



Memorandum of Understanding on the
Conservation and Management of Marine Turtles and
their Habitats of the Indian Ocean and South-East Asia

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REVIEW OF PAST AND PRESENT SPECIES ASSESSMENTS

1. In 2006, the IOSEA Secretariat published the first of a series of assessments of the conservation status of marine turtles found in the IOSEA region. The *Assessment of the conservation status of the leatherback turtle in the Indian Ocean and South-East Asia*, compiled by Hamann et al., provided a comprehensive review of the available information and offered insightful recommendations for future activities to address gaps in knowledge. Hard copies are still available from the Secretariat, upon request, and the full text can also be downloaded from the IOSEA website: <http://www.ioseaturtles.org/content.php?page=Leatherback%20Assessment>.
2. The Signatory States agreed that similar assessments should next be prepared for loggerhead and green turtles, recognising that the latter would be particularly ambitious in view of the number of countries concerned. The loggerhead assessment was meant to be available for review by the Fifth Meeting of the Signatory States (Bali, 2008), however this proved not to be possible for various reasons described in document MT-IOSEA/SS.5/Doc. 7. Instead, a way forward was agreed that would see the production of a streamlined loggerhead assessment for the present meeting. Dr. Mark Hamann has been coordinating the work, which will be presented as an addendum to this document as soon as the text is available. The IOSEA Advisory Committee is expected to review, and possibly refine the document further, at its meeting on 21-22 January.
3. Notwithstanding the excellent work that went into the first leatherback assessment, to the credit of everyone involved in its production, it is probably fair to say that only limited progress has been made over the past five years towards implementation of the report's key recommendations. The main findings and recommendations were contained in a succinct 7-page synthesis that has been reproduced in slightly modified form in Annex 1.
4. The Secretariat has already proposed to the Advisory Committee, and is now making a similar suggestion to Signatory States, that a modest effort be made before and during the Signatory State meeting to review and update the information contained in the 7-page synthesis/recommendation section; and to develop a number of project concepts from the existing recommendations, with a view to securing funding for their implementation.
5. To facilitate this updating exercise, text boxes have been added to the original synthesis to allow each of the short sub-regional synopses to be updated with any new information known about changes in leatherback conservation status since 2006. This might be done by incorporating, for example, first-hand knowledge from Advisory Committee members; information readily available from personal contacts with other leatherback experts working in the countries concerned; and possibly information from recently published papers (which might be found in the IOSEA Bibliography Resource).
6. The main information gaps identified in 2006 in relation to biological, management and other issues have been highlighted in yellow in the attached text. It would be useful to try to identify activities that have been undertaken over the last five years that have helped to close some of these gaps. These could simply be listed as bullet points, in a way that readily illustrates whether (and where) important gaps still remain; and possibly indicate the priority of resolving them.

7. The recommendations section from 2006 contains some good suggestions – both specific and general – for necessary follow-up work, but without a clear indication of priority, feasibility (degree of effort required), cost etc. The Secretariat would like to suggest that a few simple project concepts be drawn up for 3-4 of the 'necessary' activities already identified that would meet the criteria of: (1) being important/useful to do in the short-term; (2) feasible with existing technical capabilities; and (3) realisable within a modest budget in the order of USD 10-15,000. With the concepts in hand, one or two might be developed further and funded with existing or new IOSEA resources, or matching funds sought elsewhere.

Action requested:

Representatives of Signatory States, Advisory Committee members and others with special expertise and interest in leatherback conservation are requested to fill in the text boxes in Annex 1 with information at their disposal or readily obtained from other sources. Contributions can be sent to the Secretariat by email, ideally in advance of the SS6 meeting, or brought to Bangkok. At the meeting itself, a volunteer be sought to organise, in the margins, a working group of interested experts that will compile the available information in a single document and, if possible, develop drafts of the project concepts mentioned above.

Leatherback turtle synthesis

Nesting areas

This study has confirmed that there are four main areas of leatherback turtle nesting in the Indian Ocean and South East Asian region. These probably represent separate large-scale management units.

1. Southwest Indian Ocean - South Africa and Mozambique

The population nesting in South Africa has rarely averaged more than 100 females nesting annually within the index beach (56km of the 200km beach). Data from the index beach shows a rise from 10 to 20 nesting females per year in the 1960s, and up to approximately 100 nesting females per year in the 1990s, but in the last four years it has declined to approximately 20 to 40 nesting females per year visiting the index beach per year. The study in South Africa is one of the longest, continuous studies of leatherback turtle nesting in the world. The numbers nesting in Mozambique are not well documented, but based on data presented in this report from 1994 to 2004 it is likely that approximately 10 females nest per year in southern Mozambique (see Mozambique and South Africa sections). In addition, there does not appear to be an increase in the number of leatherback turtles nesting per year in southern Mozambique to offset the decline in South Africa.

STATUS UPDATE (2011):

2. Bay of Bengal and north-eastern Indian Ocean - Sri Lanka, Andaman & Nicobar Islands (India), Thailand and Sumatra – Java and other islands of southern Indonesia and Arnhem Land (Australia)

There are few continuous long term data sets at any of these locations. Data from recent years, presented in this report, indicate that the nesting population in Sri Lanka might be in the order of 100 to 200 females per year (based on one year of data), for the Andaman and Nicobar Islands it is approximately 400 to 600 females per year and in Thailand fewer than 10 nests (that is probably not more than 3 or 4 females) are laid per year. An interesting pattern is emerging from two geographically close rookeries in Java. At Meru Betiri the number of leatherback turtles nesting each year has declined from approximately 20 females per year in the early 1980s down to less than five females per year in the early 2000s. In contrast, at a neighbouring beach approximately 500 eggs laid per year (1 or 2 females) up to 1000 eggs laid per year). Sightings of nesting in Arnhem Land (northern Australia) are irregular but the area has been incompletely surveyed.

STATUS UPDATE (2011):

3. Southwestern South China Sea – Malaysia, Viet Nam and other minor nesting out to Japan

The Malaysian rookeries have undergone a well-documented decline from approximately 5000 nests per year in the 1960s down to less than 10 nests per year in the 2000s. This is one of the best-studied, most dramatic examples of decline in a nesting population of marine turtles. While there are no detailed data from Viet Nam, community surveys reveal that the population has declined from an estimated 500 females per year (equivalent to thousands of nests per year) prior to the 1960s down to less than 10 nests per year in recent years.

STATUS UPDATE (2011):

4. Western Pacific – Indonesia (northwest Papua), Papua New Guinea, eastern Australia

The leatherback turtles nesting along the north coast of New Guinea (Indonesia and Papua New Guinea) are from the same genetic population as females nesting in the Solomon Islands. There are few long term data for either location (see Indonesian and Papua New Guinea sections). Data from recent surveys at both locations indicates that the total nesting population is approximately 1000 females per year. Surveys along the Papua coast are incomplete. The small eastern Australian population identified in the 1970s is approaching extinction, no nests have been recorded in eastern Australia since 1996, and track sightings in northern Australia are irregular.

STATUS UPDATE (2011):

Foraging grounds and migratory corridors (non breeding areas)

This study has confirmed that there are few data on the foraging grounds and migratory corridors of leatherback turtles in the IOSEA region. The data presented in this report indicates that leatherback turtles have been reported from the waters of 32 of the 44 nations in the Indian Ocean and South East Asian region. However, in most of the countries that have no records of leatherback turtles, the main fisheries are shallow water artisanal fisheries, and **in most cases there have been few efforts made to collect fisheries based bycatch information.**

UPDATE / PROGRESS SINCE 2006:

The use of satellite telemetry to track post-nesting leatherback turtles has revealed that turtles from nesting beaches within the IOSEA region use the southern Atlantic, Southern and Pacific Oceans (northern and southern). In particular, migration data from post nesting females in South Africa show that the leatherback turtles migrated south into the southern ocean, and in several cases over into the southern Atlantic Ocean. In addition, post nesting leatherback turtles tracked with satellite telemetry from West Papua swam northwards into the northern Pacific Ocean whereas those tracked from Papua New Guinea migrated into the southern Pacific Ocean. Aside from these data, and those collected from tag recoveries from peninsular Malaysia there is little known about the “at sea” components of leatherback turtle life history in the IOSEA region.

UPDATE / PROGRESS SINCE 2006:

Gaps in the basic biological information

Population genetics (Assessments of marine turtle population genetics are used to determine distinct breeding populations).

There are wide gaps in our understanding of leatherback turtle population genetic profiling within the IOSEA region. To address this gap, and determine the genetic structure of leatherback turtle populations the following rookeries need to be sampled and compared to each other, as well as to published genotypes from Malaysia, Indonesian West Papua and South Africa:

- Australia (northern and eastern)
- Andaman and Nicobar Islands
- Mozambique
- Sri Lanka
- Sumatra
- Java
- Thailand
- Viet Nam

Knowledge of these genotypes will facilitate identification of the origin (by breeding area) of leatherback turtles being captured throughout their dispersed foraging and migratory distribution of the IOSEA region.

UPDATE / PROGRESS SINCE 2006:

Life history attributes

A. Nesting populations

There are substantial gaps in our knowledge of life history attributes for several of the leatherback turtle nesting sites in the IOSEA region. The specific gaps vary between locations, and details can be found by referring to sections on India, Indonesia, Malaysia, Mozambique, Papua New Guinea, Sri Lanka, South Africa, Thailand and Viet Nam. Data on life history attributes are necessary for the development of accurate population models. It is preferential that life history parameters be collected from at least one rookery per management unit. **The gaps in life history attributes include:**

- The number of clutches per female per year/nesting season
- The number of years between breeding seasons
- The rate of recruitment into the breeding population
- Nest success and hatchling recruitment
- Internesting areas

Of the 10 nations with current leatherback turtle nesting five have included some of the leatherback turtle rookeries within protected areas.

UPDATE / PROGRESS SINCE 2006:

B. Non-nesting beach aspects

Within the IOSEA region there are substantial gaps in our knowledge of leatherback turtle foraging areas, habitat use (oceanic and coastal), internesting area habitats, diet, growth, age and survivorship. While there have been substantial tracking and foraging area studies in eastern Pacific and western Atlantic leatherback turtle populations, few data exist for the Indian Ocean region, with the exception of the South Africa and the Papua region.

UPDATE / PROGRESS SINCE 2006:

Gaps in management

Bycatch and fisheries mortality

Leatherback turtle fisheries bycatch was reported to occur at varying levels of intensity in 25 of the 44 nations in the IOSEA region, not recorded in 13 nations and undetermined in 6. This bycatch has not been quantified in most countries, and fewer bycatch data exist for the high seas fisheries. There are also gaps in the ecological, social and economical aspects of marine turtle bycatch. Bycatch and fisheries based mortality needs to be addressed by Fisheries and/or Government organizations. This will take a coordinated international effort similar to those undertaken in the Atlantic and Pacific Ocean fisheries.

UPDATE / PROGRESS SINCE 2006:

Egg take

The direct take of leatherback turtle eggs occurs in each of the leatherback turtle breeding areas to varying degrees (encompasses both legal and illegal take). However in most cases the level of exploitation in relation to the size of the population and the socio-economic and cultural factors related to the use of eggs are unknown. Improved knowledge of these factors will enable the level of exploitation to be assessed for sustainability and managed accordingly. Every effort must be made not to repeat what has happened at Rantau Abang.

UPDATE / PROGRESS SINCE 2006:

Hatchling production

Aside from data collected from the hatchery programme in Malaysia and South Africa, there have been no detailed assessments of the hatchling production at any of the rookeries in the IOSEA region. Without these data it is impossible to conduct meaningful population assessments and design management strategies. While natural (in situ) incubation is the preferred management option for egg incubation, hatcheries are used as a management tool in one nation (plus some of the commercial hatcheries in Sri Lanka occasionally incubate leatherback turtle eggs).

UPDATE / PROGRESS SINCE 2006:

Rising beach temperatures associated with climate change can be expected to negatively impact on population sex ratio and incubation success of leatherback turtle eggs. No adequate monitoring appears to be in place in any of the IOSEA countries to guide rookery management in response to climate change.

UPDATE / PROGRESS SINCE 2006:

Standard monitoring

Monitoring of several of the rookeries in the IOSEA region has been initiated relatively recently. There is a need for managers in each location to develop standard monitoring protocols that remain consistent year to year, and complements existing projects. Mostly importantly, if whole season monitoring is not possible at all rookeries, index beaches and standard monitoring periods need to be determined and used annually. It is also preferable that tagging projects double tag turtles (PIT and flipper) to minimize problems of tag loss. The introduction of standard practices will substantially improve the ability to use the data effectively in the future.

UPDATE / PROGRESS SINCE 2006:

Additional issues for leatherback turtles in the IOSEA region

Direct harvest of turtles

A traditional harvest of leatherback turtles occurs in the Kei Islands of Indonesia. While research addressing social, economical and cultural aspects of this harvest are underway (see Indonesian section), gaps exist with regard to understanding biological aspects of the harvest (size, age class, sex and maturity). The combination of biological, social, economic and cultural data can be assessed to determine ecological sustainability and help to manage any trade-offs (social, economical, cultural or ecological) that may occur as a result of management.

UPDATE / PROGRESS SINCE 2006:

Predation of eggs

Depredation of eggs by pigs and dogs presents a problem in at least several locations (Andman and Nicobar Islands Papua New Guinea and Indonesian West Papua). Turtle conservation groups in these regions would benefit from assistance in management of the problem e.g. by predator removal or nest protection programs.

UPDATE / PROGRESS SINCE 2006:

Leatherback turtles nesting in South Africa

The leatherback turtle nesting population in South Africa and Mozambique was rising and has recently undergone a marked decline in annual nesting numbers (based on data from the South African index beach). In addition, an increase in the proportion of recruits (identified as first time nesting turtles) to the nesting population has occurred. Therefore, close attention should be paid to the assessment of current and future nesting leatherback turtle data so that management and remedial actions can be quickly taken if needed.

UPDATE / PROGRESS SINCE 2006:

Incomplete nesting distribution data

There are gaps in our knowledge of the distribution and size of current and/or historical leatherback turtle rookeries along the Indian Ocean southern margin of Indonesian (Sumatra, Java and out to the east) and the islands on northern Indonesian Papua and southeastern Philippines. These data could be collected from a combination of ground based and aerial surveys in each of the respective areas.

UPDATE / PROGRESS SINCE 2006:

Recommendations for leatherback turtle conservation

These three tables of recommendations were developed through plenary and working group discussions held at the IOSEA Memorandum of Understanding's Fourth Meeting of the Signatory States (Muscat, Oman, March 2006).

Gap	Nations/agencies	Project context/aim	Expected outcomes
Regional and national fisheries based projects			
High seas and within EEZ bycatch (pelagic fisheries)	Nations of the IOSEA region and Nations (outside IOSEA) deploying foreign fishing fleets into the region. International fisheries management agencies	Work within national and regional fisheries bodies to develop programs and activities such as onboard observer programs, and bycatch assessment/quantification and mitigation projects (including gear modification and improved fishing practices to reduce bycatch). Advocate for regional and national fisheries bodies' policies to incorporate turtle bycatch assessment and mitigation strategies Investigate/ advocate for investigation of seasonal and spatial closures as a management tool for reducing bycatch.	National bycatch observer, assessment and quantification programs established. National and/or regional bycatch mitigation projects established Coordinated regional approaches to bycatch management and illegal fishing established Reduced mortality of marine turtles
Within territorial waters bycatch (coastal fisheries)	States of the IOSEA region	Determine the spatial and temporal variation in distribution and impact of fishing effort. There is a particular need for the development of gear modification and/or use to achieve reduction in turtle mortality in gill nets [c.f. achievements such as TEDs and work in progress with long line fisheries]. Assess the impact of fisheries to inter-nesting, migrating & foraging turtles Assess the impacts of ghost nets and plastics pollution	Improved understanding of bycatch "hotspots" which will aid in fisheries bycatch management. National and/or regional bycatch mitigation projects established Improved understanding of the impacts that bycatch may have on turtle at particular life history stages Reduced mortality of leatherback turtles
MPAs	States of the IOSEA region	Protection and adequate management of already identified critical habitats (nesting, inter-nesting, feeding and migratory) Identification of further critical habitats – especially inter-nesting, feeding and migratory)	MPA networks (community-based and/or formally gazetted) that provide adequate protection and management across critical leatherback habitats

Gap	Relevant nations	Project aim	Expected outcomes
Regional and national genetic based projects			
Population genetics - Leatherback turtle nesting down through the Andaman Sea, southern Indonesia to northern Australia and in Sri Lanka have not been genetically identified.	Sri Lanka, India, Indonesia, Thailand, South Africa, Papua New Guinea, Australia and Mozambique	Determine the genotype of leatherback turtles nesting in Sri Lanka, India Thailand and Indonesia [Sumatra] and compare these with published haplotypes	Understanding of the genetic structure of leatherback turtles to be used as a base for monitoring and management
Genetics of bycatch/strandings/direct take [development of an organized collection program]	Countries with leatherback turtle bycatch programs and/or direct take [Australia, Eritrea, Sri Lanka, South Africa (shark nets) & Indonesia (Kei Is.)]	Using genetic markers identified for nesting populations, determine population structure of marine turtle bycatch or stranded turtles	Stock based threat analysis to be used as a base for monitoring and management
Biological data			
Quantify key demographic parameters [reproductive output, clutches per season, remigration interval and annual survivorship]	Each nation with nesting leatherback turtles	Conduct annual saturation tagging census at an index rookery within each genetic management unit for a minimum of six consecutive breeding seasons	Improved understanding of the biological structure of leatherback turtle populations to be used as a base for monitoring and management
Incomplete mapping of the breeding distribution and census	The priority areas are Sri Lanka, southern Indonesia to north western Australia and Philippines.	Complete the mapping and develop a six year census project at index beaches.	6 year (& then ongoing) determination of size of nesting population
Limited understanding of post nesting distribution of female leatherback turtles	Sri Lanka, India, Indonesia (predominately southern)	Satellite telemetry study to define geographical scale of migration pathways	Improved understanding of the structure of leatherback turtle populations to be used as a base for monitoring and management
Limited data on hatchling production including sex ratios and health and survivorship of hatchlings	South Africa, Mozambique, India, Sri Lanka, Indonesia and Papua New Guinea and Thailand	Determine; (1) survivorship of eggs and hatchlings (inc. natural egg loss, predation and human use), (2) clutch size, (3) beach temperatures, (4) temporal and spatial patterns of nest distribution and survivorship (5) socio-economic drivers that underlie egg take and (6) Implementing management options to maximize hatchling production	Improved understanding of the biological structure of leatherback turtle populations, in particular aspects related to egg and hatchling mortality to be used as a base for monitoring and management

Issue	Relevant nations	Project aim	Expected outcomes
Pervasive egg depredation over multiple rookeries.	India, Indonesia and Papua New Guinea	Develop a cost effective method of managing predators to produce enough hatchlings to sustain a population such as threat removal, deterrents or barriers.	Reduced mortality of leatherback turtle clutches from predation. The data can be used as a base for monitoring and management
<p>Egg take</p> <p>a) illegal take of eggs b) excessive legal take of eggs in some rookeries c) In most cases these egg takes have not been assessed for sustainability d) In most cases a lack of community based awareness or action exist to ensure adequate hatchling production</p> <p>Take of turtles</p> <p>Lack of real incentives (such as creation of alternative livelihoods) to encourage community support for conservation to ensure adequate hatchling production.</p> <p>A defined need for collaborative, community based projects to maintain adequate hatchling production and reduce or eliminate the direct take of turtles.</p> <p>Inadequate enforcement of existing legislation/ policy</p>	Indonesia, India, Sri Lanka, Papua New Guinea	<p>Determine the enforcement, regulatory and socio/economic drivers that underlie legal or illegal egg or turtle take</p> <p>Design a targeted education approach (by Govt and/or NGO) to raise awareness about the level of hatchling production that is needed to ensure sustainable populations.</p> <p>Where necessary, strengthen policy, legislation and enforcement of egg and turtle protection measures</p> <p>Create and implement incentives (such as creation of alternative livelihoods) to encourage community support for conservation to ensure adequate hatchling production.</p> <p>Develop collaborative, community based projects to maintain adequate hatchling production and reduce or eliminate the direct take of turtles.</p>	<p>Improved understanding of the social, economical and ecological aspects related to the management of leatherback turtle populations</p> <p>Decreased mortality of leatherback turtle eggs, or turtles.</p> <p>Improved social and cultural awareness about leatherback turtle conservation and management</p> <p>Improved socio-economic conditions of coastal communities that participate adjacent to rookeries</p> <p>Decreased mortality of leatherback turtle eggs, and improved hatchling production</p>
Hatcheries that are functioning with reduced hatch success and producing incorrectly imprinted & physically compromised hatchlings and manipulated sex ratios.	Sri Lanka and southern Indonesia	For Governments, regulatory agencies and NGO groups to develop a coordinated education and enforcement approach to change hatchery practice that results in high rates of hatching success of healthy and correctly imprinted hatchlings that are released on the night of emergence	Decreased mortality of leatherback turtle eggs, and improved production of high quality hatchlings