India

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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 7517 km coastline and two marine eco-regions (Bay of Bengal and the Arabian Sea), supports five species of marine turtles out of the seven species known in the world: green turtle, olive ridley, hawksbill and leatherback are known to nest on beaches of India and 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 Odiysa 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 Indian sub-continent is an important region for marine biodiversity conservation in general and sea turtle conservation in particular in the world. However, turtle populations and their habitats are under threat due to fisheries and other anthropogenic related activities along the coast. A variety of surveys and conservation oriented projects were carried out through the GOI UNDP National Sea Turtle Project implemented by the Wildlife Institute of India in 2000-2002. This was followed by a CMS-UNEP project implemented by the Madras Crocodile Bank Trust in 2003-2005. The research and reviews are compiled in Shanker and Choudhury 2006.

India has continuously monitoring olive ridley populations and their habitats in recent years with respect to coastal landscape dynamics, population dynamics and the impact of climate change on population sex ratios. Following studies on nesting and offshore populations in the 1990s, studies on migratory route and habitat use using satellite techniques were carried out by the Wildlife Institute of India and Odisha Forest Department from 2007-2012 with financial support of DGH. This study has provided more insights for the long term conservation of sea turtles and for rational planning of developmental activities including possible hydrocarbon exploration in this region. Similarly, the Wildlife Institute of India is planning to take up satellite tracking study on sea turtles along the Sindhudurg coast with support of UNDP-GEF and Maharashtra Forest Department.

Long term monitoring of nesting populations and impacts of climate change on sex ratios is being carried out since 2007 at Rushikulya by Indian Institute of Science and Dakshin Foundation in collaboration with Odisha FD. Following two decades of surveys by the Madras Crocodile Bank Trust and Andaman and Nicobar Islands Environmental Team (ANET), long term monitoring of leatherback turtles has been carried out at Little Andaman Island since 2008 by Indian Institute of Science, Dakshin Foundation and ANET in collaboration with A&N FD. Long term monitoring of foraging green turtle populations in the Lakshadweep Islands is being carried out by Nature Conservation Foundation. In addition, there are monitoring programmes for sea turtles by one or more non-governmental organisations in each of the states on India's coast, some for as long as 25 years, and the organisations also contribute significantly to outreach and education.

All five species of sea turtles that occur in Indian coastal waters are protected under Schedule I of the Wildlife Protection Act (1972), as well as listed in Appendix I of Convention of International Trade in Endangered Species of Wild Fauna and Flora (CITES) which prohibits trade in turtle products by signatory countries. At present, there is no commercial or

international trade of marine turtles or turtle products in India. However, incidental capture in trawl nets is a well-known cause of mortality for sea turtles; more than dead 10,000 turtles are washed ashore in Odisha alone each year. Both gill and trawl nets cause considerable mortality along the mainland coast. At the consultation workshop of the Sub-Committee on Conservation of Marine Species for Development of Species Recovery Plans and Marine Protected Areas in India, (2009), two species of marine turtles, olive ridley and leatherback, were chosen for the preparation of species recovery plans. Marine turtles were also included in the IDWH programme of MoEF to effectively promote people-inclusive conservation programmes to conserve turtle habitats.

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.

Several national and local organisations and individuals came together to form a national sea turtle network called Turtle Action Group (TAG) in January 2009 to work together towards sea turtle conservation in India.

In addition, fishing communities and conservation groups have formed the Orissa Marine Resources Conservation Consortium (OMRCC) to provide a platform for dialogue and collaborative action. A leatherback recovery plan has been prepared to initiate long-term monitoring, identify potential threats and formulate effective management strategies to mitigate these threats in the Andaman and Nicobar Islands.

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]

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).

There are two 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. Harbouring 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: Abundance of fish resources in turtle habitat attract mechanized boats and kills thousands of sea turtle due to incidental capture

☐ 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.

Fishing zone of mechanized boats has been regulated so that mechanized boats do not fish in the turtle congregation areas.

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, Tamil Nadu and West Bengal 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.

There were reports of international poachers fishing in water of Andaman and Nicobar islands where sea turtles are also known to use the same areas. Indian Coast Guard and Navy have intensified the patrolling in these areas to keep away

these poachers.

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 answere 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:
Flewwelling, 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:
Flewwelling, 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:
Flewwelling, 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 Demonostrations

■ **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

State Governments especially the Forest Departments periodically review the efficacy of mitigation measures but this review process is still needs to be strengthened at both State and Federal levels.

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. Recently, Wildlife Institute of India has carried out national level assessment on impact of fisheries related activities on dugong and its associated species including sea turtles. As per the survey it was found that incidental capture of sea turtles have been declined in India.

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. InScraping 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.

Sivakumar, K. and Nair, A. (2013): Dugong Distribution, Habitat and Risks Due to Fisheries and Other Anthropogenic Activities in India. Wildlife Institute of India – Technical Report. Dehradun, India. 74 pp.

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

Information related to satellite tracking of sea turtles have been shared with Sri Lanka by the Wildlife Institute of India. WII has organised a training workshop on turtle monitoring and satellite tracking of sea turtles in Sri Lanka during 2010.

See
Sivakumar, K., B.C. Choudhury and S.R.B. Dissanayake, 2010. Joint turtle conservation programme of Sri Lanka and India: Sea turtles of Sri Lanka, also breeds in India and Maldives. Wildlife, (Journal of Department of Wildlife Conservation, Sri Lanka), June (2010):18-24.

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:

Some people from the coast of Tamil Nadu and Kerala are known to capture the sea turtles for meat and similarly in Andaman and Nicobar islands.

Sivakumar, K. 2005. Turtles in trouble. Newsletter, WII 12(1):3-6

"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.

Sivakumar, K. 2002. Turtle nesting on the south bay of Great Nicobar Island. Marine Turtle Newsletter, 96:17-18

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

Various NGOs and the State Forest Departments have been involved in these nature education program

Egg relocation/hatcheries

■ **YES** ☐ NO ☐ N/A ☐ EXCELLENT ■ **GOOD** ☐ LOW ☐ UNKNOWN

All most all coastal State/Union Territories Forest Departments and certain NGOs have been protecting the nesting beaches from predators and also collect the eggs and hatch them in the safer hatcheries and release them successfully.

Predator control

■ **YES** ☐ NO ☐ N/A ☐ EXCELLENT ☐ GOOD ■ **LOW** ☐ UNKNOWN

Dogs are major predators and on some places jackals and other predators such as monitor lizard, pigs, etc are threat to nests. Dogs have been periodically driven away from the selected nesting beaches especially in Odisha and Andaman and Nicobar Islands.

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

Odisha Government has taken several steps to minimize the light pollution nearby mass nesting grounds.

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]

All turtle nesting beaches that are outside the established PAs have been under the governance of the Coastal Zone Regulation of Government of India. CRZ regulates and minimize anthropogenic activities on these beaches and also provides protection from various anthropogenic pressures. Further, Wildlife Institute of India has identified about 15 turtle nesting beaches along the peninsular India as Important Coastal and Marine Biodiversity Areas and these ICMBAs would soon be managed with a conservation plan. 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.

State Pollution Control Boards of all coastal states as well as several research institutions have been monitoring the water quality along the coasts that include sea turtle habitat.

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 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.

Zoological Survey of India of the Ministry of Environment, Forests and Climate Change, and NGOs such as Wildlife Trust of India and SDMRI are being involved in the coral restoration programs in India.

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. Further, through ICZM and UNDP-GEF Marine Programs the mangrove restoration programs in India is being strengthened in the recent past.

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 Lakshaweep islands of India by establishing Marine Protected Areas. However, there was no any other efforts to restore sea grass beds that have already been degraded except protecting these habitats.

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 and 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 (Eschscoltz) from Orissa Coast in natural and artificial condition. Science & Culture, 143: 43-45.

BISWAS, S. 1982. A Report on the olive ridley, Lepidochelys olivacea (Eschscoltz) [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. Copiea, 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.

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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.

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Lepidochelys olivacea at Gahirmatha, Orissa during the 1985 season. CMFRI Marine Fisheries Information Service T & E, 64: 1-16.

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Sajan John Satyaranjan Behera, K. Sivakumar , B.C. Choudhury and Subrata Kumar Behera. 2011. Observation of a subadult olive ridley turtle Lepidochelys olivacea from Gahirmatha marine sanctuary, Orissa, India. Herpetological Bulletin - Number 116:1-3

R. Suresh Kumar, Sajan John, K. Sivakumar, & Binod C. Choudhury, 2013. Egg laying duration in the olive ridley turtle Lepidochelys olivacea and its relevance for the estimation of mass nesting population size. Herpetological Journal, 23 (1):23–28.

Satyaranjan Behera, Basudev Tripathy, Kupuswamy Sivakumar, Binod Chandra Choudhury, Chandrasekhar Kar. 2013. Nesting habitat suitability for olive ridley turtles (Lepidochelys olivacea) at the Gahirmatha rookery, Odisha coast of India. International Journal of Conservation Science 4(4): 477-484.

Satyaranjan Behera, B. Tripathy, K. Sivakumar and B.C. Choudhury. 2013. A case study on olive ridley (Lepidochelys olivacea) solitary nests in Gahirmatha rookery, Odisha, India. Testudo Vol. 7, No. 5:49-60

Satyaranjan Behera, K. Sivakumar, B.C. Choudhury, B. Tripathy and C.S. Kar, 2012. Occurrence of Olive ridley (Lepidochelys olivacea) solitary nests and their future conservation implications in Gahirmatha rookery, Odisha, India. Indian Forester, 138(10):869-875

Satyaranjan Behera, Basudev Tripathy, K. Sivakumar and B. C. Choudhury, 2014. Stomach Contents of Olive Ridley Turtles (Lepidochelys Olivacea) Occurring in Gahirmatha, Odisha Coast of India. Proc Zool Soc DOI 10.1007/s12595-014-0100-0

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

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 Odiysa 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.

State Forest Departments such as Andhra Pradesh (Godavari mouth), Tamil Nadu (Point Calimere), Gujarat (Porbandar coasts), Andaman and Nicobar Islands (Galathea etc) have been monitoring the nesting population of sea turtles.

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 more than 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) evelopment 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 internesting 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

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.

In 2014-15, migration and habitat use of about 10 sea turtles from the Sindhudurg coast of Maharashtra State would be studied using satellite tracking techniques.

■ **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.

See
Sivakumar, K., B.C. Choudhury and S.R.B. Dissanayake, 2010. Joint turtle conservation programme of Sri Lanka and India: Sea turtles of Sri Lanka, also breeds in India and Maldives. Wildlife, (Journal of Department of Wildlife Conservation, Sri Lanka), June (2010):18-24.

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 and Sri Lanka" by Wildlife Institute of India.

Sivakumar, K., B.C. Choudhury and S.R.B. Dissanayake, 2010. Joint turtle conservation programme of Sri Lanka and India: Sea turtles of Sri Lanka, also breeds in India and Maldives. Wildlife, (Journal of Department of Wildlife Conservation, Sri Lanka), June (2010):18-24.

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 Odisha - Population seems to be declining due to fisheries-interface mortality. Curtailing fisheries related mortality and safeguarding arribada population and developmental activities on 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

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) – the website provides information on sea turtles in India, and provides other online resources (maps, publications, manuals) to users.

16. Recently, UNDP-GEF Marine Program in East Godavari and Sindhudurg coasts published series of nature education awareness materials related to sea turtles and other coastal fauna and flora.

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

Fishing communities and conservation groups have formed the Odisha Marine Resources Conservation Consortium (OMRCC) to provide a platform for dialogue and collaborative action.

Several Eco-development Committees in Gulf of Mannar region have been engaged in community learning.

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 Gujurat (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 Odisha (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.

Dakshin Foundation is planned to organise Sea Turtle Researchers Meet inviting turtle researchers from all over India and neighbouring countries.

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 Wildlife (Protection) Act, 1972 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. Scientific Authorities of India of CITES such as Wildlife Institute of India and IFGTB have already organized CITES training programs in India.

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.

Further, TRAFFIC-India has also been monitoring illegal trade on protected species including sea turtles.

See:
Sajan JOHN, Mutyam Praveen Kumar BATU, Sivakumar KUPPUSAMY, Binod Chandra CHOUDHURY, 2012. An Assessment of Legally Protected Marine Fauna in Curio Trade – A Market Study from Tamil Nadu, India. International Journal of Conservation Science, 3(3): 217-230

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]

Illegal fishing in territorial waters	☐ ESSENTIAL ■ **IMPORTANT** ☐ LIMITED ☐ NOT AT ALL
Incidental capture by foreign fleets	☐ ESSENTIAL ■ **IMPORTANT** ☐ LIMITED ☐ NOT AT ALL
Enforcement/patrolling of territorial waters	☐ ESSENTIAL ■ **IMPORTANT** ☐ LIMITED ☐ NOT AT ALL
Hunting/harvest by neighboring countries	☐ ESSENTIAL ■ **IMPORTANT** ☐ LIMITED ☐ 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

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.

SACEP - The South Asia Cooperative Environment Program Secretariat located at Sri Lanka also has the mandatory of to promote regional co-operation in South Asia in the field of environment, both natural and human in the context of sustainable development and on issues of economic and social development which also impinge on the environment and vice versa; to support conservation and management of natural resources of the region and to work closely with all national, regional, and international institutions, governmental and non governmental, as well as experts and groups engaged in such co-operation and conservation efforts

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 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 Odisha and later in Sri Lanka during February 2010. The WII in collaboration with GIZ is planning to conduct seies of capacity building program towards monitoring and management of coastal and marine biodiversity including sea turtles in next three years starting from December 2014.]

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; Bhubaneshwar, 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

So far there was no review of policies and laws but there was a review on research gaps in conservation and management of coastal and marine biodiversity including sea turtles in India carried out by Wildlife Institute of India in consultation with experts from all over country.

See

Tripathy, B., R. S. Kumar, B. C. Choudhury, K. Sivakumar & A. K. Nayak. 2009. Compilation of Research Information on Biological and Behavioural Aspects of Olive Ridley Turtles along the Orissa Coast of India – A Bibliographical Review for Identifying Gap Areas of Research. Wildlife Institute of India, Dehra Dun & IUCN-India, New Delhi. K. Sivakumar, J.A. Johnson, B.C. Choudhury and V.B. Mathur,2010. Identification of research gaps in Coastal and Marine Biodiversity Conservation in India. Wildlife Institute of India, Dehradun, India.

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]

Being a Focal Point of South-Asia Sub-Region, India would try to organise the first Sub-Regional Meeting/workshop 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: