority marine turtle populations frequenting the territory of your country? [IND, BPR]**

YES  NO  UNSURE

Several long-term monitoring projects are in progress:  
Since 1994 in Bundala National Park by the DWC.  
Since 1996 by TCP, and then continued from 2001 to date by the DWC - in Rekawa beach.  
Since 1997 in Galle and Hambanthota districts by NARA.

See listed citations in Section 3.1.1

**3.1.3 Has the genetic identity of marine turtle populations in your country been characterised? [INF, PRI]**

YES  NO  UNSURE

Proposed study on the genome of the marine turtle species of Sri Lanka to be commenced in 2005, by NARA. The first phase of the project will concentrate on leatherback turtles.

**3.1.4 Which of the following methods have been or are being used to try to identify migration routes of turtles? Use the text boxes to provide additional details. [INF, PRI]**

**Tagging**  YES  NO

Tagging was undertaken by the Turtle Conservation Project (TCP), and monitoring undertaken throughout the year. Titanium metal tags have been used for turtle tagging and two tags were fixed to the front flippers (one on each flipper).

See listed citations in Section 3.1.1

**Satellite tracking**  YES  NO

Satellite tracking was undertaken by the Marine Turtle Research Group. This is the first time that turtles in Sri Lanka have been fitted with satellite transmitters. Six female green turtles were tagged after they nested on Rekawa Beach on the south coast of Sri Lanka between the 30th of July and the 8th of August 2006. Four more turtles were tagged in mid-June 2007. The project aims to reveal the interesting habitat, migratory routes and foraging grounds of this population.

Source: www.seaturtle.org [http://www.seaturtle.org/tracking/?project\_id=149]

Other

None of the above

**3.1.5 Have studies been carried out on marine turtle population dynamics and survival rates (e.g. including studies into the survival rates of incidentally caught and released turtles)? [INF, PRI]**

YES  NO  UNSURE

TCP has conducted population dynamics and hatchling success studies in Rekawa and Kosgoda beaches. Several other papers have also been published on these titles.

Hatchability has been studied in in-situ and ex-situ turtle nest conservation programmes in Rekawa and Bundala NP by DWC field officers.

**3.1.6 Has research been conducted on the frequency and pathology of diseases in marine turtles? [INF, PRI]**

YES  NO  UNSURE

**3.1.7 Is the use of traditional ecological knowledge in research studies being promoted? [BPR, PRI]**

YES  NO  UNSURE

Traditional ecological knowledge has been used in the identification of species, nesting seasons, nesting frequencies, nesting hotspots etc. for ongoing field studies conducted by DWC, NARA, TCP and IUCN-SL.

See for example: Rajakaruna, Rupika S., Naveen, D.M., Dissanayake, J., Ekanayake, E.M. Lalith, and Ranawana, Kithsiri B. (2009). Sea turtle conservation in Sri Lanka: assessment of knowledge, attitude and prevalence of consumptive use of turtle products among coastal communities Indian Ocean Turtle Newsletter 10(1): 1-13.

**3.2.1 List any regional or sub-regional action plans in which your country is already participating, which may serve the purpose of identifying priority research and monitoring needs. [INF]**

The TCP will undertake an extensive research review to identify research and monitoring priorities under the - RUK Turtle Conservation Project - implemented by DWC.

The National Marine Turtle Action Plan includes the priorities for research and monitoring. (de Silva, A. 2005. Marine turtle conservation strategy and Action plan for Sri Lanka. Department of Wildlife Conservation, Sri Lanka.)

**3.2.2 On which of the following themes have collaborative studies and monitoring been conducted? Use the text boxes to describe the nature of this international collaboration or to clarify your response. Answer 'NO' if the studies/monitoring undertaken do not involve international collaboration. [INF, PRI]**

a) Genetic Identity  YES  NO  NOT APPLICABLE

b) Conservation status  YES  NO  NOT APPLICABLE

CAMP workshop on herpetofauna held at the National Zoological gardens to discuss the conservation status of marine turtles in Sri Lanka in 2004.

Contact Mr. Anslam De Silva for details

**c) Migrations**  YES  NO  NOT APPLICABLE

Details given in the TCP's by-catch survey report

**d) Other biological and ecological aspects**  YES  NO  NOT APPLICABLE

**Other**

A Marine Turtle Nesting Habitat Assessment of the beach stretch from Tangalle to Pilinnawa (Yala National Park) (approximately 96km) has been completed by IUCN-SL in collaboration with DWC, and future monitoring is planned by DWC field staff followed by a training programme.

Habitat assessment in the coastline between Tangalle and Hambantota was conducted by TCP in 1999.

See listed citations in Section 3.1.1

**3.3.1 List, in order of priority, the marine turtle populations in your country in need of conservation actions, and indicate their population trends. [PRI]**

Five species of marine turtles have been recorded in Sri Lanka in different abundances. Based on observations, the following order of priority for marine turtle conservation can be suggested for Sri Lanka:

1. Hawksbill Turtle
2. Leatherback Turtle
3. Loggerhead Turtle
4. Green Turtle
5. Olive ridley Turtle

**3.3.2 Are research and monitoring activities, such as those described above in Section 3.1 periodically reviewed and evaluated for their efficacy? [SAP]**

YES  NO  UNSURE

Evaluated within organisations or project implementing agencies.

**3.3.3 Describe how research results are being applied to improve management practices and mitigation of threats (in relation to the priority populations identified in 3.3.1, among others). [SAP]**

Research results are being used to improve the efficacy of conservation actions through management, threat mitigation, assessment of hatchery management practices and assessment of habitat loss.

**3.4.1 Has your country undertaken any initiatives (nationally or through collaboration with other Range States) to standardise methods and levels of data collection? [BPR, INF]**

YES  NO  UNSURE

Not presently, but this will be addressed under the regional co-operation sub-component of the - RUK Turtle Conservation Project - (DWC & IUCN-SL).

**3.4.2 To what extent does your country exchange scientific and technical information and expertise with other Range States? [SAP, IND]**

OFTEN (SYSTEMATICALLY)  OCCASIONALLY  RARELY  NEVER

**3.4.3 If your country shares scientific and technical information and expertise with other Range States, what mechanisms have commonly been used for this purpose? Comment on any positive benefits/outcomes achieved through these interactions. [INF]**

The BOBLME project is facilitating exchange.

**3.4.4 Does your country compile and make available to other countries data on marine turtle populations of a regional interest? [INF]**

YES  NO  **UNSURE**

**OBJECTIVE IV. INCREASE PUBLIC AWARENESS OF THE THREATS TO MARINE TURTLES AND THEIR HABITATS, AND ENHANCE PUBLIC PARTICIPATION IN CONSERVATION ACTIVITIES**

**4.1.1 Describe the educational materials, including mass media information programmes that your country has collected, developed and/or disseminated. [INF, PRI]**

Government and NGOs have educational projects under way, for example,

DWC has conducted Awareness programmes in Bundala, Rekawa, Kalametiya, Hikkaduwa, etc. in coastal areas. Additional awareness material developed by DWC includes posters, mobile exhibition units, and a documentary film. DWC with collaboration of Sri Lanka Broadcasting & Television Cooperation has produced short documentary programmes on nature (including turtle conservation). Also newsletters have been produced.

TCP has conducted awareness programmes, exhibitions, and workshops for local communities on turtle conservation, alternative income generation workshops for coral miners in Rekawa and Kosgoda and conducted many education and awareness programmes on coral conservation. TCP has also prepared documentaries and media programmes - e.g Kosgoda programme and turtle conservation exhibition with local media.

NARA has conducted awareness programmes on the importance of sea turtle conservation for schoolchildren and master teachers, in Hikkaduwa, Habaraduwa, Galle. Assisted school children (A/L students) in designing research projects which is a part of their syllabus, in conservation of natural resources. Articles in scientific journals and public papers have also been produced.

IUCN-SL has prepared handouts on turtles & assessing their habitats for capacity building of DWC officers. Several more are in preparation: (1) A laymen's guide on CMC; (2) Handbooks on In-situ conservation and Law enforcement for capacity-building of officers & communities engaged in turtle conservation. (3) An occasional paper on the habitat assessment of marine turtles from Tangalle to Yala - southern coast of Sri Lanka.

Sri Lanka contributes to the development of a web-based information resource for marine turtle conservation through data on marine turtle populations, nesting data, and information on projects.

Websites of DWC, TCP, NARA, Coast Conservation Department, Department of Fisheries and Aquatic Resources, Sri Lanka Customs, IUCN-SL. Bundala National park celebrates the World International Wetland day on 2nd of February annually. Many awareness programmes organise school children, government officers, community people etc. especially emphasising the importance of turtle conservation in Sri Lanka to mark the day.

**4.1.2 Which of the following groups have been the targets of these focused education and awareness programmes described in above in Section 4.1.1? [PRI, INF]**

- Policy makers
- Fishing industry
- Local/Fishing communities**
- Indigenous groups**
- Tourists**
- Media**
- Teachers**
- Students**
- Military, Navy, Police
- Scientists
- Other:Local Government Agencies, schools**
- None of the above

TCP - Teachers, School children, Communities, Media (details to be given)  
DWC- Awareness workshops and information packs for and school children and teachers.rural people  
Technical inputs to the school curriculum.  
Policy circulars for Government agents.

#### **4.1.3 Have any community learning / information centres been established in your country? [BPR, SAP]**

YES  NO

To be updated by TCP

#### **4.2 Alternative livelihood opportunities [IND, BPR] Describe initiatives already undertaken or planned to identify and facilitate alternative livelihoods (including income-generating activities) for local communities.**

DWC- Ecotourism practices planned for the Bundala National Park (Management Plans updated in 2008) with active local community participation.

TCP (details to be given)

#### **4.3.1 Describe initiatives already undertaken or planned by your country to involve local communities, in particular, in the planning and implementation of marine turtle conservation programmes. Please include details of any incentives that have been used to encourage public participation, and indicate their efficacy. [BPR, IND]**

DWC- Preparation of the Management Plan for Bundala National Park. All stakeholders were involved in decision-making through a number of workshops. The Plan was presented to the local community and their inputs were also considered.

Recruited volunteers from villages for the conservation project. Bundala (DWLC) TCP (details to be given)

#### **4.3.2 Describe initiatives already undertaken or planned to involve and encourage the cooperation of Government institutions, NGOs and the private sector in marine turtle conservation programmes. [IND, BPR]**

'National Turtle Conservation Steering Committee' to be established under the National Marine Turtle Conservation Action Plan, which will be established in mid 2005. (Exact details to be updated by DWC)

IUCN-SL Participation of DWC, TCP, local NGOs and the general public in 'RUK Turtle Conservation Project' Convening the National Level Steering Committee on the 'RUK Turtle Conservation Project' with representatives from the DWC, TCP, Coast Conservation Department (CCD), NARA, Marine Pollution Prevention Authority (MPPA), and Department of Customs. The committee also takes decisions on national level turtle conservation actions, where appropriate, in addition to steering the above project.

IUCN-SL- Participation of DWC, TCP, Local NGOs and general public in - RUK Turtle Conservation Project - Convening the National Level Steering Committee on the same project with representatives from the DWC, TCP, Coast Conservation Department (CCD), NARA, Marine Pollution Prevention Authority (MPPA), and Department of Customs.

NARA-Participation of local community in research data collection since 1998 in Ussangoda, Walawemodera, Unawatuna and Habaraduwa areas.

TCP (details to be given)

### **OBJECTIVE V. ENHANCE NATIONAL, REGIONAL AND INTERNATIONAL COOPERATION**

#### **5.1.1 Has your country undertaken a national review of its compliance with Convention on International Trade in Endangered Species (CITES) obligations in relation to marine turtles? [SAP]**

YES  NO  NOT APPLICABLE

Under the Fauna & Flora Protection Ordinance marine turtles are protected.

**5.1.3 Does your country have in place mechanisms to identify international illegal trade routes (for marine turtle products etc.)? Please use the text box to elaborate on how your country is cooperating with other States to prevent/deter/eliminate illegal trade. [SAP]**

YES  NO  NOT APPLICABLE

Biodiversity unit in the Department of Customs negotiates with the Traffic International organisation and World Customs regarding information on illegal trade.

**5.1.4 Which international compliance and trade issues related to marine turtles has your country raised for discussion (e.g. through the IOSEA MoU Secretariat, at meetings of Signatory States etc.)? [INF]**

None

**5.1.5 Describe measures in place to prevent, deter and eliminate domestic illegal trade in marine turtle products, particularly with a view to enforcing the legislation identified in Section 1.5.1. [INF]**

Law enforcement through DWC officers.  
Awareness programmes for Police officers, communities and schoolchildren.  
Training for Police officers by DWC.  
Publication on protected species (including CITES lists) by IUCN-SL.

**5.2.1 Has your country already developed a national action plan or a set of key management measures that could eventually serve as a basis for a more specific action plan at a national level? [IND]**

YES  NO

The National Marine Turtle Conservation Action Plan (NMTCAP) has been developed by the DWC in collaboration with IUCN-SL (through a consultative process with all stakeholders).

**5.2.2 From your country's perspective, which conservation and management activities, and/or which particular sites or locations, ought to be among the highest priorities for action? [PRI]**

In-situ nest protection programmes involving community participation. (1.6)  
Tagging programmes for monitoring Sri Lankan Turtle population. (3.1)  
Establishment and operation of a dedicated unit for turtle conservation under the DWC. (5.4)  
Development of a national database on Marine Turtles. (3.4)  
Training on turtle biology, ecology and conservation for DWC officials and relevant partners. (5.4)  
Information exchange and regional cooperation on turtle conservation. (5.3)  
Research activities on turtle conservation especially at Rekawa, Bundala and Yala (3.1)

**5.2.3 Please indicate, from your country's standpoint, the extent to which the following local management issues require international cooperation in order to to achieve progress. [PRI]**

<b>Illegal fishing in territorial waters</b>	<input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL
<b>Incidental capture by foreign fleets</b>	<input type="checkbox"/> ESSENTIAL <input type="checkbox"/> IMPORTANT <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL
<b>Enforcement/patrolling of territorial waters</b>	<input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL
<b>Hunting/harvest by neighboring countries</b>	<input type="checkbox"/> ESSENTIAL <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> LIMITED <input type="checkbox"/> NOT AT ALL

- Poaching, illegal trade in turtle projects**  ESSENTIAL  **IMPORTANT**  LIMITED  NOT AT ALL
- Development of gear technology**  ESSENTIAL  IMPORTANT  **LIMITED**  NOT AT ALL
- Oil spills, pollution, marine debris**  ESSENTIAL  IMPORTANT  **LIMITED**  NOT AT ALL
- Training / capacity-building**  ESSENTIAL  **IMPORTANT**  LIMITED  NOT AT ALL
- Alternative livelihood development**  ESSENTIAL  **IMPORTANT**  LIMITED  NOT AT ALL
- Identification of turtle populations**  ESSENTIAL  **IMPORTANT**  LIMITED  NOT AT ALL
- Identification of migration routes**  ESSENTIAL  **IMPORTANT**  LIMITED  NOT AT ALL
- Tagging / satellite tracking**  ESSENTIAL  **IMPORTANT**  LIMITED  NOT AT ALL
- Habitat studies**  ESSENTIAL  **IMPORTANT**  LIMITED  NOT AT ALL
- Genetics studies**  ESSENTIAL  **IMPORTANT**  LIMITED  NOT AT ALL

This will be addressed in the National Marine Turtle Conservation Action Plan, which will be finalised and published in 2005 by the DWC in collaboration with IUCN-SL (through a consultative process with all stakeholders).

TCP (details to be given)

**5.3.1 Identify existing frameworks/organisations that are, or could be, useful mechanisms for cooperating in marine turtle conservation at the sub-regional level. Please comment on the strengths of these instruments, their capacity to take on a broader coordinating role, and any efforts your country has made to enhance their role in turtle conservation. [INF, BPR]**

Develop and update a national turtle database with the possibility to link with a regional database.

A symposium to exchange ideas and knowledge on marine turtle conservation in the region.

A turtle tagging programme covering the whole region, in order to understand their migration, biology and ecology.

Student exchange programmes between regional universities and conservation organisations.

**5.3.2 Has your country developed, or is it participating in, any networks for cooperative management of shared turtle populations? [BPR, INF]**

**YES**  NO  NOT APPLICABLE

**5.3.3 What steps has your country taken to encourage Regional Fishery Bodies (RFBs) to adopt marine turtle conservation measures within Exclusive Economic Zones (EEZs) and on the high seas? [SAP]**

No steps are being taken other than legislation.

**5.4.1 Describe your country's needs, in terms of human resources, knowledge and facilities, in order to build capacity to strengthen marine turtle conservation measures. [PRI]**

Sharing knowledge on biology, ecology & effective conservation practices on turtles in the region.

Technical & financial support for turtle research, participatory conservation mechanisms and local level capacity building programmes.

Technical support for developing a national database and a data exchange programme.

**5.4.2 Describe any training provided in marine turtle conservation and management techniques (e.g.**

**workshops held, training manuals produced etc.), and indicate your plans for the coming year. [PRI, INF]**

Included turtle conservation and managements techniques in the training curriculum at the National Wildlife Training Center of DWC, to train all type of Department officials and volunteers for turtle conservation.

Training programmes, workshops etc. are coordinated by the DWC.

DWC has conducted training workshops in marine turtle conservation and management techniques in collaboration with TCP and NARA.

**5.4.3 Specifically in relation to **capacity-building**, describe any partnerships developed or planned with universities, research institutions, training bodies and other relevant organisations. [BPR]**

Under sponsorship of SARC countries, annually the DWC sends officers to Wildlife Institute of India to complete wildlife diploma courses.

DWC is involved in capacity-building of departmental and government officials with IUCN-SL on:

- RAMSAR;
- CMS;
- law enforcement; and
- the identification of turtles

**5.5.1 National policies and laws concerning the conservation of marine turtles and their habitats will have been described in Section 1.5.1. Please indicate their effectiveness, in terms of their practical application and enforcement. [SAP, TSH]**

Fauna & Flora Protection Ordinance and Fisheries Act and Custom laws are effective in turtle conservation.

**5.5.2 Has your country conducted a review of policies and laws to address any gaps, inconsistencies or impediments in relation to marine turtle conservation? If not, indicate any obstacles encountered in this regard and when this review is expected to be done. [SAP]**

YES  NO  UNSURE

IUCN has conducted a workshop to prepare the National Marine Conservation Action Plan.

**5.5.3 From the standpoint of law enforcement, has your country experienced any difficulties achieving cooperation to ensure compatible application of laws across and between jurisdictions? [TSH]**

YES  NO  UNSURE

Contact Mr. Jagath Gunewardana

## **OBJECTIVE VI. PROMOTE IMPLEMENTATION OF THE MoU INCLUDING THE CONSERVATION AND MANAGEMENT PLAN**

**6.1.1 What has your country already done, or will it do, to encourage other States to sign the IOSEA MoU? [INF]**

Nothing

**6.1.2 Is your country **currently** favourable, in principle, to amending the MoU to make it a legally binding instrument? [INF]**

YES  NO  NO VIEW

**6.1.3 Would your country be favourable, over a **longer time horizon**, to amending the MoU to make it a legally-binding instrument? [INF]**

YES  NO  **NO VIEW**

Contact Mr. Jagath Gunewardane for legal advice

## 6.2 Secretariat and Advisory Committee

**6.2.1 What efforts has your country made, or can it make, to secure funding to support the core operations of the IOSEA MoU (Secretariat and Advisory Committee, and related activities)?** [\[IND\]](#)

none

**6.3.1 What funding has your country mobilised for domestic implementation of marine turtle conservation activities related to the IOSEA Marine Turtle MoU? Where possible, indicate the specific monetary values attached to these activities/programmes, as well as future plans.** [\[IND\]](#)

Consolidated funds of Government of Sri Lanka  
GEF funds

**6.3.2 Has your country tried to solicit funds from, or seek partnerships with, other Governments, major donor organisations, industry, private sector, foundations or NGOs for marine turtle conservation activities?** [\[IND\]](#)

YES  NO

GEF funding for the project on - Conservation of Biodiversity through integrated collaborative management in the Rekawa Ussangoda and Kalametiya coastal ecosystems - with a Turtle conservation component - Successful approach.

Multiple projects are operating in Sri Lanka. Consult Government and NGO web sites for details.

**6.3.3 Describe any initiatives made to explore the use of economic instruments for the conservation of marine turtles and their habitats.** [\[BPR\]](#)

None

**6.4.1 Has your country designated a lead agency responsible for coordinating national marine turtle conservation and management policy? If not, when is this information expected to be communicated to the IOSEA MoU Secretariat?** [\[IND\]](#)

YES  **NO**

Identified Department of Wildlife Conservation as the lead agency in the National Marine Turtle Conservation Action Plan.

**6.4.2 Are the roles and responsibilities of all government agencies related to the conservation and management of marine turtles and their habitats clearly defined?** [\[IND\]](#)

YES  **NO**  UNSURE

**6.4.3 Has your country ever conducted a review of agency roles and responsibilities? If so, when, and what was the general outcome? If not, is such a review planned and when?** [\[SAP\]](#),

YES  **NO**  UNSURE

At present there are overlapping responsibilities, and policies. Most Government groups are working as individual bodies.

This lack of collaboration and national level coordinating agency for Turtle conservation makes progress slow.

**Comments/suggestions to improve the present reporting format:**

**Additional information not covered above:**



## Thailand

### GENERAL INFORMATION

#### Agency or institution primarily responsible for the preparation of this report:

Marine and Coastal Resources Research and Development Institute, Department of Marine and Coastal Resources

#### Other agencies, institutions, or NGOs that have provided input:

Royal Thai Navy  
 Department of Fisheries  
 Department of National Parks Animals and Plants  
 Phuket Sea Turtle Conservation Association, Maikhaw Beach, Phuket (NGO)  
 Prathong Subdistrict Administration Organisation, Phang Nga  
 Kasetsart University  
 NAUCRATES, Onlus - Friends of Sea Turtles, Italy

#### Designated Focal Point:

Mr. Mickmin Charuchinda  
 Marine and Coastal Ecosystems Specialist  
 Department of Marine and Coastal Resources  
 The Government Complex  
 5th Floor, Building B, 120 Chaengwattana 7 Road,  
 Tung Song Hong, Lak Si,  
 Bangkok 10210  
 Thailand

Email: mickmin\_charuchinda@yahoo.com  
 Tel: +662 141 1237  
 Fax: +662 143 8675

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### OBJECTIVE I. REDUCE DIRECT AND INDIRECT CAUSES OF MARINE TURTLE MORTALITY

#### 1.1 Introduction to marine turtle populations and habitats, challenges and conservation efforts. [INF]

The 740 km of the Andaman Sea coast of Thailand is situated between Myanmar and Malaysia. The narrow continent shelf bordered by deep oceanic waters of the northern portion widens to the south where large areas of mangrove forest fringe the coast. The complex ecosystem of mangrove forests, seagrass beds, coral reefs supports diverse fishery resources (Nootmorn et al., 2003).

Five species of sea turtles have been recorded in Thai waters: olive ridley turtle (*Lepidochelys olivacea*), green turtle (*Chelonia mydas*), hawksbill turtle (*Eretmochelys imbricata*), leatherback turtle (*Dermochelys coriacea*), and loggerhead turtle (*Caretta caretta*).

Low genetic divergence between the nesting green turtle populations of the Gulf of Thailand and the Andaman Sea has been found, indicating that the present geological boundary (the part of the southern continent from Thailand to the Malaysia peninsula down to Indonesia) does not effectively prevent the gene flow between the two populations that was observed in invertebrate species in these areas (Kittiwattanawong et al., 2003).

Most sea turtle populations in the South East Asian region have decreased dramatically through long-term harvesting of

eggs and adults, and as a result of being caught as by-catch in the ever growing trawler fisheries (Shanker & Pilcher, 2003). The remaining sea turtle populations in Thailand are widespread and exhibit a scattered distribution. Most of the available information is informal, with data on population status, trends and local exploitation or scientific data collected using different methodologies. It is known that sea turtles nest along the Andaman Sea coast (west coast - Phrathong Island, Ko Korkhao Island, Thaimuang Beach, Surin Islands, Similan Islands, Phang-nga Province; Maikhaw Beach, Phuket Province; Ko Tarutao, Ko Adang Rawi, Satun Province) and in the Gulf of Thailand (east coast - Kram Islands, Choburi Province; Kra Island, Nakhonsrithammarat Province). Little is known about their feeding and foraging habitats, although knowledge of migration patterns has improved in the last five years. Long distance migrations of few animals were recorded in the Gulf of Thailand; a green turtle tracked in the Andaman Sea coast travelled to Andaman islands.

Sea turtles threats on nesting grounds are mitigated by some conservation projects. However, tourism development, egg poaching, and illegal trade of turtle products are affecting the population. Estimation of mortality at seas has not been quantified, but it is evident that fisheries are the main threat for sea turtles in Thai waters.

Synopsis:

Species and relative abundance

1. Green turtle: 78%
2. Hawksbill turtle: 20%
3. Leatherback turtle: 1%
4. Loggerhead: 1% and
5. Olive ridley turtle: 1%

Foraging grounds:

- Green turtle - seagrass areas both in the Gulf of Thailand and the Andaman Sea
- Hawksbill turtles - among coral reefs
- Olive Ridley turtles - Coastal areas from Ranong to Phangnga

Developmental habitats: assumed to be in offshore area

Based on:

Juntarashote, K. 2003. Country report for BOBLME Programme: Thailand. BOBLME, FAO GCP/ RAS/ 179/ WBG, Chennai, India.

Kittiwattanawong, K., Mananasup, S., Kinoshita, M. & Nakayama, K. (2003b). No genetic divergence between green turtle (*Chelonia mydas*) nesting populations from the Andaman Sea and the Gulf of Thailand. In: Proceedings of the 4th Workshop on SEASTAR2000 (Editor: Arai, N.) pp. 15 – 19.

Kittiwattanawong, K., Chantrapornsyl, & Aureggi, M. (2006). The status of marine turtles in Thailand. *Testudo Journal* 6 (3): 50-63.

Nootmorn, P., Chayakun, R., and Chullasorn, S., ( 2003). The Andaman Sea Marine Ecosystem in Thailand. Department of Fisheries. Bangkok.

Shanker, K. (2004). "Marine turtle status and conservation in the Indian Ocean." *FAO Fisheries Reports* 738: 85-98.

Shanker, K. & Pilcher, N.J. (2003). Marine turtle conservation in South and Southeast Asia: hopeless cause or cause of hope? *MTN* 100: 43 – 51.

See additional References in Section 3.1.1

**1.2.1 Describe any protocol or approaches practiced in your country, which you consider exemplary, for minimising threats to marine turtle populations and their habitats, which may be suitable for adaptation and adoption elsewhere. [BPR]**

Local community volunteers and educational/awareness activities (local fishermen and schools).

Enforcement of legislation has generally been ineffective.

By empowering and strengthening local villagers to protect their territorial waters (i.e. within 3 km from the shore line)

Education of school children and local villagers

Developed a set of national marine parks and protected areas

See: BOBLME (2011). Status of Marine Protected Areas and Fish Refugia in the Bay of Bengal Large Marine Ecosystem. BOBLME-2011-Ecology-10

**1.3.1 Describe any socio-economic studies or activities that have been conducted among communities that interact with marine turtles and their habitats. [BPR, INF]**

A study on interaction between artisanal fisheries and sea turtles was conducted at Phra Thong Island (Tsaros and Aureggi, 2007). Squid traps, the most common type of fishing gear (68.8% of fishermen interviewed), can potentially catch turtles. Whilst only three interviewees mentioned the interaction between traps and turtles, there are several factors which contribute to this concern. The trap stays at sea over night, with fresh bait, which can attract turtles. The opening (35-40 cm) could allow a young turtle to enter and become trapped. This opening should be reduced to minimize by-catch without reducing the amount of squid caught in trap.

See: Tsaros, P. and Aureggi, M. 2007. Interaction between artisan fisheries and sea turtles at Phra Thong Island. Naucrates Final report, pp16.

**1.3.2 Which of these adverse economic incentives are underlying threats to marine turtles in your country? [TSH]**

**High prices earned from turtle products relative to other commodities**

- Lack of affordable alternatives to turtle products
- Ease of access to the turtle resource (eg. by virtue of proximity or ease of land/water access)
- Low cost of land near nesting beaches
- Low penalties against illegal harvesting
- Other1:
- Other2:
- Other3:
- None of the above or Not Applicable

**1.3.3 Has your country has taken any measures to try to correct these adverse economic incentives? [BPR]**

YES  NO  NOT APPLICABLE (no adverse economic incentives exist)

Consumption of sea turtle eggs is inspired by traditional beliefs. Education and awareness building would be helpful measures.

**1.4.1 Indicate, and describe in more detail, the main fisheries occurring in the waters of your country, as well as any high seas fisheries in which flag vessels of your country participate, that could possibly interact with marine turtles. [INF]**

**a) Shrimp trawls:  YES  NO**

Shrimp trawl research vessels have routinely surveyed assigned grids, on a monthly basis since 1970, without catching a single turtle. The surveys have been conducted in both the Gulf of Thailand and the Andaman Sea. Survey depths range between 10 and 50 m. It may therefore be concluded that the fishery is not interacting with turtles.

The percentage of sea turtles accidentally caught by trawls is around 8% compared to other fishing gears, according to records (1991-2006) obtained from Phuket Marine Biological Center (Andaman Sea) and Mannai Seaturtle Conservation Center (Gulf of Thailand).

Source: Department of Fisheries

**b) Set gill nets:  YES  NO**

Some turtles have been caught by gillnets (such as crab gillnets, bamboo stake traps etc). More than half of the turtles caught were still alive. Wounded turtles have been treated and released back to the sea.

The percentage of sea turtles accidentally caught by gillnet is around 58% compared to other fishing gears, according to records (1991-2006) obtained from Phuket Marine Biological Center (Andaman Sea) and Mannai Seaturtle Conservation Center (Gulf of Thailand).

**c) Anchored Fish Aggregating Devices (FADs):**  YES  NO

There is no record of use of FADs in Thailand.

**d) Purse seine (with or without FADs):**  YES  NO

Some turtles have been caught by anchovy purse seiners that operate in the coastal zone. Most of the turtles were still alive.

The percentage of sea turtles accidentally caught by purse seine is around 5% compared to other fishing gears, according to records (1991-2006) obtained from Phuket Marine Biological Center (Andaman Sea) and Mannai Seaturtle Conservation Center (Gulf of Thailand).

**e) Longline (shallow or deepset):**  YES  NO

**f) Driftnet:**  YES  NO

There is no record of use of driftnets in Thailand.

**g) Other1:**

There is some evidence of capture of turtles in this gear.

**h) Other2:**

Some (adult) turtles have been caught by entanglement in the floating line, always resulting in death.

According to records (1991-2006) obtained from Phuket Marine Biological Center (Andaman Sea) and Mannai Seaturtle Conservation Center (Gulf of Thailand), sea turtles accidentally caught by squid trap is around 6% compared to other fishing gears.

**None of the above**

**1.4.2 Please indicate the relative level of fishing effort and perceived impact of each of the above fisheries on marine turtles (e.g. in terms of by-catch). [TSH]**

**a) Shrimp trawls**

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source: Records and reports from research vessels (shrimp trawl); as well as reports derived from surveys at landing sites.

**b) Set gill nets**

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  NONE  UNKNOWN

Source: Information from fishermen who have caught turtles in their gear.

**c) Anchored Fish Aggregating Devices (FADs)**

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  **NONE**  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  **NONE**  UNKNOWN

Source:

**d) Purse seine (with or without FADs)**

**Fishing effort:**

RELATIVELY HIGH  **MODERATE**  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  **MODERATE**  RELATIVELY LOW  NONE  UNKNOWN

Source: Information from the owners of the gear.

**e) Longline (shallow or deepset)**

**Fishing effort:**

RELATIVELY HIGH  MODERATE  **RELATIVELY LOW**  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  **RELATIVELY LOW**  NONE  UNKNOWN

Source: Information from fishermen

**f) Driftnet**

**Fishing effort:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  **NONE**  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  RELATIVELY LOW  **NONE**  UNKNOWN

Source:

**g) Other1 (from 1.4.1): Pair trawlers**

**Fishing effort:**

RELATIVELY HIGH  **MODERATE**  RELATIVELY LOW  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  **MODERATE**  RELATIVELY LOW  NONE  UNKNOWN

Source: Some pair trawlers fish illegally in the area within 3 km of the shoreline.

**h) Other2 (from 1.4.1): Squid traps**

**Fishing effort:**

RELATIVELY HIGH  MODERATE  **RELATIVELY LOW**  NONE  UNKNOWN

**Perceived Impact:**

RELATIVELY HIGH  MODERATE  **RELATIVELY LOW**  NONE  UNKNOWN

Source: Information from fishermen in coastal villages.

**1.4.3 Describe any illegal fishing that is known to occur in or around the waters of your country that may impact marine turtles. Describe the measures being taken to deal with this problem and any difficulties encountered in this regard. [TSH]**

Illegal fishing boats often invade within 3 km of coastal zone, even though fisheries patrol is set up to guard the 3 km coastal area. With the limited manpower and budget, patrolling and enforcement cannot be done thoroughly. It is planned to encourage volunteers within local communities to help monitor and protect these areas.

**1.4.4 Which of the following methods are used by your country to minimise incidental capture/mortality of marine turtles in fishing activities? [IND]**

a) **Appropriate handling** of incidentally caught turtles (e.g. resuscitation or release by fishers using equipment such as de-hooking, line cutting tools and scoop nets)

**YES**  NO  NOT APPLICABLE

Some trainings have been conducted, but not frequently.

b) **Devices that allow the escape of marine turtles** (e.g. turtle excluder devices (TEDs) or other measures that are comparable in effectiveness)

YES  NO  **NOT APPLICABLE**

Although there is information available on the use of TEDs, fishers have not accepted the use TEDs, on grounds of cost and because they know from their experience that no turtles are caught by small shrimp trawlers.

See: Chantrapornsyl, S. (1996). Status of marine turtles in Thailand. Proceedings of the First SEAFDEC Workshop on Marine Turtle Research and Conservation, Jan. 15-18, Malaysia: 77-92.

c) **Measures to avoid encirclement** of marine turtles in purse seine fisheries

YES  **NO**  NOT APPLICABLE

There are no measures specifically in relation to turtles, but from the fisheries side there are several measures to protect pelagic fish targeted by purse seiners (e.g. mesh size, light, length of net, etc.).

See: Flewelling, P. and Hosch, G.2006. Country review: Thailand (Andaman Sea). De Young, C. (ed.) Review of the state of world marine capture fisheries management: Indian Ocean. FAO Fisheries Technical Paper. No. 488. Rome, FAO. 2006. 458p.

d) **Appropriate combinations** of hook design, type of bait, depth, gear specifications and fishing practices

YES  **NO**  NOT APPLICABLE

e) **Monitoring and recovery of fish aggregating devices** (FADs)

**YES**  NO  NOT APPLICABLE

Usually FADs are used as habitats for fish shelter and spawning area. The communities take care of their FADs in order to enhance fishery resources.

f) **Net retention and recycling schemes**

YES  **NO**  NOT APPLICABLE

g) **Spatial and temporal control of fishing** (e.g. seasonal closures of fishing activities)

**YES**  NO  NOT APPLICABLE

Thailand has several areas with annual seasonal closures (e.g. areas in Prachuab, Kiri Khan - Chumphon - Surat Thani provinces) for three months from 15 February to 15 May. Similarly, there are areas in the Andaman Sea, Choburi coastal area for six months (September to February), Trad in Koh Chang area, etc. See: FAO (2009). NATIONAL FISHERY SECTOR OVERVIEW: THAILAND. FAO. FCP/CP/THA (on-line)

Flewelling, P. and Hosch, G. 2006. Country review: Thailand (Andaman Sea). De Young, C. (ed.) Review of the state of world marine capture fisheries management: Indian Ocean. FAO Fisheries Technical Paper. No. 488. Rome, FAO. 2006. 458p.

h) **Effort management control**

**YES**  NO  NOT APPLICABLE

Various effort management control measures are in place:

1. Freezing the number of trawlers. The next step will be to reduce their number and to eliminate push nets.
2. Limitations on mesh size, sieve size for purse seines and short neck clam dredgers.
3. No fishing effort allowed within 3 km from the shoreline.
4. Closed area and closed season for certain fishing gear.
5. Limitations on length, width and mesh size for Rastrelliger (mackerel) catch.

See: FAO (2009). NATIONAL FISHERY SECTOR OVERVIEW: THAILAND. FAO. FCP/CP/THA (on-line)

Flewelling, P. and Hosch, G. 2006. Country review: Thailand (Andaman Sea). De Young, C. (ed.) Review of the state of world marine capture fisheries management: Indian Ocean. FAO Fisheries Technical Paper. No. 488. Rome, FAO. 2006. 458p.

Other (list and explain):

None of the above

**1.4.5 Which of the following programmes has your country developed - in consultation with the fishing industry and fisheries management organisations - to promote implementation of measures to minimise incidental capture and mortality of turtles in national waters and in the high seas? [IND]**

**Onboard observer programmes**

YES  **NO**  NOT APPLICABLE

See: Flewelling, P. and Hosch, G. 2006. Country review: Thailand (Andaman Sea). De Young, C. (ed.) Review of the state of world marine capture fisheries management: Indian Ocean. FAO Fisheries Technical Paper. No. 488. Rome, FAO. 2006. 458p.

**Vessel monitoring systems**

YES  **NO**  NOT APPLICABLE

Although there is no VMS in Thailand per se.

1. For high seas fisheries, cooperation has been initiated with companies to minimise the incidental catch of turtles by using circle hooks for tuna longlines.
2. Boat owners have to report all of their catch, including by-catch to government agencies, or face no extension of licences for the next year.

See: Flewelling, P. and Hosch, G. 2006. Country review: Thailand (Andaman Sea). De Young, C. (ed.) Review of the state of world marine capture fisheries management: Indian Ocean. FAO Fisheries Technical Paper. No. 488. Rome,

FAO. 2006. 458p.

**Inspections** (i.e. at sea, in port, at landing sites)

**YES**  NO  NOT APPLICABLE

There are researchers and inspectors to check at ports and landing sites.

See: Flewelling, P. and Hosch, G. 2006. Country review: Thailand (Andaman Sea). De Young, C. (ed.) Review of the state of world marine capture fisheries management: Indian Ocean. FAO Fisheries Technical Paper. No. 488. Rome, FAO. 2006. 458p.

**Training programmes / workshops** to educate fishers

**YES**  NO  NOT APPLICABLE

Few training workshops have been conducted to date; it is planned to hold more (and more widespread) training sessions in future.

**Informative videos, brochures, printed guidelines** etc.

**YES**  NO  NOT APPLICABLE

Documents, posters, brochures.

**Other (list and explain):**

YES  NO  NOT APPLICABLE

**None of the above**

**1.4.6 Are the mitigation measures described in 1.4.4 and 1.4.5, periodically reviewed and evaluated for their efficacy? [SAP]**

**YES**  NO  UNSURE

Very few mitigation measures are periodically reviewed and evaluated for their efficacy.

**1.4.7 In your country, what types of data collection, research and development have been undertaken to support the reduction of marine turtle incidental catch (while taking into consideration the impact of various mitigation measures on other species)? [SAP]**

No specific studies have been conducted in Thailand but Studies in Sri Lanka and India suggest that turtle by-catch may be a problem in some fisheries. The use of Turtle Excluder Devices (TEDs) in shrimp trawling has been enforced since 1996.

**1.4.8 Has your country exchanged information and provided technical assistance (formally or informally) to other Signatory States to promote the activities described in 1.4.4, 1.4.5 and 1.4.7 above? [SAP]**

YES  NO  **UNSURE**

**1.4.9 What legislative and practical measures has your country taken in support of UN General Assembly Resolution 46/215 concerning the moratorium on the use of large-scale driftnets? [SAP]**

None

**1.5.2 Which, among the following list, are economic uses and cultural values of marine turtles in your country? Please rate the relative prevalence / importance of each consumptive or non-consumptive use.**  
[\[INF\]](#)

**USES / VALUES**

**RELATIVE PREVALENCE / IMPORTANCE**

**Meat consumption**

YES  NO

HIGH  MODERATE  LOW  UNKNOWN

**Egg consumption**

YES  NO

HIGH  MODERATE  LOW  UNKNOWN

**Shell products**

YES  NO

HIGH  MODERATE  LOW  UNKNOWN

**Fat consumption**

YES  NO

HIGH  MODERATE  LOW  UNKNOWN

**Traditional medicine**

YES  NO

HIGH  MODERATE  LOW  UNKNOWN

**Eco-tourism programmes**

YES  NO

HIGH  MODERATE  LOW  UNKNOWN

Programmes are being developed.

See: Junichi Okuyama; Boonhai, Kanokwan; Boonmee, Panumard; Mananunsap, Somachai; Charuchinda, Mickmin; Arai, Nobuak. (2003). The regional management model for ecotourism planning in the Rayong coastal area, Thailand.

Okayama, J. et al. (2003). Development on Sea Turtle Ecotourism in Mannai Island. Proc. of the 3rd SEASTAR2000 Workshop.

**Cultural / traditional significance**

YES  NO

HIGH  MODERATE  LOW  UNKNOWN

No traditional use.



**Predator control**

YES  NO  N/A

EXCELLENT  GOOD  LOW  UNKNOWN

**Vehicle / access restrictions**

YES  NO  N/A

EXCELLENT  GOOD  LOW  UNKNOWN

**Removal of debris / clean-up**

YES  NO  N/A

EXCELLENT  GOOD  LOW  UNKNOWN

Diving groups conduct underwater garbage collection along the coral reef areas.

**Re-vegetation of frontal dunes**

YES  NO  N/A

EXCELLENT  GOOD  LOW  UNKNOWN

**Building location/design regulations**

YES  NO  N/A

EXCELLENT  GOOD  LOW  UNKNOWN

**Light pollution reduction**

YES  NO  N/A

EXCELLENT  GOOD  LOW  UNKNOWN

**Other (list and rate them)**

YES  NO  N/A

**1.6.2 Has your country undertaken any evaluation of its nest and beach management programmes? [SAP]**

YES  NO  NOT APPLICABLE

Reference/contact details for published or unpublished reports concerning the evaluation of the effectiveness of nest and beach management programmes:

AUREGGI, M. (2009). Thirteen years of sea turtle conservation in South Thailand: are we avoiding extinction? Proceedings of the 5th International Symposium on SEASTAR2000 and Asian Bio-logging Science (The 9th SEASTAR2000 workshop) (2009)&#12288;http://repository.kulib.kyoto-u.ac.jp/dspace/bulletin/seastar2000: 7-10.

Chantrapornsy, S., 1992. Artificial incubation and embryonic development of olive ridley turtle eggs. Phuket mar. biol. Cent. Res. Bull. 57: 41-50.

Chantrapornsy, S., 1995. Biology and conservation of olive ridley turtles (*Lepidochelys olivacea*) in the Andaman Sea, Southern Thailand. PMBC Bulletin No. 57:51-66.

Mananunsap, S. and M. Charuchinda, 1994. Laying eggs of sea turtle around Khram Island, Chonburi Province During 1988-1993. Seminar on Fisheries, Department of Fisheries. Sept. 19-21, 1994.

Mananunsap, S. and S. Rongmuangsart, 1988. Reproductive biology of sea turtles of Khram Island, Chonburi Province. Seminar on Fisheries, Department of Fisheries, Sep. 1988.

Phasuk, B., 1981. Sea turtles and conservation. Thai Fisheries Gazette 34(3): 253-267.

Phasuk, B., 1992. Biology of sea turtles and reproductive biology of green turtle in Thailand. Thai Fisheries Gazette, 45 (1): 603-650 (1992).

Phasuk, B., 1992. Conservation of sea turtle in Thailand. Thai Fisheries Gazette, 45(3): 807-820.

## **OBJECTIVE II. PROTECT, CONSERVE AND REHABILITATE MARINE TURTLE HABITATS**

**2.1.1 What is being done to protect critical habitats *outside* of established protected areas? (NB: It is assumed that legislation relating to established protected areas will have been described in Section 1.5.1) [BPR, SAP]**

The majority of known nesting sites are within national parks and reserves.

**2.1.2 Are assessments routinely made of the environmental impact of marine and coastal development on marine turtles and their habitats? [IND, SAP]**

YES  NO  NOT APPLICABLE

**2.1.3 Is marine water quality (including marine debris) monitored near turtle habitats? If yes, describe the nature of this monitoring and any remedial measures that may have been taken. [SAP]**

YES  NO  NOT APPLICABLE

The water quality in the Andaman Sea was assessed from May 2002 to March 2003 (PCD 2003). Heavy metal concentrations and total bacteria counts were below the national standard for sea water but total coli form bacteria near Patong Beach in Phuket Province and Ban Lamsak in Phangnga Province was higher.

See: PCD. 2003. Assessment of marine environment. Pollution Control Division. CD ROM. Bangkok.

**2.1.4 Are measures in place to prohibit the use of poisonous chemicals and explosives? [SAP]**

YES  NO  NOT APPLICABLE

**2.2.1 Are efforts being made to recover degraded coral reefs? If yes, give details (location, duration, effectiveness, lessons learned, future plans etc). [IND, SAP]**

YES  NO  NOT APPLICABLE (no degraded coral reefs)

A 20-year plan has been developed by the National Environment Commission to keep a balance between economic and social development, and conservation of the environment and natural resources. Part of the prescribed action includes coastal coral reef ecosystems.

See: Thailand Policy and Prospective Plan for Enhancement and Conservation of National Environment Quality (1997-2016)

**2.2.2 Are efforts being made to recover degraded mangrove habitats that are important for turtles? If yes, give details (location, duration, effectiveness, lessons learned, future plans etc.) [IND, SAP]**

YES  NO  NOT APPLICABLE (no mangrove habitats important for turtles)

The mangrove areas along the Andaman Sea coast have decreased based on LANDSAT images taken since 1975. Many areas have been destroyed. The National Mangrove Resource Committee has established a zoning system within which activities are regulated. Because the mangrove forest area is the major source of income and food the stakeholders are joining the mangrove forest conservation and management efforts.

See: Juntarashote, K. (2003). Country report of BoBLME Programme: Thailand.

Kazuhiro, S. (2000). Socioeconomic study on the utilization of mangrove forests in southeast Asia. In : Proceedings of Asia-Pacific Cooperation on Research for conservation of mangroves, Okinawa, Japan, pp. 129-138.

**2.2.3 Are efforts being made to recover degraded sea grass habitats? If yes, give details (location, duration, effectiveness, lessons learned, future plans etc.). [IND, SAP]**

**YES**  NO  NOT APPLICABLE (no degraded sea grass habitats)

Along the Andaman Sea coast the largest seagrass beds are located from Chaomai Beach to Muk Island, off Talibong Island in Trang Province, Phangnga Bay and in Lanta Bay, Krabi Province. (Chansang et al. 1988, OEPP 2003a). Degraded seagrass beds occur near Phuket Island. The government and NGOs have started education and awareness campaigns and started a sea grass plantation.

See: Chansaeng, H., P. Boonyanate, S. Poovachiranon, N. Phongsuwan and S. Bussarawit. 1988. Project 2: Living resources in coastal areas with emphasis on mangroves and coral reef ecosystem: Subproject on inventory and monitoring of coral reefs, seagrass and soft bottom communities in the Andaman Sea. ASEAN-Australia Cooperative Program on Marine Science. Phuket Marine Biological Center, Phuket Province, Thailand. Chansaeng and Poovachiranon. 1994. The distribution and species composition of seagrass beds along the Andaman Sea Coast of Thailand. Phuket mar. Biol. Cent. Res. Bull. 59:43-52.

Juntarashote, K. (2003). Country report of BoBLME Programme: Thailand.

OEPP (Office of Environmental Policy and Planning). (2003a). OEPP 2003 Project: Thailand's National Coastal Resources and Environmental Profile. OEPP. Ministry of Science, Technology and Environment. Bangkok. (in Thai)

**OBJECTIVE III. IMPROVE UNDERSTANDING OF MARINE TURTLE ECOLOGY AND POPULATIONS THROUGH RESEARCH, MONITORING AND INFORMATION EXCHANGE**

**3.1.1 Give a list of available literature that includes baseline information from studies carried out in your country on marine turtle populations and their habitats. [INF]**

There are many publications on sea turtle population study in Thailand.

Adulyanukosol, K. & Ruangkaew, R. (2003). Sea turtle stranding records in the Andaman coast, Thailand. In: Proceedings of the 3rd Workshop on SEASTAR2000 (Editor: Arai, N.) pp. 105-109.

Aureggi, M. (2006). The status of marine turtles in Thailand. Testudo 6: 50-63.

Aureggi, M. (2009). Thirteen years of sea turtle conservation in South Thailand: are we avoiding extinction? Proceedings of the 5th International Symposium on SEASTAR2000 and Asian Bio-logging Science (The 9th SEASTAR2000 workshop) (2009) &#12288; <http://repository.kulib.kyoto-u.ac.jp/dspace/bulletin/seastar2000>: 7-10.

Aureggi, M. & Chantrapornsyl, S. (2003). Conservation Project: sea turtles at Phra Thong Island, South Thailand. Kachhapa Newsletter 9: 3-5.

Aureggi, M. & Chantrapornsyl, S. (2006). Reproductive biology and conservation of the olive ridley turtle at Phra Thong Island & aman Sea, Thailand. Phuket Marine Biological Center Research Bulletin 67: 81-87.

Aureggi, M., Chantrapornsyl, S. & Young, L. (2003). Conservation Project at Phra Thong and Kho Khao Islands, South West Thailand. Tiger Paper 30(3): 11-13.

Aureggi, M., Gerosa, G. & Chantrapornsyl, S. (2000). Elimination of egg poaching activity at Phra Thong island, Thailand. First Italian Meeting on Sea Turtle Biology and Conservation. Policoro, Italy.

Aureggi, M., Gerosa, G. & Chantrapornsyl, S. (2004). An update of sea turtle nesting along the Andaman coast of Thailand: 1996-2000. In: Proceedings 21st International Symposium on Sea Turtle Biology and Conservation (Editors: Coyne, M.S. and Clark, R.D.) pp. 98-100. NOAA Technical Memorandum NMFS-SEFSC-528.

Chantrapornsyl, S. (1997). Status of marine turtles in Thailand. Unpublished report.

Chantrapornsyl, S. (1992). Artificial incubation and embryonic development of olive ridley turtle eggs. Phuket mar. Biol. Cent. Res. Bull. 57: 41-50.

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- Charuchinda, M., Sakamoto, W., Monanunsap, N. & Arai, N. (2003b). Satellite tracking for loggerhead turtles, *Caretta caretta*: note on navigational ability in the ocean. In: *Proceedings of the 3rd Workshop on SEASTAR2000* (Editor: Arai, N.) pp. 59–62.
- Kittiwattanawong, K., Chantrapornsyl, S., and Aureggi, M. (2006). The status of marine turtles in Thailand. *Testudo Journal* 6(3): 50-63.
- Kittiwattanawong, K., Chantrapornsyl, S., Mananansup, M., Charuchinda, M., Sakamoto, W., Arai, N. & Klom-in, W. (2003). Protective areas for interesting green turtle (*Chelonia mydas*) populations in Thailand. In: *Proceedings of the 3rd Workshop on SEASTAR2000* (Editor: Arai, N.) pp. 45–48.
- Kittiwattanawong, K., Chantrapornsyl, S., Sakamoto, W., & Arai, N. (2001). Feeding and inter-nesting grounds of the green turtle nesting population at Similan islands, Thailand. In: *Book of abstracts of the 1st Workshop on SEASTAR2000*, Phuket, 2001, p. 21.
- Kittiwattanawong, K., Mananasup, S., Kinoshita, M. & Nakayama, K. (2003b). No genetic divergence between green turtle (*Chelonia mydas*) nesting populations from the Andaman Sea and the Gulf of Thailand. In: *Proceedings of the 4th Workshop on SEASTAR2000* (Editor: Arai, N.) pp. 15 – 19.
- Klom-in, W. (2001). The Royal Thai Navy sea turtles conservation in the Andaman Sea. In: *Book of abstracts of the 1st Workshop on SEASTAR2000*, Phuket, 2001, p. 12.
- Klom-in, W. (2002). The Royal Thai Navy sea turtles conservation in the Andaman Sea. In: *Book of abstracts of the 3rd Workshop on SEASTAR2000*, Bangkok, 2002, p. 36.
- Mananunsap, S. and Charuchinda, M. (1994). Laying egg of sea turtle around Khram Island, Chonburi Province During 1988-1993. *Seminar on Fisheries, Department of Fisheries*. Sept. 19-21, 1994.
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- Mananunsap, S. & Charuchinda, M. (2001). Reproductive biology of green turtle at Ko Kram Island, Chonburi Province, Thailand. In: *Proceedings of the 1st Workshop on SEASTAR2000*, pp. 11–15.
- Mananunsap, S., Charuchinda, M. & Tatsukawa, K. (2003). Satellite tracking for nesting hawksbill, *Eretmochelys imbricata* in the Gulf of Thailand. In: *Proceedings of the 3rd Workshop on SEASTAR2000* (Editor: Arai, N.) pp. 23–25.
- Mudsuk, N., Senanan, W., Monanunsap, S., and Kaewsua, N. (2005). Detection of multiple paternity in Green turtle clutches during a reproductive season at Khram Island, Thailand, the proceeding of the fifth SEASTAR 2000 workshop, December 2005, page 1-5, Kyoto, Japan.
- Phasuk, B. (1992). Biology of sea turtles and reproductive biology of green turtle in Thailand. *Thai Fisheries Gazette*, 45 (1): 603-650 (1992).
- Phasuk, B. & Rongmuangsart, S. (1973). Growth studies on the olive ridley turtle, *Lepidochelys olivacea* Eschscholtz, in captivity and the effect of food preference on growth. *Phuket Mar. Biol. Center Res. Bull.*: 114pp.
- Phasuk, B. (1992) (Thai). Biology, culture technique and conservation of sea turtles in Thailand. *Phuket Mar. Biol. Cent. Tech. Paper*. No.1/1992: 114pp.
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- Phasuk, B., (1981). Sea turtle and conservation. *Thai Fisheries Gazette* 34(3): 253-267.
- Polunin, N.V.C. (1975). Sea Turtles: reports on Thailand, West Malaysia and Indonesia with synopsis of data on the conservation status in the Indo west pacific region. IUCN unpubl. report. Settle, S. (1995). The status of nesting populations of sea turtles in Thailand and their conservation. *Tiger Paper* 22(1): 2–6.
- Shanker, K. & Pilcher, N.J. (2003). Marine turtle conservation in South and Southeast Asia: hopeless cause or cause of hope? *MTN* 100: 43 – 51.
- Shiba, N., Arai, N., Sakamoto, W., Tubtimsang, W. & Charuchinda, M. (2002). The relationship between shrimp trawl fishing grounds and adult female green turtle in the Gulf of Thailand. In: *Proceedings of the 2nd Workshop on SEASTAR2000*, pp. 5– 9.

Tsaros, P. and Areggi, M. (2007). Interaction between artisan fisheries and sea turtles at Phra Thong island. Naucrates Final report, pp16.

**3.1.2 Have long-term monitoring programmes (i.e. of at least 10 years duration) been initiated or planned for priority marine turtle populations frequenting the territory of your country? [IND, BPR]**

YES  NO  UNSURE

Monitoring of nest numbers at most nesting beaches.

Sea turtle conservation and monitoring at Phra Thong island started in 1996.

See: AUREGGI, M. (2009). Thirteen years of sea turtle conservation in South Thailand: are we avoiding extinction? Proceedings of the 5th International Symposium on SEASTAR2000 and Asian Bio-logging Science (The 9th SEASTAR2000 workshop) (2009) <http://repository.kulib.kyoto-u.ac.jp/dspace/bulletin/seastar2000>: 7-10.

**3.1.3 Has the genetic identity of marine turtle populations in your country been characterised? [INF, PRI]**

YES  NO  UNSURE

The population genetic studies of sea turtles in Thailand have been completed both in the Gulf of Thailand and the Andaman Sea Coast of Thailand. Some results showed that there was no genetic divergence of sea turtle population between the Gulf and the Andaman Sea coast of Thailand.

See: Kittiwattanawong, K., Mananunsai, S. Kinoshita, M., and Nakayama, K.(2003). No genetic divergence between green turtle *Chelonia mydas* nesting populations from the Andaman Sea and the Gulf of Thailand. Proceedings on the 4th SEASTAR2000 Workshop (2003) 15-19.

**3.1.4 Which of the following methods have been or are being used to try to identify migration routes of turtles? Use the text boxes to provide additional details. [INF, PRI]**

**Tagging**  YES  NO

Source: Department of Marine and Coastal Resources, Ministry of Natural Resources and Environment

- 1979-1983, 2000-3000 head-started turtles (green, olive ridley and hawksbill) were tagged with plastic tags and released in the Andaman sea
- 1998-recent: Inconel tag & PIT
- Inconel tags were applied to the juvenile turtles.
- Microchip tags were also applied for double tagging all turtles

**Sea turtle tagging from 1998 to 2008**

Year	Andaman Sea	Gulf of TH	SEAFDEC MFRDMD
	Inconel	PIT	Inconel
1998			1100
1999	14	20	260
2000	5	86	62
2001	71	70	50
2002	66	71	87
2003	65	50	101
2004	77	64	15
2005	117	251	12
2006	112	160	10
2007	98	291	18
2008	39	258	9
<b>Total</b>	<b>664</b>	<b>1321</b>	<b>672</b>

**Satellite tracking**  YES  NO

Satellite tracking has been done with female nesting turtles (green, hawksbill and olive ridley turtles)

On going PTTs activities

- Tracking of head started turtles
- 12-14 months old green turtles
- Fund raising by coastal hotels and resorts
- Continue experiment on GPS-PTTs

**PTT-attached sea turtles from 1995 to 2008**

	-----Andaman Sea-----	Gulf of Thailand-----	Total---
Green-----	18 (2)-----	23-----	43-----
Hawksbill-----	0-----	12-----	12-----
Loggerhead-----	0-----	1 (1)-----	2-----
Olive ridley-----	1-----	0-----	1-----
Leatherback-----	1-----	0-----	1-----
Total-----	22-----	37-----	59-----

Source: Department of Marine and Coastal Resources, Ministry of Natural Resources and Environment

See also: Aureggi, M. (2006). "The Status of Marine Turtles in Thailand." Testudo 6(3).

Monanunsap, S., Charuchinda, M. & Tatsukawa, K. (2003). Satellite tracking for nesting hawksbill, *Erethmochelys imbricata* in the Gulf of Thailand. In: Proceedings of the 3rd Workshop on SEASTAR2000 (Editor: Arai, N.) pp. 23–25.

**Other**

**None of the above**

**3.1.5 Have studies been carried out on marine turtle population dynamics and survival rates (e.g. including studies into the survival rates of incidentally caught and released turtles)? [INF, PRI]**

YES  NO  **UNSURE**

There were records of stranding sea turtles during 1991-2006 obtained from Phuket Marine Biological Center (Andaman Sea) and Mannai Seaturtle Conservation Center (Gulf of Thailand). However, there is no direct observation from fishing vessels.

**3.1.6 Has research been conducted on the frequency and pathology of diseases in marine turtles? [INF, PRI]**

**YES**  NO  UNSURE

Research has been done on captive green turtles at Mannai Island Sea Turtle Conservation (DMCR).

**3.1.7 Is the use of traditional ecological knowledge in research studies being promoted? [BPR, PRI]**

YES  **NO**  UNSURE

**3.2.1 List any regional or sub-regional action plans in which your country is already participating, which may serve the purpose of identifying priority research and monitoring needs. [INF]**

1. Cooperative research and conservation on sea turtles - Southeast Asia Sea Turtle Association Research (SEASTAR 2000) started in 2000-2004.
2. Cooperative research by SEAFDEC on regional tagging, hatchery management and regional database.

**3.2.2 On which of the following themes have collaborative studies and monitoring been conducted? Use**

**the text boxes to describe the nature of this international collaboration or to clarify your response. Answer 'NO' if the studies/monitoring undertaken do not involve international collaboration. [INF, PRI]**

**a) Genetic Identity**  YES  NO  NOT APPLICABLE

Population genetics research with in Southern Asian countries.

**b) Conservation status**  YES  NO  NOT APPLICABLE

Nesting sites and nesting population monitoring survey.

**c) Migrations**  YES  NO  NOT APPLICABLE

Inconel and microchip tagging programmes  
Satellite tracking programme within Southeast Asian countries.

**d) Other biological and ecological aspects**  YES  NO  NOT APPLICABLE

Captive breeding biology  
Monitoring sex ratios, size, growth rates in hatcheries  
Research of diseases in hatchery tanks  
Nesting behavior of Olive Ridley, Green and Hawksbill.

Other

**3.3.1 List, in order of priority, the marine turtle populations in your country in need of conservation actions, and indicate their population trends. [PRI]**

1. Olive Ridley and Leatherback due to critically low population numbers (only ~5% of historical numbers remaining)
2. Hawksbill turtle, decrease of up to ~60%
3. Green turtle, decrease of up to ~80%

No detailed statistical analysis; only monitoring of trends for nesting populations.

**3.3.2 Are research and monitoring activities, such as those described above in Section 3.1 periodically reviewed and evaluated for their efficacy? [SAP]**

YES  NO  UNSURE

Every year, SEAFDEC/MFRDMD by Japan.  
Trust Found reviews all data on tagging and genetic research on each country in SEAFDEC Member.

**3.3.3 Describe how research results are being applied to improve management practices and mitigation of threats (in relation to the priority populations identified in 3.3.1, among others). [SAP]**

Research results are being used to improve the efficacy of conservation actions through the assessment of hatchery management practices.

References are not available on head-starting programmes run in the country.

**3.4.1 Has your country undertaken any initiatives (nationally or through collaboration with other Range States) to standardise methods and levels of data collection? [BPR, INF]**

YES  NO  UNSURE

Responsible staff use standardized data, but no special agreed protocols.

**3.4.2 To what extent does your country exchange scientific and technical information and expertise with other Range States? [SAP, IND]**

OFTEN (SYSTEMATICALLY)                       **OCCASIONALLY**                       RARELY                       NEVER

**3.4.3 If your country shares scientific and technical information and expertise with other Range States, what mechanisms have commonly been used for this purpose? Comment on any positive benefits/outcomes achieved through these interactions. [INF]**

Seminars, publications, website, and proceedings of meetings (for SEASTAR, satellite tracking data and SEAFDEC/MFRI)

**3.4.4 Does your country compile and make available to other countries data on marine turtle populations of a regional interest? [INF]**

**YES**    NO    UNSURE

Compilation of data on migration and shared feeding grounds are shared upon request.

**OBJECTIVE IV. INCREASE PUBLIC AWARENESS OF THE THREATS TO MARINE TURTLES AND THEIR HABITATS, AND ENHANCE PUBLIC PARTICIPATION IN CONSERVATION ACTIVITIES**

**4.1.1 Describe the educational materials, including mass media information programmes that your country has collected, developed and/or disseminated. [INF, PRI]**

General materials on awareness developed include:  
Booklets, brochures, videos, presentations to schools and community groups, T-shirts, posters, etc.

Database and websites are under construction.

**4.1.2 Which of the following groups have been the targets of these focused education and awareness programmes described in above in Section 4.1.1? [PRI, INF]**

- Policy makers
- Fishing industry
- Local/Fishing communities**
- Indigenous groups
- Tourists**
- Media**
- Teachers**
- Students**
- Military, Navy, Police
- Scientists**
- Other:
- None of the above

**4.1.3 Have any community learning / information centres been established in your country? [BPR, SAP]**

**YES**    NO

The Department of Marine and Coastal Resources (DMCR) established information centers at various places for public learning.

Plans to establish a local natural resource museum and information center.

Conservation center is now established at Lion village Ko Phra Thong, run by Naocrates and PMBC.

**4.2 Alternative livelihood opportunities [IND, BPR] Describe initiatives already undertaken or planned to identify and facilitate alternative livelihoods (including income-generating activities) for local communities.**

None

**4.3.1 Describe initiatives already undertaken or planned by your country to involve local communities, in particular, in the planning and implementation of marine turtle conservation programmes. Please include details of any incentives that have been used to encourage public participation, and indicate their efficacy. [BPR, IND]**

Local volunteer group involved in conservation of sea turtle in the areas.

**4.3.2 Describe initiatives already undertaken or planned to involve and encourage the cooperation of Government institutions, NGOs and the private sector in marine turtle conservation programmes. [IND, BPR]**

Efforts have been made to involve coastal residents in turtle conservation and monitoring nesting beaches.

**OBJECTIVE V. ENHANCE NATIONAL, REGIONAL AND INTERNATIONAL COOPERATION**

**5.1.1 Has your country undertaken a national review of its compliance with Convention on International Trade in Endangered Species (CITES) obligations in relation to marine turtles? [SAP]**

YES  NO  NOT APPLICABLE

Thailand signed CITES in 1991 and listed all kinds of marine turtle as protected animals in the wildlife preservation acts of 1992.

**5.1.2 Does your country have, or participate/cooperate in, CITES training programmes for relevant authorities? [SAP]**

YES  NO  NOT APPLICABLE

**5.1.3 Does your country have in place mechanisms to identify international illegal trade routes (for marine turtle products etc.)? Please use the text box to elaborate on how your country is cooperating with other States to prevent/deter/eliminate illegal trade. [SAP]**

YES  NO  NOT APPLICABLE

Sea turtle products, including their by-products, cannot be imported or exported abroad without permission and according to CITES regulations. Source: FAO (2009). NATIONAL FISHERY SECTOR OVERVIEW: THAILAND. FAO. FCP/CP/THA (on-line)

**5.1.4 Which international compliance and trade issues related to marine turtles has your country raised for discussion (e.g. through the IOSEA MoU Secretariat, at meetings of Signatory States etc.)? [INF]**

**5.1.5 Describe measures in place to prevent, deter and eliminate domestic illegal trade in marine turtle products, particularly with a view to enforcing the legislation identified in Section 1.5.1. [INF]**

Strengthen enforcement of laws and legislation concerning protected animals.

**5.2.1 Has your country already developed a national **action plan** or a set of **key management measures** that could eventually serve as a basis for a more specific action plan at a national level? [IND]**

**YES**  **NO**

Now, Thailand is trying to develop a national plan for sea turtle conservation and management, in which DMCR is participating (on behalf of Government) along with and Thailand Wildlife Foundation (NGO representation).

Also Wildlife Reservation and Protection Act B.E., 2535 (1992) covers general conservation protection for sea turtles.

See; FAO (2009). NATIONAL FISHERY SECTOR OVERVIEW: THAILAND. FAO. FCP/CP/THA (on-line)

**5.2.2 From your country's perspective, which **conservation and management activities**, and/or which particular **sites or locations**, ought to be among the highest priorities for action? [PRI]**

1. Database on marine turtle (3.4)
2. Assessment of each population of marine turtle species (3.1)
3. Reducing incidental catch (1.4)
4. Promoting public participation (4.3)
5. Developing nesting beach management programmes (2.1)

**5.2.3 Please indicate, from your country's standpoint, the extent to which the following **local management issues** require **international** cooperation in order to to achieve progress. [PRI]**

<b>Illegal fishing in territorial waters</b>	<input checked="" type="checkbox"/> <b>ESSENTIAL</b> <input type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> <b>LIMITED</b> <input type="checkbox"/> <b>NOT AT ALL</b>
<b>Incidental capture by foreign fleets</b>	<input type="checkbox"/> <b>ESSENTIAL</b> <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> <b>LIMITED</b> <input type="checkbox"/> <b>NOT AT ALL</b>
<b>Enforcement/patrolling of territorial waters</b>	<input type="checkbox"/> <b>ESSENTIAL</b> <input type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> <b>LIMITED</b> <input type="checkbox"/> <b>NOT AT ALL</b>
<b>Hunting/harvest by neighboring countries</b>	<input type="checkbox"/> <b>ESSENTIAL</b> <input type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> <b>LIMITED</b> <input type="checkbox"/> <b>NOT AT ALL</b>
<b>Poaching, illegal trade in turtle projects</b>	<input checked="" type="checkbox"/> <b>ESSENTIAL</b> <input type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> <b>LIMITED</b> <input type="checkbox"/> <b>NOT AT ALL</b>
<b>Development of gear technology</b>	<input type="checkbox"/> <b>ESSENTIAL</b> <input type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> <b>LIMITED</b> <input type="checkbox"/> <b>NOT AT ALL</b>
<b>Oil spills, pollution, marine debris</b>	<input type="checkbox"/> <b>ESSENTIAL</b> <input type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> <b>LIMITED</b> <input type="checkbox"/> <b>NOT AT ALL</b>
<b>Training / capacity-building</b>	<input checked="" type="checkbox"/> <b>ESSENTIAL</b> <input type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> <b>LIMITED</b> <input type="checkbox"/> <b>NOT AT ALL</b>
<b>Alternative livelihood development</b>	<input type="checkbox"/> <b>ESSENTIAL</b> <input type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> <b>LIMITED</b> <input type="checkbox"/> <b>NOT AT ALL</b>
<b>Identification of turtle populations</b>	<input type="checkbox"/> <b>ESSENTIAL</b> <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> <b>LIMITED</b> <input type="checkbox"/> <b>NOT AT ALL</b>
<b>Identification of migration routes</b>	<input type="checkbox"/> <b>ESSENTIAL</b> <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> <b>LIMITED</b> <input type="checkbox"/> <b>NOT AT ALL</b>
<b>Tagging / satellite tracking</b>	<input type="checkbox"/> <b>ESSENTIAL</b> <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> <b>LIMITED</b> <input type="checkbox"/> <b>NOT AT ALL</b>
<b>Habitat studies</b>	<input checked="" type="checkbox"/> <b>ESSENTIAL</b> <input type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> <b>LIMITED</b> <input type="checkbox"/> <b>NOT AT ALL</b>
<b>Genetics studies</b>	<input type="checkbox"/> <b>ESSENTIAL</b> <input checked="" type="checkbox"/> <b>IMPORTANT</b> <input type="checkbox"/> <b>LIMITED</b> <input type="checkbox"/> <b>NOT AT ALL</b>

**5.3.1 Identify existing frameworks/organisations that are, or could be, useful mechanisms for cooperating in marine turtle conservation at the sub-regional level. Please comment on the strengths of these instruments, their capacity to take on a broader coordinating role, and any efforts your country has made to enhance their role in turtle conservation. [INF, BPR]**

Prohibition of harvest and trade of sea turtles and their products, both nationally and internationally.

**5.3.2 Has your country developed, or is it participating in, any networks for cooperative management of shared turtle populations? [BPR, INF]**

YES  NO  NOT APPLICABLE

**5.3.3 What steps has your country taken to encourage Regional Fishery Bodies (RFBs) to adopt marine turtle conservation measures within Exclusive Economic Zones (EEZs) and on the high seas? [SAP]**

None

**5.4.1 Describe your country's needs, in terms of human resources, knowledge and facilities, in order to build capacity to strengthen marine turtle conservation measures. [PRI]**

Patrol boats with accessories and equipment such as dehooking devices.

**5.4.2 Describe any training provided in marine turtle conservation and management techniques (e.g. workshops held, training manuals produced etc.), and indicate your plans for the coming year. [PRI, INF]**

Training is conducted regularly on marine turtle research and conservation for Government sectors, teachers, school children and the private sector.

Training programmes on the national level are organized by the DMCR.

Regional or international training will be approved by the Ministry of Natural Resources and Environment.

**5.4.3 Specifically in relation to capacity-building, describe any partnerships developed or planned with universities, research institutions, training bodies and other relevant organisations. [BPR]**

Marine and Coastal Resources Research and Development Institute

**5.5.1 National policies and laws concerning the conservation of marine turtles and their habitats will have been described in Section 1.5.1. Please indicate their effectiveness, in terms of their practical application and enforcement. [SAP, TSH]**

**5.5.2 Has your country conducted a review of policies and laws to address any gaps, inconsistencies or impediments in relation to marine turtle conservation? If not, indicate any obstacles encountered in this regard and when this review is expected to be done. [SAP]**

YES  NO  UNSURE

Legislation concerning conservation of marine turtle has been improved and is now considered sufficient.

**5.5.3 From the standpoint of law enforcement, has your country experienced any difficulties achieving cooperation to ensure compatible application of laws across and between jurisdictions? [TSH]**

YES  NO  UNSURE

**OBJECTIVE VI. PROMOTE IMPLEMENTATION OF THE MoU INCLUDING THE CONSERVATION AND MANAGEMENT PLAN**

**6.1.1 What has your country already done, or will it do, to encourage other States to sign the IOSEA MoU? [INF]**

Nothing

**6.1.2 Is your country currently favourable, in principle, to amending the MoU to make it a legally binding instrument? [INF]**

YES  NO  NO VIEW

**6.1.3 Would your country be favourable, over a longer time horizon, to amending the MoU to make it a legally-binding instrument? [INF]**

YES  NO  NO VIEW

## **6.2 Secretariat and Advisory Committee**

**6.2.1 What efforts has your country made, or can it make, to secure funding to support the core operations of the IOSEA MoU (Secretariat and Advisory Committee, and related activities)? [IND]**

Not considered yet

**6.3.1 What funding has your country mobilised for domestic implementation of marine turtle conservation activities related to the IOSEA Marine Turtle MoU? Where possible, indicate the specific monetary values attached to these activities/programmes, as well as future plans. [IND]**

Not at present, but we use our regular budgets from DMCR to do research and conservation programme on these matters.

**6.3.2 Has your country tried to solicit funds from, or seek partnerships with, other Governments, major donor organisations, industry, private sector, foundations or NGOs for marine turtle conservation activities? [IND]**

YES  NO

Collaborative research and conservation of marine turtles by JSPS, funded through the Kyoto University, Japan, and by Japan Trust Fund (via SEAFDEC).

Phuket Mariotte Hotel established a Mai Khao Sea Turtle Conservation Foundation to support Mai Khao beach sea turtle conservation activities.

Dusit & Laguna Co. Ltd. And Le Meridien Hotel, Phuket, provides a sea turtle conservation awareness campaign and arranges an annual sea turtle releasing festival. A donation is collected for the PMBC Sea Turtle Conservation Project.

**6.3.3 Describe any initiatives made to explore the use of economic instruments for the conservation of marine turtles and their habitats. [BPR]**

None

**6.4.1 Has your country designated a lead agency responsible for coordinating national marine turtle conservation and management policy? If not, when is this information expected to be communicated to the IOSEA MoU Secretariat? [IND]**

YES  NO

**6.4.2 Are the roles and responsibilities of all government agencies related to the conservation and management of marine turtles and their habitats clearly defined? [IND]**

YES  NO  UNSURE

**6.4.3 Has your country ever conducted a review of agency roles and responsibilities? If so, when, and what was the general outcome? If not, is such a review planned and when? [SAP],**

YES  NO  UNSURE

An attempt to develop a national action plan for conservation is under progress. Two workshops were conducted to gather information on protocols employed by each responsible organization. Further meeting will be held in order to develop a common conservation strategy. The implementation of the plan is expected after an MoU is signed among responsible organizations.

**Comments/suggestions to improve the present reporting format:**

**Additional information not covered above:**

## **Annex 2. Overview of marine turtle populations (by country)**



## Indian Ocean – South-East Asian Marine Turtle Memorandum of Understanding



**Scope of Query:** Bangladesh, India, Indonesia, Malaysia, Maldives, Myanmar, Sri Lanka, Thailand  
**Bangladesh**

### 1.1 Introduction to marine turtle populations and habitats, challenges and conservation efforts. [INF]

**Responses** (8=100.0%): Bangladesh, India, Indonesia, Malaysia, Maldives, Myanmar, Sri Lanka, Thailand  
**No Response:**

#### Detailed Responses

**Bangladesh** Bangladesh coastline measures 710 kilometres approximately (ICZM 2003). Not all the coastline is suitable for nesting, because sandy beaches are available only in sections along the mainland coast (Islam 2006). Apart from the mainland coast, there are numerous offshore islands whose sandy beaches are ideal for marine turtle nesting (Islam 2006).

Although five species of marine turtles occur in the territorial waters of Bangladesh (Rashid and Islam 2005), only three species have been reported to nest in Bangladesh. Among them, olive ridleys (Ahmed et al 1986, Khan 1987, Rashid 1984, 1986, Rashid and Islam 1999, Islam 2002, Rashid & Islam 2005) and green turtles (Khan 1982, 1987, Rashid 1997, Rashid and Islam 1999) are common, while hawksbills are rare (Rashid 1997, Islam 2002). There was an unconfirmed nesting record of a loggerhead based on a specimen collected by the staff of the Marine Fisheries Research Institute (MFRI) in Cox's Bazaar. Leatherback turtles are seldom encountered (Rashid and Islam 1999) and with no known records of nesting, in Bangladesh; although, one crawl mark recorded in Ceeradia, St. Martin's Island was suspected to be from a leatherback turtle.

Olive ridleys nest on sandy beaches all along the mainland coast and islands stretching from the Sunderban mangrove forests in the southwest, to St. Martin's Island in the southeast. Subsequent comprehensive studies (CARINAM 1996-98) have shown that the estimated numbers of ridleys nesting annually at St. Martin's Island may be less than 200 individuals. A total of 639 ridleys were recorded to nest on St. Martin's Island from October 1996 to February 2003, with the highest numbers recorded during the 2000-01 season. Centre for Nature Resource Studies (CNRS) recorded 650 nesting individuals (GT-129, OL-521) from 2002 to 2007 during a study funded by CAIRNS-Bangladesh. CWBMP recorded 30 olive ridleys and one green turtle from October 2007 to May 2008.

Green turtles are less widespread than olive ridleys; they nest along the mainland coast as well as on island beaches. They have been reported to nest on south-central island beaches, mainland beaches in the southeast (from Cox's Bazar to Teknaf) and also on some coastal islands (e.g., St. Martin's, Sonadia, Kutubdia, Hatiya and Sandweep islands). Nesting records for this species are either rare or absent for the coastal beaches of the Sunderbans. Green turtles nest year-round but the frequency of nesting increases from October to February, with the peak during November to January. They nest on the same beaches as olive ridley turtles, though there may be differences in nest site selection.

Nesting hawksbill turtles are rare visitors to the beaches of Bangladesh (Rashid & Islam 2005). There are a few unconfirmed reports of nesting on St. Martin's Island, the most recent being in 1992 (Rashid 1997). Reports from the local people of the island indicate that it used to nest here regularly in the 1950s. Little information is available on the loggerhead species in Bangladesh. The nearest sites where nesting of loggerheads has been reported are the islands off Myanmar (Thorbjarnarson et al. 2000), which lie east of St. Martin's Island; a few may nest in Bangladesh.

Leatherback turtles have not been recorded nesting in Bangladesh (Islam 2006). A search of the literature found no historic evidence of leatherback nesting in Bangladesh. However, on 11 April 1997 a dead adult leatherback turtle was washed ashore on St. Martin's Island (Islam 1999, Rashid & Islam 2005). During the 2000-01 breeding season, a crawl mark suspected to be that of a leatherback was observed at the southern tip of the southern-most of the three Ceeradia islands. In 2006 two leatherbacks washed ashore and in 2007 a live young leatherback was brought to the Bakkhali river fish landing, Cox's Bazaar after it got trapped in a fishing net. The turtle later died of exhaustion and heat.

See References in Section 3.1.1

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## India

India with ~8500 km coastline and two marine eco-regions (Bay of Bengal and the Arabian Sea), supports four species of marine turtles out of the seven species known in the world: green turtle, olive ridley, hawksbill, leatherback. A fifth species (loggerhead) inhabits the eco-regions, at least in small numbers.

India supports the largest known population of nesting olive ridley turtles, along the Orissa coast, and the largest nesting population of leatherback turtles in the Andaman & Nicobar Islands in the south Asia region. Foraging areas used by these species are presumed to be, at least in part, within the Indian Ocean. The Andaman & Nicobar and Lakshadweep group of islands, with extensive coral formations and undisturbed lagoons, also support a large foraging population and some nesting populations of hawksbill and green turtles. The full extent of the foraging areas used by these species is undefined.

The marine turtles in India face many threats including incidental capture in marine fisheries and a host of other problems on the nesting beaches, due to the various developmental activities and coastal human population density and their dependency on the marine environment. In addition, industrial development and production, ports and shipping, beach armouring, erosion and coastal plantations, etc. pose serious threats to the survival of marine turtles (Rodrigues et al 2010).

Because they are protected under the Indian Wildlife (Protection) Act, 1972, marine turtles in India have received much conservation and management attention for the last three decades. The MoEF (Ministry of Environment & Forests) supports conservation efforts of the maritime provinces to protect and manage the marine turtle populations and their habitats through the Govt. of India Wildlife Conservation Schemes. In addition to the Forest and Wildlife organizations of the central and maritime states, the Indian Coast Guard, Indian Navy and the marine fisheries organizations have also been involved in the conservation of marine turtles, particularly in controlling incidental capture related mortalities in the state of Orissa.

Several academic institutions and organisations have also been supported for conducting basic and management related research on marine turtles and their habitats including population surveys, genetic studies, and satellite telemetry studies to identify migratory routes and foraging habitats of turtles.

Based on citations in Section 3.1.1 and

Choudhury, B. C., S. C. Sharma, et al. (2000). "The sea turtle conservation agenda of India." Sea turtles of the Indo-Pacific: research management and conservation. Proceedings of the Second ASEAN Symposium and Workshop on Sea Turtle Biology and Conservation.: 100-106.

Rodriguez, S and Sridhar, A. 2010. Harboursing Trouble: The Social and Environmental Upshot of Port Growth in India. Dakshin Foundation, Bangalore, p 62. ([www.dakshin.org](http://www.dakshin.org))]

Shanker, K. (2004). Marine turtle status and conservation in the Indian Ocean FAO Fisheries Report Supplement Rome, 9-12 March 2004 FAO. 738: 238p.

Shanker, K. & Choudhury, BC (eds.) 2006. "Marine Turtles of Indian Subcontinent" . Universitie Press, Hyderabad. A Publication of GOI-UNDP & Wildlife Institute of India, Dehra Dun.

Sampath, V. (2003). NATIONAL REPORT on the Status and Development Potential of the Coastal and Marine Environment of the East Coast of India and its Living Resources.

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## Indonesia

Indonesia, the world's largest archipelago with more than 17,000 islands along the equator is blessed with more than 360 million ha of marine area. Being within the North and South 20oC isotherms of average sea surface temperature, Indonesia is a perfect location for the growth of coral-reef, sea grass-bed, and a high biodiversity of marine organisms, including nesting, feeding and migration corridors for six of the world's seven species of marine turtles.

Among the six turtle species found in Indonesian waters, three species are prominent, i.e. the green turtle (*Chelonia mydas*), hawksbill turtle (*Eretmochelys imbricata*), and the leatherback turtle (*Dermochelys coriacea*). The green turtle and the hawksbill turtle have wide distributions and are the most abundant turtles found in the region. The annual total nesting activity throughout the country for the green and hawksbill turtles may exceed 35,000 and 28,000, respectively. Derawan island of East Kalimantan, with annual nesting density between 4635 - 5011 per year is considered to be one of the largest green turtle rookeries in the region. Although the numbers of nesting turtles fluctuate throughout the year (low to peak

season), this area is one place where people may see the nesting turtles anytime during the year. This is not necessarily the case for other rookeries, and Derawan island a perfect site to develop turtle-based tourism. The nesting population of the leatherback turtle has not been properly documented, except at the single nesting beach of Jamursba Medi (and nearby), Irian Jaya. However, the northern coast of Papua (including Jamursba Medi) remains as the largest leatherback rookery in the Pacific.

Two of the other three turtle species, i.e. the olive ridley (*Lepidochelys olivacea*) and the loggerhead (*Caretta caretta*), nest in relatively small numbers at scattered locations throughout the archipelago. The third species, the flatback turtle (*Natator depressus*), is endemic to Australia, but is found in many feeding grounds within the Flores Banda and Arafura seas.

See references in Section 3.1.1

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## Malaysia

Malaysia is comprised of Peninsular Malaysia, located in the southern-most part of the Malay Peninsula; and East Malaysia (Sabah and Sarawak) on the island of Borneo.

Four species of marine turtles (leatherback, green turtle, hawksbill, and olive ridley) are found in Malaysia. 1 Current statistics indicate that the leatherback and olive ridley turtle populations are nearing extinction in Malaysia; while other species, with the exception of the green turtles of the Sabah Turtle Islands, are in steady decline.

The leatherback turtle (*Dermochelys coriacea*) nests mainly along a 15 km stretch of beach centred in Rantau Abang, Terengganu. Records show that nesting density in the 1950's exceeded 10,000 but have plummeted to near zero in recent years. When once Rantau Abang was regarded as one of the world's most important nesting sites for leatherbacks, the 99.9% decline has brought the species to extinction in Malaysia.

The olive ridley turtle (*Lepidochelys olivacea*) nests in northern Terengganu, Penang, possibly Perak and Sarawak. It has suffered the same fate as the leatherback turtles. In the mid 1980s, 500 nests were deposited annually in Terengganu, but the species has not been seen nesting at Terengganu since 2005. Notwithstanding, remnant numbers may still occur in Penang and Perak and Sarawak.

The hawksbill turtle (*Eretmochelys imbricata*) nests in the Sabah Turtle Islands, Melaka and to a lesser degree in Redang Island, Terengganu. Declines have not been as dramatic as the leatherback and olive ridley turtles. In Sabah, where current nesting density is registered at around 450 nests per annum, a 25% decline has been registered over the last ten years. According to available data, the Melaka nesting density has fluctuated from 208 – 471 nests per annum. However it is not possible to comment on the trend as yearly nesting data is not available. In Terengganu, a 70% decline has been registered in the last 20 years. Currently, about a dozen nests are deposited annually.

The green turtle (*Chelonia mydas*) is a widely distributed species with significant nesting populations occurring in Sabah, Sarawak and Terengganu. The population in Sabah staged a recovery from 1987-2000. An average of 6549 nests per annum has been recorded from 2004-2008, compared to the 9071 annual nests deposited from 1994-1998. In 2009, over 13,000 nests were deposited. The Sarawak population has declined from over 13,000 nests per year in the 1950s to about 2,000 in recent years, giving a decline of 85%. Nesting data for Terengganu from the mid 1980s to 2008 show a decline of 25% from over 3,000 nests in the 1980s to the average of 2355 nests annually from 2004-2008.

Population decline is attributed to a long history of egg exploitation, poaching of local populations by illegal fishing boats from neighbouring countries, fishing mortality (incidental catch, ghost fishing and destructive fishing methods), loss of nesting and marine habitats, marine pollution, and negative impacts of tourism and climate change.

Although Marine turtle conservation in Malaysia has occurred for decades, it needs to be upgraded through education, legislation, and coordinated among the various states and agencies of Malaysia. Conservation efforts through development of hatcheries were started in Terengganu in 1961, Kelantan in 1964, Pahang in 1971, Malacca in 1987 and Perak in 1990. Existing egg incubation programmes should be expanded and in-situ incubation of nests should be more widely practiced where possible.

Most of the major nesting beaches in Malaysia are now protected as sanctuaries where commercial egg collection is prohibited. In some of these sanctuaries, especially in Terengganu, more stringent supervision of the management of the sanctuaries is needed. Commercial sale of turtle eggs should be banned throughout Malaysia to put a stop to the rampant smuggling of eggs from East Malaysia into West or Peninsular Malaysia and to curb the appetite for turtle eggs among many Malaysians.

Fisheries regulations need review and up-dating. Currently, several regulations are in place: Fisheries

(Prohibition of Methods of Fishing) Regulations 1990 (bans the use of drift nets/ gillnets with mesh sizes greater than 10 inches); Fisheries (Prohibited Area) Regulations 1991 (waters off Merchang to Kampung Kuala Abang (Tanjung Jara, Terengganu) declared a prohibited area).

Poaching of local populations by foreign vessels has emerged as one of the most serious threats that needs to be addressed.

Through the BOBLME project, Malaysia is participating with neighbouring countries to improve marine turtle conservation.

Source:

Abu Talib, A., G.H. Tan and Y. Abd. Hamid. 2003. Overview of the national fisheries situation with emphasis on the demersal fisheries off the West Coast of Peninsular Malaysia, p. 833 - 884. In G. Silvestre, L. Garces, I. Stobutzki, M. Ahmed, R.A. Valmonte-Santos, C. Luna, L. Lachica-Ali, P. Munro, V. Christensen and D. Pauly (eds.) Assessment, Management and Future Directions for Tropical Coastal Fisheries in Asian Countries. WorldFish Center Conference Proceedings 67, 1 120 p.

Chan, E.H. 2004. Turtles in Trouble. Siri Syarahan Inaugural KUSTEM : 7 (2004). Kolej Universiti Sains dan Teknologi Malaysia (now known as Universiti Malaysia Terengganu). ISBN 983-2888-07-7. Pdf available at :<http://www.turtleconservationcentre.org/wp-content/uploads/TurtlesInTrouble.pdf>

Chan, E. H. 2006. Marine turtles in Malaysia: On the verge of extinction? *Aquatic Ecosystem Health & Management* 9 (2): 175-184.

Chan, E.H. 2009. Population trends in South East Asian sea turtles. Pp 11-12 and 33-42 In: Chan, E.H., N. Pilcher and K. Hiew. Report of the Workshop on Regional Cooperation to Address Direct Capture of Sea Turtles 1-3 June 2009, Kuala Terengganu. Penerbit UMT, Universiti Malaysia Terengganu.

Chan, E. H. 2010. Malaysian turtles in crisis. Opinion paper written for WWF Malaysia in support of the Memorandum to the Most Honourable Prime Minister of Malaysia, Dato' Sri Mohd Najib bin Tun Abdul Razak Re Enactment of Comprehensive Federal Legislation for Turtles.

Chan, E.H., N. Pilcher and K. Hiew. 2009. Report of the Workshop on Regional Cooperation to Address Direct Capture of Sea Turtles 1-3 June 2009, Kuala Terengganu. Penerbit UMT, Universiti Malaysia Terengganu.

Liew, H. C. 2002. Status of marine turtle conservation and research in Malaysia. Pp. 51-56. In: Proceedings of the Western Pacific Sea Turtle Cooperative Research and Management Workshop, February 5-8, 2002, Honolulu, Hawaii, USA.

Pilcher, N. J. 2010. Threats to marine turtles in Malaysia. Opinion paper written for WWF Malaysia in support of the Memorandum to the Most Honourable Prime Minister of Malaysia, Dato' Sri Mohd Najib bin Tun Abdul Razak Re Enactment of Comprehensive Federal Legislation for Turtles.

Shanker, K. 2004. Marine turtle status and conservation in the Indian Ocean. Papers Presented at the Expert Consultation on Interactions between Sea Turtles and Fisheries within an Ecosystem Context, Rome, 9-12 March 2004. FAO Fisheries Report No. 738, Supplement, p. 85-134.

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## Maldives

The Maldives is a chain of 26 coral atolls, containing 1192 islands, that extends approximately 860km from latitude 7o6'35"N to 0o42'24"S, and between longitude 72o33'19"E to 73o46'13"E (Woodroffe 1989, Ali 2004). The islands vary in size (approx. 0.5 km<sup>2</sup> - approx. 5.0 km<sup>2</sup>) and in shape (small sandbanks with sparse vegetation - elongated strip islands). Approximately 80% of the land area of the Maldives is less than 1 meter above mean high tide level (maximum height about 3 meters) (MHAHE, 1999).

A nationwide ban on harvesting adult and juvenile turtles was began 1995; in addition, a 10 year moratorium on the harvesting of turtle eggs was started. A new 10 year moratorium began on January 1, 2006 (Maldivian Fisheries Law, Clause 10, Law No. 5/87).

The only compiled report about the sea turtles of Maldives is in the "Marine Research Bulletin" published from Marine Research Center (Frazier et al. 2000, Zahir 2000). Adult and immature green turtles (*Chelonia mydas*) forage throughout the archipelago; nesting occurs on many islands (Kunfunadhoo and Maadhoo Islands (Baa), Hukuruelhi (now changed to Hukurudhoo) Island (Ari), Gaadhoo, Hithadhoo and Isdhoo islands (Laamu)). Adult and immature hawksbill turtles (*Eretmochelys imbricata*) forage throughout the archipelago. Nesting occurs on Kunfunadhoo (Baa) and Baros (North Malé). Nesting, at least in small numbers, occurs on most uninhabited islands of the atolls (Frazier et al. 2000, Zahir 2000, Zahir 2006).

Three other marine turtle species have been reported from the archipelago: The olive ridley (*Lepidochelys olivacea*), the loggerhead (*Caretta caretta*), and the leatherback (*Dermochelys coriacea*) (Frazier et al. 2000, Zahir 2000, Zahir 2006). These species are not common; information concerning their occurrence and distribution (including nesting) is scant. A more current assessment is needed.

Although eggs of both green and hawksbill turtles were eaten in the past; the level of current consumption is unknown. The same is true concerning the local consumption of meat, which traditionally focuses on green turtles. There is a history of commercial use of hawksbill shell but this has been legislated against. However, collection of turtle eggs is allowed in view of their traditional importance as a protein source. As a result, the stocks are considered depleted until better data provide a clearer picture of their status.

Based on Ali, M. (2004). The Maldives: National Report. Status and developmental potential of the coastal and marine resources of the Maldives and their threats. GEF PDF Block B Phase of FAO/BOBLME Programme Sustainable Management of the Bay of Bengal Large Marine Ecosystem (BOBLME) GCP/RAS /179/WBG

Liew, Hock-Chark (2009). Turtle Conservation Plan for Gan Island. Maldives component in the Regional Programme for Participatory and Integrated Agriculture, Forestry and Fisheries Development for Long-term Rehabilitation and Development in Tsunami-affected Areas (GCP/RAS/218/JPN).

MHAHE (Ministry of Home Affairs Housing and Environment), (1999) Second National Environment Action Plan NEAP II, Male' Maldives.

Woodroffe, C. (1989) Maldives and Sea Level Rise: An Environmental Perspective. University of Wollongong, Australia.

Zahir, H. (2006). Sea turtles in the Maldives: Status, threats and management. Workshop on Assessing the relative importance of sea turtle mortality due to fisheries Zanzibar, 25-28 April 2006. (PowerPoint presentation).

See also references listed in Section 3.1.1

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**Myanmar** The Union of Myanmar is situated between longitude 90deg-108deg East and latitude 10deg- 28deg North. It has coastline of 2832 km, which is divided into three regions: the Rakhine region to the north, facing Myanmar's most prolific shrimp grounds in the Bay of Bengal and bordering with Bangladesh; the Gulf of Mottama region (or "Ayeyarwady"), in the centre; and the Tanintharyi region to the south, facing the 800-island Myeik archipelago of the Andaman Sea and bordering with Thailand.

The continental shelf spreads over some 228,751 km<sup>2</sup>, and the exclusive economic zone (EEZ) has a surface area of almost half a million square kilometres (486000 km<sup>2</sup>). The territorial sea of Myanmar extends 12 nautical miles from the base line towards the sea and EEZ covers all areas of territorial sea and extend 200 nautical miles from the base line to seawards.

Turtle nesting occurs around the Andaman Sea, Gulf of Mottama (Gulf of Mattaban), Thameehla Island, and Bay of Bengal. In 1963, the Department of Fisheries (DoF) began a project to propagate and conserve sea turtles on Thameehla Island (Diamond Island) in Ngaputaw Township, Ayeyarwady Division. Then in 1986-87, the project was fully revived and a hatchery was established with skillful technicians (Aung and Maung, 1999; Lwin and Myo, 2003).

Conservation and research activity increased when Myanmar became a member of Southeast Asian Fisheries Development Center (SEAFDEC) in 1999. As a member, Myanmar was able to participate in training and workshops related to conservation and enhancement of turtle conducted by SEAFDEC. At present, Myanmar is cooperating and collaborating with many institutions namely ASEAN-SEAFDEC, and Memorandum of Understanding on Conservation and Management of Marine Turtles and their Habitats in Indian Ocean and Southeast Asia (IOSEA-MoU).

Three species of sea turtles are commonly seen in Myanmar and nest regularly: olive ridley (Leik Hlaung), green turtle (Pyin Tha Leik), and hawksbill (Leik Kyet Tu Yway). Two other species (the loggerhead (Leik Khway) and leatherback (Leik Zaung Lyar) turtles) are reported seldom by fishermen from some parts of the Taninthayi and are totally absent in the Mon, Rakhine and Ayeyarwady Delta Coastal areas.

Olive ridley turtles are found in the Mon and Ayeyarwady divisions, Lampi Island in Tanintharyi Division and Thameehla Island. Hawksbill turtles are found in the Taninthayi and Rakhine Coastal areas, and green turtles in the Mon, Taninthayi, Rakhine, Ayeyarwady and Coco Island. Other Islands in Bogalay Township in Ayeyarwaddy Division are important for marine turtles.

Summary of nesting sites and feeding habitats for sea turtles in Myanmar:

Tanintharyi Division 97deg to 98deg 45 ' E 10deg 30 ' to 15deg N  
Mon State 97deg to 97deg 45 ' E 15deg to 16deg 30 ' N  
Rakhine State 92deg 15 ' to 94deg 45 ' E 17deg 15 ' to 21deg N  
Ayeyarwaddy Division 94deg to 96deg E 15deg 30 ' to 16deg N  
Yangon Division ( Coco Island ) 93deg 30' to 94deg 06 ' E 14deg to 15deg N

The reasons for the decreasing sea turtle population in Myanmar can be summarised as follows:

- (a) Human habitation on beaches used by turtles;
- (b) Poaching of turtles eggs without reserve for the sustainability of turtles;
- (c) Incidental catch in the sea by fishing gears;
- (d) Direct catch on some islands for traditional beliefs;
- (e) Destruction of routes to hatching areas and nesting places;
- (f) Destruction of nesting beaches by urban construction works and negative impacts introduced by human beings;
- (g) Insufficient legislative measures and weak law enforcement.

Based on:

Anon (2003). Sea Turtles Threats, Conservation and Management in Myanmar. ASEAN / SEAFDEC Regional Technical Consultation on Management and Conservation of Sea Turtle in Southeast Asia, Kuala Lumpur, Malaysia, 16-18 September 2003.

Pe, M. (2003). National Report Of Myanmar on the Sustainable Management of The Bay of Bengal Large Marine Ecosystem (BOBLME). GCP/RAS/179/WBG.

Thorbjarnarson, J. B., Platt, S.G. and Khaing, S.T. (2000). "Sea Turtles in Myanmar: Past and Present." Marine Turtle Newsletter 88: 10-11.

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## Sri Lanka

The island Republic of Sri Lanka is located southeast of India ( 5°55' and 9°51' N latitude, and 79°41' and 81°53' E longitude) and has a coastline of about 1,620 km.

Five species of marine turtles (the Loggerhead (*Caretta caretta*), the Green (*Chelonia mydas*), the Olive ridley (*Lepidochelys olivacea*, the Leatherback (*Dermochelys coriacea*), and the Hawksbill (*Eretmochelys imbricata*) nest along the coastal belt of Sri Lanka.

Turtle nesting beaches are distributed all around the coast, except in Puttalam and Gampaha districts. Turtles still occasionally use beaches near Colombo, in Kalutara and Matara districts.

The primary nesting beaches are distributed on the western, southwestern, and southern coasts of the island where the human population density is very high.

Induruwa: Green Turtle, Olive Ridley Turtle and Leatherback Turtle;

Kosgoda: Loggerhead Turtle, Hawksbill Turtle, Green Turtle, Olive Ridley Turtle and Leatherback Turtle;

Akurala: Green Turtle;

Mavela: Green Turtle and Leatherback Turtle;

Usangoda: Leatherback Turtle.

Ambalantota: Green Turtle and Leatherback Turtle;

Bundala: Green Turtle, Olive Ridley Turtle, Leatherback Turtle, Loggerhead Turtle and Hawksbill Turtle;

Yala: Green Turtle, Leatherback Turtle and Olive Ridley Turtle.

Galle and Hambantota districts host the most used nesting beaches. Kosgoda-Induruwa area in Galle district and Rekawa beach in Hambantota district have been identified as turtle rookeries. Foraging areas probably occur around the island wherever appropriate food can be found. Offshore in Kandakuliya, thousands of Olive Ridley Turtles are found every year but no nesting has been found.

In Sri Lanka, it is illegal to capture, kill, injure or possess sea turtles or their eggs. In addition Sri Lanka has banned the international trade of sea turtle products. However, turtles around Sri Lanka face entanglement in small and large mesh gillnet fisheries and tuna long-line fishery. Other than incidental by-catch in fisheries, major threats to marine turtles in Sri Lanka include unquantified egg collection, destruction of nesting and foraging grounds through coastal development, and inappropriate activities at turtle hatcheries.

See:

Joseph, J. (2003). NATIONAL REPORT OF SRI LANKA on the Formulation of a Transboundary Diagnostic Analysis and Strategic Action Plan for the Bay of Bengal Large Marine Ecosystem Programme.

Kapurusinghe, T. (2006). Status and Conservation of Marine Turtles in Sri Lanka. In: Marine turtles of Indian sub-continent: status, threats and conservation, . eds. K. Shanker & B. C. Choudhury, Universities Press, Hyderabad.

Rajakaruna, R. S., Naveen, D.M., Dissanayake, J., Ekanayake, E.M. Lalith, Ranawana, K. B. (2009). Sea turtle conservation in Sri Lanka: assessment of knowledge, attitude and prevalence of consumptive use of turtle products among coastal communities. Indian Ocean Turtle Newsletter 10(1): 1-13.

And citations in Section 3.1.1

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## Thailand

The 740 km of the Andaman Sea coast of Thailand is situated between Myanmar and Malaysia. The narrow continent shelf bordered by deep oceanic waters of the northern portion widens to the south where large areas of mangrove forest fringe the coast. The complex ecosystem of mangrove forests, seagrass beds, coral reefs supports diverse fishery resources (Nootmorn et al., 2003).

Five species of sea turtles have been recorded in Thai waters: olive ridley turtle (*Lepidochelys olivacea*), green turtle (*Chelonia mydas*), hawksbill turtle (*Eretmochelys imbricata*), leatherback turtle (*Dermochelys coriacea*), and loggerhead turtle (*Caretta caretta*).

Low genetic divergence between the nesting green turtle populations of the Gulf of Thailand and the Andaman Sea has been found, indicating that the present geological boundary (the part of the southern continent from Thailand to the Malaysia peninsula down to Indonesia) does not effectively prevent the gene flow between the two populations that was observed in invertebrate species in these areas (Kittiwattanawong et al., 2003).

Most sea turtle populations in the South East Asian region have decreased dramatically through long-term harvesting of eggs and adults, and as a result of being caught as by-catch in the ever growing trawler fisheries (Shanker & Pilcher, 2003). The remaining sea turtle populations in Thailand are widespread and exhibit a scattered distribution. Most of the available information is informal, with data on population status, trends and local exploitation or scientific data collected using different methodologies. It is known that sea turtles nest along the Andaman Sea coast (west coast - Phrathong Island, Ko Korkhao Island, Thaimuang Beach, Surin Islands, Similan Islands, Phang-nga Province; Maikhaw Beach, Phuket Province; Ko Tarutao, Ko Adang Rawi, Satun Province) and in the Gulf of Thailand (east coast - Kram Islands, Choburi Province; Kra Island, Nakhonsrithammarat Province). Little is known about their feeding and foraging habitats, although knowledge of migration patterns has improved in the last five years. Long distance migrations of few animals were recorded in the Gulf of Thailand; a green turtle tracked in the Andaman Sea coast travelled to Andaman islands.

Sea turtles threats on nesting grounds are mitigated by some conservation projects. However, tourism development, egg poaching, and illegal trade of turtle products are affecting the population. Estimation of mortality at seas has not been quantified, but it is evident that fisheries are the main threat for sea turtles in Thai waters.

### Synopsis:

#### Species and relative abundance

1. Green turtle: 78%
2. Hawksbill turtle: 20%
3. Leatherback turtle: 1%
4. Loggerhead: 1% and
5. Olive ridley turtle: 1%

#### Foraging grounds:

- Green turtle - seagrass areas both in the Gulf of Thailand and the Andaman Sea
- Hawksbill turtles - among coral reefs
- Olive Ridley turtles - Coastal areas from Ranong to Phangnga

Developmental habitats: assumed to be in offshore area

#### Based on:

Juntarashote, K. 2003. Country report for BOBLME Programme: Thailand. BOBLME, FAO GCP/ RAS/ 179/ WBG, Chennai, India.

Kittiwattanawong, K., Mananasup, S., Kinoshita, M. & Nakayama, K. (2003b). No genetic divergence

between green turtle (*Chelonia mydas*) nesting populations from the Andaman Sea and the Gulf of Thailand. In: Proceedings of the 4th Workshop on SEASTAR2000 (Editor: Arai, N.) pp. 15 – 19.

Kittiwattanawong, K., Chantrapornsyl, & Aureggi, M. (2006). The status of marine turtles in Thailand. *Testudo Journal* 6(3): 50-63.

Nootmorn, P., Chayakun, R., and Chullasorn, S., ( 2003). The Andaman Sea Marine Ecosystem in Thailand. Department of Fisheries. Bangkok.

Shanker, K. (2004). "Marine turtle status and conservation in the Indian Ocean." *FAO Fisheries Reports* 738: 85-98.

Shanker, K. & Pilcher, N.J. (2003). Marine turtle conservation in South and Southeast Asia: hopeless cause or cause of hope? *MTN* 100: 43 – 51.

See additional References in Section 3.1.1

### **Annex 3. Overview of fisheries occurring in the waters of BOBLME countries**

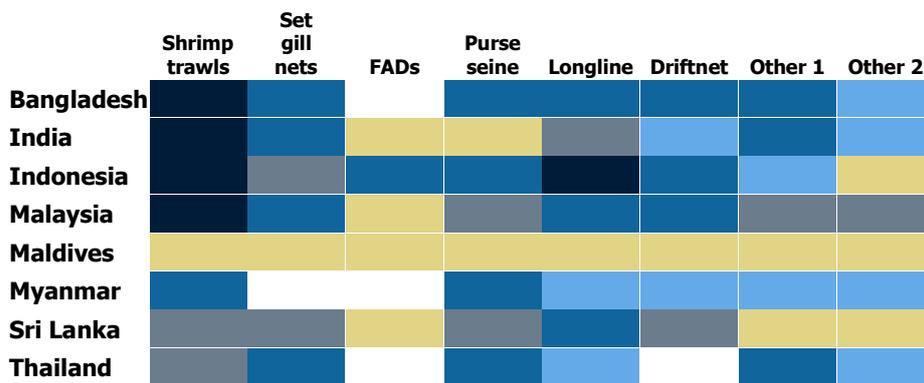


# Indian Ocean – South-East Asian Marine Turtle Memorandum of Understanding

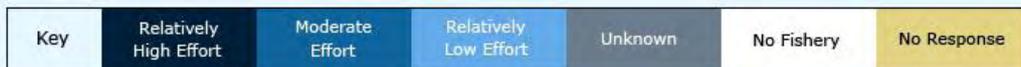


1.4.1 Indicate, and describe in more detail, the main fisheries occurring in the waters of your country, as well as any high seas fisheries in which flag vessels of your country participate and could possibly interact with marine turtles. [INF]

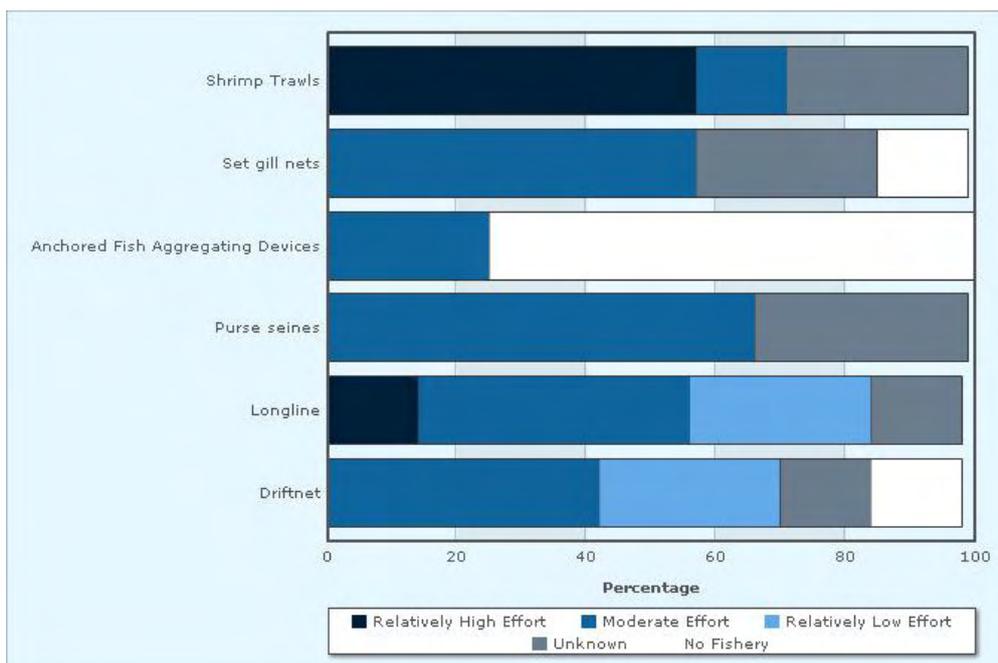
## Level of fishing effort



In the matrix above, the colour blue depicts the presence of a particular fishery, while the shade of blue represents the reported relative level of fishing effort taken from Question 1.4.2 (see key for details).



## Aggregate Summary of Responses



## SHRIMP TRAWLS

Shrimp trawls are used in 7 (100.0%) of 7 Signatory States responding	
Relatively High (4=57.1%)	Bangladesh, India, Indonesia, Malaysia
Moderate (1=14.3%)	Myanmar
Relatively Low (0=0.0%)	
Unknown (2=28.6%)	Sri Lanka, Thailand
No Fishery (0=0.0%)	
No Response	Maldives

### Detailed Responses

**Bangladesh** In the last twenty years, fishing in the marine sector has expanded rapidly due to initiatives in the 1970's. The expansion has gone on without any real control and management. This has led to a sharp increase in fishing effort. The ownership of the industry has changed dramatically. With the introduction of more expensive fishing methods most of the boats are no longer owned by fishermen, but by business men who then employ fishers on a catch sharing basis. Even for those fishermen not using boats, they are no longer in control of the fishing resources.

For effective management of marine and coastal fisheries the management regimes are divided into three principal categories: I) Artisanal Fisheries Management, II) Mechanised Commercial Boat Fisheries Management and III) Industrial Trawl Sector Management (Marine Fisheries Sector Sub-Strategy, Dept. of Fisheries (DOF). 2006) No data are available on the marine turtles from Fishery Statistical Yearbook 2006-07. A total of 127 fishing trawlers (Shrimp trawler - 39; Fish trawler - 88) are involved in the marine fisheries (DOF 2008).

See also BOBLME 2010.

**India** Shrimp trawls operate all along the coastline of India except for two months annually (fishing holidays). It is assumed that 60% of the mortality of turtles along the Indian coastline is the result of incidental capture in shrimp trawls. In Orissa, it is legally mandated that trawlers use TEDs. However, practically no trawler in Orissa uses TEDs. Acceptance of TEDs, even though provided free of cost by the Marine Product Export Development Authority (MPEDA) under the Ministry of Commerce, Government of India, is not satisfactory.

In the southern states, including Kerala and Tamil Nadu, there seem to be large-scale shifts away from trawling, but not necessarily towards friendlier fishing practices.

See :

Rodriguez, S., G. Balasubramanian, M. P. Shiny, M. Duraiswamy and P. Jaiprakash. 2008. Beyond the Tsunami: Community Perceptions of Resources, Policy and Development, Post-Tsunami Interventions and Community Institutions in Tamil Nadu, India. UNDP/UNTRS, Chennai and ATREE, Bangalore, India. p 78.

**Indonesia** The utilization of shrimp trawls in most Indonesian seas is prohibited in accordance with the current Presidential Decree No 39/1980. Fishing vessels operating shrimp trawls operate only in Arafura Sea (southern part of Papua) and they must be equipped with Turtle Excluder Devices.

Onboard observations were carried out by WWF in 2005 and 2006 on the following fishing grounds: Arafura Sea, Digul, Kalmana, and Timika. In 2005, 12 observed vessels had by-catch of 133 turtles; in 2006 (3 months only) 4 observed vessels had by-catch of 26 turtles.

Additionally, interview data from fishermen (157 respondents) indicated that an average of one sea turtle was caught per individual vessel / trip.

**Malaysia** The otter trawl net is the main fishing gear used to catch a large number of demersal finfish from deep water and penaeid prawn resources, particularly on the west coast of Peninsular Malaysia.

**Maldives** N/A

**Myanmar** Otter bottom trawl nets are the main fishing gear used to catch demersal finfish and penaeid prawns (FAO 2006). The following is the number of trawl fishing vessels registered for operating in Myanmar waters.

991 trawl fishing vessels were registered (2007-2008 fiscal year).

205 foreign trawl fishing vessels were operating (1 April to 22 July 2008).

786 local trawl fishing vessels were operating (1 September 2007 to 22 July 2008).

**Sri Lanka** Approximately 25% (based on tonnage landed) of the total catch (Blue Ocean Institute, Project Global)

Source: BOBLMEP/National Report Sri Lanka

**Thailand** Shrimp trawl research vessels have routinely surveyed assigned grids, on a monthly basis since 1970, without catching a single turtle. The surveys have been conducted in both the Gulf of Thailand and the Andaman Sea. Survey depths range between 10 and 50 m. It may therefore be concluded that the fishery is not interacting with turtles.

The percentage of sea turtles accidentally caught by trawls is around 8% compared to other fishing gears, according to records (1991-2006) obtained from Phuket Marine Biological Center (Andaman Sea) and Mannai Seaturtle Conservation Center (Gulf of Thailand).

Source: Department of Fisheries

## SET GILL NETS

Gill nets are used in 6 (85.7%) of 7 Signatory States responding

### Effort

Relatively High (0=0.0%)

Moderate (4=57.1%) Bangladesh, India, Malaysia, Thailand

Relatively Low (0=0.0%)

Unknown (2=28.6%) Indonesia, Sri Lanka

No Fishery (1=14.3%) Myanmar

No Response Maldives

## Detailed Responses

**Bangladesh** Set gill nets, though banned by the government, are still operational. A total of 25,369 (18,992 mechanized and 6,377 non-mechanized) boats with 71,768 and 34,548 gill nets (Total 106,316 net units) are operational, respectively (DOF 2008).

See also BOBLME 2010.  
Hussain, M.G. and Hoq, M.E. (eds.). 2010

**India** Although capture of turtles occurs, the mortality due to use of set gill nets is not adequately investigated. However, there is a CMFRI study that documents relative mortality in gill and trawl nets.

See :  
Rajagopalan, M., E. Vivekanandan, S.K. Pillai, M. Srinath & A.B. Fernando. 1996. Incidental catch of sea turtles in India. Marine Fisheries Information Service, T & E Series 143: 8-16.  
Rajagopalan, M., K. Vijayakumaran & E. Vivekanandan. 2006. Marine fishery related mortality of sea turtles in India - an overview. In: Sea Turtles of the Indian Sub-continent (eds. K. Shanker & B. C. Choudhury), Universities Press, Hyderabad, India. pp 227-237.

**Indonesia** Most fishing vessels in Indonesia use set gill nets. The nets are arranged in accordance with the fish targets by regulating mesh sizes in the fishing gears.

No interactions with sea turtles were reported.

**Malaysia** Set gill nets are used by the coastal fishermen mainly catch demersal fish species like marine catfish and jewfish.

**Maldives** N/A

## Myanmar

**Sri Lanka** Approximately 17% (based on tonnage landed) of the total catch (Blue Ocean Institute, Project Global)

Source: BOBLMEP/National Report Sri Lanka

**Thailand** Some turtles have been caught by gillnets (such as crab gillnets, bamboo stake traps etc). More than half of the turtles caught were still alive. Wounded turtles have been treated and released back to the sea.

The percentage of sea turtles accidentally caught by gillnet is around 58% compared to other fishing gears, according to records (1991-2006) obtained from Phuket Marine Biological Center (Andaman Sea) and Mannai Seaturtle Conservation Center (Gulf of Thailand).

## ANCHORED FISH AGGREGATING DEVICES (FADS)

Anchored Fish Aggregating Devices (FADs) are used in 1 (25.0%) of 4 Signatory States responding

### Effort

Relatively High (0=0.0%)

Moderate (1=25.0%)

Indonesia

Relatively Low (0=0.0%)

Unknown (0=0.0%)

No Fishery (3=75.0%)

Bangladesh, Myanmar, Thailand

No Response

India, Malaysia, Sri Lanka

## Detailed Responses

### Bangladesh

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### India

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**Indonesia** FADs ("rumpon") are used traditionally by artisanal fisherman.

During the assessment of interactions between sea turtles and fisheries, some fishermen reported often finding sea turtles swimming around their FADs, especially those installed close to nesting areas such as north coast of Papua, Manado (north coast of Sulawesi), Maluku (Banda Seas).

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**Malaysia** No information available

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**Maldives** Tuna are caught around Fish Aggregating Devices (FADs), as well as in open water and associated with drifting flotsam and sometimes along the outer reef edge.

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**Myanmar** FADs are not used in Myanmar.

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**Sri Lanka** Information not available

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**Thailand** There is no record of use of FADs in Thailand.

## PURSE SEINE (with/without FADs)

Purse seine (with/without FADs) are used in 6 (100.0%) of 6 Signatory States responding

### Effort

Relatively High (0=0.0%)

Moderate (4=66.7%)

Bangladesh, Indonesia, Myanmar, Thailand

Relatively Low (0=0.0%)

Unknown (2=33.3%)

Malaysia, Sri Lanka

No Fishery (0=0.0%)

No Response

Maldives

## Detailed Responses

**Bangladesh** Purse seines contribute around 2,082 units to the total fishing effort; these nets (with or without FADs) are allowed for fishing (DOF 2008).

See also BOBLME 2010.  
Hussain, M.G. and Hoq, M.E. (eds.). 2010

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**India** These are being used in Kerala and there is some work on this. Not much turtle mortality is reported from these operations.

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**Indonesia** Purse seines are used by both traditional fisheries and large scale fisheries.

Purse seiners in Java say that they catch at least one turtle during a trip, especially where the fishing ground was near a turtle nesting beach.

<b>Malaysia</b>	The purse seine net is used to catch pelagic fishes. Two main types of purse-seine nets are used. Small pelagic fish are caught using the fish purse seine (operated with or without fish aggregating devices (FADs)) and anchovies are caught using the anchovy purse-seine.
<b>Maldives</b>	N/A
<b>Myanmar</b>	The following information is the number of purse seine fishing vessels registered for operating in Myanmar waters.  163 purse seine fishing vessels were registered (2007-2008 fiscal year).  12 foreign purse seine fishing vessels were operating (1 April to 22 July 2008).  151 local purse seine fishing vessels were operating (1 September 2007 to 22 July 2008).
<b>Sri Lanka</b>	Approximately 12% (based on tonnage landed) of the total catch (Blue Ocean Institute, Project Global)  Source: BOBLMEP/National Report Sri Lanka
<b>Thailand</b>	Some turtles have been caught by anchovy purse seiners that operate in the coastal zone. Most of the turtles were still alive.  The percentage of sea turtles accidentally caught by purse seine is around 5% compared to other fishing gears, according to records (1991-2006) obtained from Phuket Marine Biological Center (Andaman Sea) and Mannai Seaturtle Conservation Center (Gulf of Thailand).

## LONGLINE (Shallow or Deepset)

Longline (shallow or deepset) is used in 7 (100.0%) of 7 Signatory States responding	
<b>Effort</b>	
Relatively High (1=14.3%)	Indonesia
Moderate (3=42.9%)	Bangladesh, Malaysia, Sri Lanka
Relatively Low (2=28.6%)	Myanmar, Thailand
Unknown (1=14.3%)	India
No Fishery (0=0.0%)	
No Response	

## Detailed Responses

**Bangladesh** Long-line fishing is well represented in the total fishing effort: Mechanised 1,350 (with 13,619 net units); Non-mechanised 222 (1,592 with net units); other Long Line 1,069 (with 9,403 net units) operating for artisanal fishing (DOF 2008).

See also BOBLME 2010.  
Hussain, M.G. and Hoq, M.E. (eds.). 2010

**India** In surveys conducted from 2005-08, there were 19 reported instances of sea turtle interactions with the longline gear during the survey conducted in the west coast (Arabian Sea) involving 23 turtles, out of which 19 were olive ridleys, whereas two numbers each of green turtles and hawksbills were also recorded. The sea turtle HR recorded from this region was 0.068 individuals/1000 hooks, contributing 0.943% to the total catch recorded from the region. Along the west coast also, sea turtle interaction was more pronounced in the northern latitudes (lat. 15–23°N), from where 15 sea turtles were recorded, whereas the remaining 8 turtles were recorded from the southern latitudes.

In the A&N waters, instances of sea turtle interaction were meagre, the only recorded interaction being from the latitudes 12°N to 13°N (one turtle each), although extensive survey was conducted in this area during the study period. The turtle HR recorded from the A&N waters was only 0.008, and their contribution to the total catch of the region was 0.102%. Since the A&N waters are also a part of Bay of Bengal large marine ecosystem (LME), the data pertaining to these two regions were pooled together and the results showed that 64 sea turtles were recorded as bycatch from the Bay of Bengal LME, with an HR of 0.137 individuals/1000 hooks, contributing 1.769% of the total catch recorded from this LME.

Month-wise analysis of data on the sea turtles interaction revealed that along the west coast, sea turtle

interaction was more during November–March, the maximum HR being recorded during March (0.175), followed by February (0.144). Along the east coast, the seasonal variations in the sea turtle interaction were not prominent, although the number of specimens recorded varied greatly during different months. No interactions were observed during six months, viz. January, March, April, August, November and December while the catch was in the range of 1 (June) to 25 (May) during the remaining months. From the A&N waters, both the reported interactions were during January.

See :

Sijo P. Varghese\*, S. Varghese and V. S. Somvanshi 2010. Impact of tuna longline fishery on the sea turtles of Indian seas. CURRENT SCIENCE, 98 (10): 1378-1384.

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**Indonesia** The longline fishery operates in the high seas mostly and is used by large scale fisheries with vessels bearing Indonesian flag.

Data from WWF-RCCF observations (May-December 2006) show that 10 tuna longline vessels with 32,208 hooks (539 settings) caught 85 sea turtles (plus 1 whale, 2 dolphins, 2 seabirds, and 507 sharks).

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**Malaysia** Longlines are used in both shallow and deep water and are quite effective in catching turtles.

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**Maldives** Long-line minimum depth for main line is 60m (target: yellow fin and big eye tuna in deep water).

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**Myanmar** One local longline fishing vessels was operating from 1 September 2007 to 22 July 2008 in Myanmar waters.

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**Sri Lanka** Information not available

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**Thailand**

## DRIFTNET

Driftnet is used in 6 (85.7%) of 7 Signatory States responding

### Effort

Relatively High (0=0.0%)

Moderate (3=42.9%) Bangladesh, Indonesia, Malaysia

Relatively Low (2=28.6%) India, Myanmar

Unknown (1=14.3%) Sri Lanka

No Fishery (1=14.3%) Thailand

No Response Maldives

## Detailed Responses

**Bangladesh** Around 1,103 drift nets are in operation (DOF 2008).

See also BOBLME 2010.  
Hussain, M.G. and Hoq, M.E. (eds.). 2010

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**India** Since a very large number of trawl nets, gill nets etc. are discarded by marine fisheries operations; their contribution to turtle mortality is not ruled out. However, this has not been investigated in a systematic manner in the offshore waters.

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**Indonesia** Commonly used by traditional fisheries.

During onboard observation in tuna longline, observers reported that sometimes several sea turtles were entangled in drift nets.

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**Malaysia** Drift and gill nets are used in the coastal fisheries. Two main types are used: one for finfish and trammel nets for penaeid prawns. Coastal fishermen use set gill nets to catch demersal fish species. Large-meshed bottom gillnets used to catch stingrays are very destructive as they are effective in catching marine turtles that often drown in the nets.

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**Maldives**

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**Myanmar** 159 local driftnet fishing vessels were operating from 1 September 2007 to 22 July 2008 in Myanmar waters.

**Sri Lanka** Approximately 6% (based on tonnage landed) of the total catch (Blue Ocean Institute, Project Global)  
Source: BOBLMEP/National Report Sri Lanka

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**Thailand** There is no record of use of driftnets in Thailand.

## OTHER 1

### Detailed Responses

**Bangladesh** There are 1,091 seasonal mechanized crafts with 2,007 net units; 4,664 non-mechanized crafts with 18,970 net units and 7,010 all-season non-mechanized crafts with 29,106 nets operating in the Bay (DOF 2008).

See also BOBLME 2010.  
Hussain, M.G. and Hoq, M.E. (eds.). 2010

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**India** Monofilament nets used by artisanal fisherfolks within the first two km of shoreline have also been recorded to be responsible for turtle mortality. However, their contribution to turtle mortality is insignificant as the artisanal fisherfolk remove the turtles as soon as they detect a turtle to save the net.

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#### Indonesia

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**Malaysia** Other traditional fishing gear employed by the coastal fishermen include hook-and-line, bag nets, lift nets, seine nets, traps, barrier nets and scoop nets.

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**Maldives** The tuna fishery is the major fishery and utilizes three techniques:  
1) Pole and line fishery (skipjack and small yellow fin tuna), 2) Hand-line fishery (large yellow fin tuna), and  
3) Long-line fishery (listed above)

---

**Myanmar** 155 local traps were operating from 1 September 2007 to 22 July 2008 in Myanmar waters.

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#### Sri Lanka

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**Thailand** There is some evidence of capture of turtles in this gear.

## OTHER 2

### Detailed Responses

#### Bangladesh

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**India** Dynamite fishing in coral reef harbouring areas of the country has been recorded to contribute to some level of sea turtle mortality though such fishing practices are largely targeted for fish only.

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#### Indonesia

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**Malaysia** The deep-sea fishing vessels operate beyond 30 nautical miles from the shoreline. The fishing vessels are fairly large. Basically, commercial gear such as trawls, purse seines and hook-and line are used.

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**Maldives** Ghost nets from international sources catch and kill turtles in the waters of the Maldives.

See: Anderson, R. C., Zahir, H., Jauharee, R., Sakamoto, T., Sakamoto, I., and Johnson, G. (2009). Entanglement of Olive Ridley Turtles *Lepidochelys olivacea* in ghost nets in the equatorial Indian Ocean IOTC-2009-WPEB-07.

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**Myanmar** From 1 September 2007 to 22 July 2008, 571 sets of local stow nets were used in Myanmar waters.

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#### Sri Lanka

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**Thailand** Some (adult) turtles have been caught by entanglement in the floating line, always resulting in death.

According to records (1991-2006) obtained from Phuket Marine Biological Center (Andaman Sea) and Mannai Seaturtle Conservation Center (Gulf of Thailand), sea turtles accidentally caught by squid trap is around 6% compared to other fishing gears.

#### Annex 4. List of people consulted during the review process

Not every person in the list below provided direct review of the documents; some delegated preparation of the response and/or provided additional contacts or copies of published papers, while others coordinated their response with others in the list.

Country	Contact	Address
<b>Bangladesh</b>	Mr. Mohammad Ali	Wildlife Management & Nature Conservation Division, Forest Department Chittagong E-mail: mdali1969@gmail.com
	Mr. S M Munjurul Hannan Khan	Deputy Secretary Ministry of Environment and Forest Government of Bangladesh email: munjurulkhan@gmail.com
	Mr. Zahiral Islam	MarineLife Alliance Judge Buildind, Sayeman Rd. Baharchara, COX's BAZAR 4700 E-mail: marinelifelife_al@yahoo.com, explorewild@yahoo.com
	Dr. S M A Rashid	Chief Executive Centre for Advanced Research in Natural Resources & Management (CARINAM) House: 545, Road: 11, Baitul Aman Housing, Society, Adabor, Mohammadpur, DHAKA 1207 E-mail: carinam95@yahoo.com, cwbmpcox@gmail.com
	Mr. Jafar Siddique	National Project Director, Deputy Secretary Coastal & Wetland Biodiversity Management Project, Department of Environment Ministry of Environment and Forest Kalmilata-6, Allenbari, Tejgaon,
	Dr. Mihir Kanti Mazumder	Secretary Ministry of Environment and Forests (MOEF), Building # 6, Level # 13 Bangladesh Secretariat, DHAKA
<b>India</b>	Dr. Basudev Tripathy	Scientist-C Zoological Survey of India, Malacology Division (8th Floor), Prani Vigyan Bhawan, M-Block, New Alipore, KOLKATA - 700 053 (INDIA) E.mail: tripathyb@yahoo.co.uk/tripathyb@gmail.com
	Dr. Kartik Shanker	Assistant Professor Centre for Ecological Sciences, Indian Institute of Science, Bangalore E-mail: kshanker@ces.iisc.ernet.in, kshanker@gmail.com
	Dr. B C Choudhury	Head, Endangered Species Management Department Wildlife Institute of India, P.O. Box # 18, Chandrabani, Dehradun UTTARAKHAND 248 001 E-mail: bcc@wii.gov.in, wii@wii.gov.in
	Ms. Prakriti Srivastava	Deputy Inspector General Ministry of Environment and Forest Room 717 Paryavaran Bhawan CGO Complex, Lodhi Road, New Delhi-110003
	Dr. R. B. Lal	Inspector General of Forests (WL) Ministry of Environment and Forests Room No. 106, Paryavaran Bhawan CGO Complex, Lodi Road NEW DELHI 110003, India
<b>Indonesia</b>	Ms. Maggie Muurmans	Marine Turtle Programme Manager Yayasan Pulau Banyak Pulau Banyak, Aceh Singkil SUMATRA E-mail: maggiemuurmans@gmail.com

	Dr. Windia Adnyana	Faculty of Veterinary Medicine, Udayana University, Denpasar Campus Jl.P.B. Sudirman, DENPASAR E-mail: adnyanawindia@gmail.com
	Dr. Tonny Soehartono	Director of Biodiversity Conservation Directorate General of Forest Protection and Nature Conservation, Ministry of Forestry of the Republic of Indonesia, Manggala Wanabakti Building, 7th Block, 7th Floor Jl.Jenderal Gatot Subroto, Jakarta 10270
	Mr. Wawan Ridwan	Director of Marine and Marine Species Program WWF-Indonesia Kantor Taman A9, Unit A-1, Jl. Mega Kuningan lot.8-9/A9 Kawasan Mega Kuningan, JAKARTA 12950 E-mail: wridwan@wwf.or.id
<b>Malaysia</b>	Ms. Min Min Lau	Team Leader, Melaka Turtle Programme WWF-Malaysia 1836 Jalan TBJ 2, Taman Bidara Jaya 2, Masjid Tanah, MELAKA 78300 E-mail: mmlau@wwf.org.my, coralcrunch@gmail.com
	Dr. Chan Eng Heng	CEO and Co-Founder Turtle Conservation Centre (TCC) KUALA TERENGGANU E-mail: enghengchan@gmail.com, chan@turtleconservationcentre.org
	Mrs. (Puan) Maznah Othman	Department of Fisheries Malaysia Fisheries Officer Wisma Tani, Level I,Block 4G2,Precint 4 Federal Government Administration Centre 62628 Putrajaya, Malaysia. E-mail: maznahoth@dof.gov.my
<b>Maldives</b>	Dr. Charles Anderson	Charlesandersonii@btinternet.com
	Ms. Ajual Rasheed	Marine Research Centre, Ministry of Fisheries and Agriculture, Malé, Republic of Maldives arasheed@mrc.gov.mv
	Mr. Abdulla Naseer	Ministry of Fisheries and Agriculture, Malé, Republic of Maldives Abdulla.nasser@fishagri.gov.mv
	Mr. Hussein Zahir	Marine Research Centre, Ministry of Fisheries and Agriculture, Malé, Republic of Maldives hzahir@mrc.gov.mv
	Mr. Hussain Sinan	Ministry of Fisheries and Agriculture, Malé, Republic of Maldives Hussain.sanan@fishagri.gov.mv
<b>Myanmar</b>	Mr. Maung Maung Lwin	Assistant Director Department of Fisheries, Ministry of Livestock and Fisheries Sinmin Road, Ahlone Township YANGON 095 E-mail: akthar10160@googlemail.com
<b>Sri Lanka</b>	Mr. Ananda Wijesooriya	Director General Department of Wildlife Conservation No. 382, New Kandy Road, MALABE E-mail: wadawijesooriya@gmail.com
<b>Thailand</b>	Dr. Kongkiat Kittivanawong	Marine Biologist Phuket Marine Biological Center P.O.Box 60 PHUKET 83000 E-mail: kkongkiat@gmail.com
	Dr. Monica Aureggi	President Naucrates Onlus, Friends of Sea Turtles PO BOX 4 Kura Buri, PHANG NGA 82150 E-mail: naucrates12@hotmail.com, naucrates12@tiscali.it
	Mr. Mickmin Charuchinda	Director Eastern Marine and Coastal Resources Research Center, Department of Marine and Coastal Resources 309 Moo 1, Tambon Paknamprasae, Klaeng RAYONG 21170

**Annex 5: IOSEA SITE DATABASE template (Completed Example)**

<b>Name of site/area: Thameehla Island</b>				<b>Province / State: Ayeyarwady Region</b>
<b>Geographic Coordinates</b>	Degree	Minute	Second	<b>Name of person / agency who has provided the information:</b> <b>Maung Maung Lwin, DoF, Myanmar</b>
Select: North <input checked="" type="checkbox"/> South <input type="checkbox"/>	15	51	00	
West <input type="checkbox"/> East <input checked="" type="checkbox"/>	94	17	00	<b>Information was last updated:</b> (18/12/2010)
or DECIMAL DEGREES:				
<b>On-site research activities:</b> <input checked="" type="checkbox"/> Site monitoring <input checked="" type="checkbox"/> Tagging <input checked="" type="checkbox"/> Genetic sampling <input checked="" type="checkbox"/> Satellite tracking <input checked="" type="checkbox"/> Foraging surveys				
<b>Short description of the site</b> – expand text box as necessary:				

Indicate the species occurrence / use and relative importance of the site:

Species / Habitat type	CC Loggerhead	LO Olive ridley	CM Green	EI Hawksbill	DC Leatherback	ND Flatback
<b>Nesting</b>		✓	✓	✓		
<b>Feeding</b>		✓	✓	✓		
<b>Developmental</b>						

**Abbreviations:** Loggerhead , *Caretta caretta* (CC); Olive Ridley, *Lepidochelys olivacea* (LO); Green, *Chelonia mydas* (CM); Hawksbill, *Eretmochelys imbricata* (EI); Leatherback, *Dermochelys coriacea* (DC); Flatback, *Natator depressus* (ND)

Use one of the following symbols or letters to indicate the presence or absence of a species at this site in the table above, including details (if known) about the relative importance of the site for nesting, feeding or development

	Insufficient information is available on the presence or absence of the species (leave box empty)
---	Leatherback Loggerhead Information from DoF or Villagers or Fisheries
?	It is speculated (only) that the species is present at this site and may be using one or more particular habitat types. In the absence of definitive information, place a ? in the appropriate box(es).
✓	The species is definitely <b>known to be present</b> at this site; however no information is available on the relative importance of the site for nesting, feeding or development.
✓ H	The species is known to be present at this site and definitely uses this particular habitat. The site is considered to be of <b>High importance</b> for this species, relative to other sites in the country.
✓ A	The species is known to be present at this site and definitely uses this particular habitat. The site is considered to be of <b>Average importance</b> for this species, relative to other sites in the country.
✓ L	The species is known to be present at this site and definitely uses this particular habitat. The site is considered to be of <b>Lower importance</b> for this species, relative to other sites in the country.
a - h	<b>Additional information on nesting habitat (where available):</b>

Describe the nature and intensity of threats to marine turtles at this site:

NATURE OF THREAT	INTENSITY OF THREAT <i>Mark with an 'X'</i>				
	Unknown	None	Low (rare)	Medium	High (common)
Exploitation of nesting females (i.e. direct harvest on land)		✓			
Direct harvest of animals in coastal waters at or near the site		✓			
Egg collection (i.e. direct harvest by humans)		✓			
Incidental capture in coastal fisheries			✓		
Boat strikes			✓		
Marine debris (e.g. plastics at sea, flotsam)	✓				
Industrial effluent	✓				
Inshore oil pollution	✓				
Agricultural/urban/tourism development (e.g. construction that disrupts nesting activities)		✓			
Artificial lighting (on land or near shore)		✓			
Habitat dégradation (e.g. coastal erosion, debris that				✓	

obstructs nesting, etc.)					
Vehicles		✓			
Sand mining / removal		✓			
Natural threats, disease, predation of nests/nesting females (e.g. by domestic / feral animals), or natural predation at sea		✓			
Other (type in):					

**What measures have been introduced to remove threats to marine turtles at this site?**

- Monitoring / protection programmes
- Education / awareness programmes
- Egg relocation / hatcheries
- Requirements for modification of fishing gear or fishing practices (e.g seasonal or temporal closures)
- Designation / management of protected areas, sanctuaries, exclusion zones etc.
- Regulations on building location / design
- Regulations on artificial lighting
- Vehicle / access restrictions
- Removal of debris / beach clean-up
- Predator control

Other 1

Other 2

**Please give further details or clarification about any of the information provided, as appropriate / necessary.**

- Marine turtle conservation has started before 1963
- Comprehensive conservation activities were introduced by DOF in 1986
- For instance, out of 4 turtle landing beaches separately existed on the Thameehla Island only 2 beaches remained suitable for turtle landing and laying eggs.
- It may be most probably due to the changes in environment such as soil erosion, mangrove

deterioration, changes of water current, increase heavy rains, floods and influence of increasing fishing pressures

- The activities on Thameehla Island is said to be the most advanced and emphasized and it is the main focal point

- Green turtles - commonly landing and laying eggs on the Island .

- In the beginning Olive Ridley turtles also were landing on the Island but in lesser frequency in recent days.

- In the vicinity of the prime nesting sites on the island there are enriched and diverse fauna and forage ground for turtles.

- In other way around it seems that the vicinity of the Island is providing feeding ground for the turtles such as olive ridley, hawksbill and green turtles.

The activities particularly conducted include:

1.the regular monitoring on landings , clutches and hatchlings,

2.conducting onsite training (Some Time)

- expand public awareness
- extend research
- hatching method used to transplanting.
- Tagging(Inconel tag& PITs)
  
- Thameehla Island was hit by the under mentioned natural disasters.
- Tsunami in 2004
- Cyclone Marla in 2006
- Cyclone Nargis in 2008

## Annex 6. Conversion of Geo-coordinates

Geocoordinates in degrees, minutes, and seconds were converted to decimal degrees for plotting using the formula:  $\text{degrees} + ((\text{minutes} + (\text{seconds}/60))/60)$ .

The reverse calculation was done as necessary to fill-in the data set using a formula in Excel. Assuming the degrees, minutes, and seconds were in cells A1, B1, C1, respectively, the formula entered in cell D1 was:  $=A1+((B1*60)+C1)/3600$ . If the DMS values were in a single cell (e.g. A1) and defined by spaces, the following formula was applied in cell B1:

`=INT(A1)&CHAR(186)&" "&INT((A1-INT(A1))*60)&CHAR(145)&" "&ROUND((((+A1-INT(A1))*60)-INT((+A1-INT(A1))*60)), 2)*60&CHAR(145).`





Bangladesh, India, Indonesia, Malaysia, Maldives, Myanmar, Sri Lanka and Thailand are working together through the Bay of Bengal Large Marine Ecosystem (BOBLME) Project and to lay the foundations for a coordinated programme of action designed to improve the lives of the coastal populations through improved regional management of the Bay of Bengal environment and its fisheries.

The Food and Agriculture Organization (FAO) is the implementing agency for the BOBLME Project.

The Project is funded principally by the Global Environment Facility (GEF), Norway, the Swedish International Development Cooperation Agency, the FAO, and the National Oceanic and Atmospheric Administration of the USA.

For more information, please visit [www.boblme.org](http://www.boblme.org)



Sida



Norad

