TECHNICAL WORKSHOPS AND MEETING TO SIGN THE MEMORANDUM OF UNDERSTANDING CONCERNING CONSERVATION AND MANAGEMENT OF DUGONGS *(DUGONG DUGON*) AND THEIR HABITATS THROUGHOUT THEIR RANGE

28 - 31 October 2007, Abu Dhabi, United Arab Emirates

REPORT OF THE TECHNICAL WORKSHOPS AND MEETING TOSIGN THE DUGONGS MEMORANDUM OF UNDERSTANDING

Introduction

1. The Technical Workshops and Meeting to sign the Memorandum of Understanding Concerning Conservation and Management of Dugongs (*Dugong dugon*) and their Habitats throughout their Range was held at the Beach Rotana Hotel, Abu Dhabi, United Arab Emirates, from 28 to 31 October 2007. The Workshops and Meeting were convened under the auspices of the Convention on the Conservation of Migratory Species of Wild Animals (CMS) and were hosted by the Government of Abu Dhabi, represented by the Environment Agency–Abu Dhabi.

2. The development of a Memorandum of Understanding for the Conservation of Dugongs had been called for in Recommendations 7.5 and 8.5 of the Conference of the Parties to the Convention on Migratory Species, in 2002 and 2005 respectively (CMS/DUGONG/Inf.1). A draft Memorandum of Understanding (CMS/DUGONG/Inf.5) and associated Conservation and Management Plan (CMS/DUGONG/Inf.6) had been developed at two meetings on dugong conservation and management held in Bangkok, Thailand, in August 2005 and May 2006.

3. The purposes of the current meeting were to further discuss the Implementation of the Conservation and Management Plan; to obtain updates on progress made by various Range States; and to sign the Memorandum of Understanding. The meeting would commence with two concurrent workshops concerning the Implementation of the Conservation and Management Plan in the Western Indian Ocean sub-region and in the Eastern Indian Ocean and Pacific Ocean sub-regions and would conclude with a Plenary Meeting at which the Memorandum of Understanding would be signed.

4. A list of participants attending the meeting is attached as Annex 1 to this report.

5. The Workshop and Meeting participants adopted the Agenda on the basis of the Provisional Agenda contained in document CMS/DUGONG/Doc.1 attached as Annex 2 to this report.

I. TECHNICAL WORKSHOPS

Agenda Item 1: Dugong Workshop on issues concerning the Eastern Indian Ocean and the Pacific sub-region and other issues related the general implementation of the Dugong Conservation and management Plan

Opening remarks

6. The Workshop was opened by Mr. Lahcen El Kabiri, Deputy Executive Secretary of the Convention on Migratory Species (CMS), who welcomed the participants and thanked the Government of the United Arab Emirates for its hospitality. The participants decided to conduct their work on the basis of the work programme set out in document CMS/DUGONG/Doc.5. The moderator of the workshop was Ms. Kirstin Dobbs, Director of Conservation, Heritage and Indigenous Partnerships, Great Barrier Reef Marine Park Authority, Australia. In her opening remarks she said that the objective of the workshop was to increase understanding of the challenges of dugong conservation, identifying common issues and priorities through the presentation of country reports and related discussions.

7. Ms. Helene Marsh, Professor of Environmental Science, James Cook University, Queensland, Australia, gave an overview of aspects of Dugong Biology and Behaviour (Annex 3) that justified the development of a conservation agreement under CMS. The dugong, she said, was the only member of the family Dugongidae and the only strictly marine herbivorous mammal. Its rate of breeding was slow and sensitive to environmental change and it was classed as vulnerable on a global scale by the World Conservation Union (IUCN). It was of cultural and dietary significance in certain areas. While it relied on seagrass beds for grazing it migrated widely throughout its range and there was therefore a compelling case for management planning on a regional scale. The dugong was, encouragingly, still present in the extremities of its range. Both the animal and its habitat were under increasing threat throughout its range, however, and its loss in certain areas could lead to a decline in the quality of the seagrass beds that it farmed. Research had indicated that there was a mismatch between the geopolitical scale at which a resource such as the dugong was typically managed and the biological scale at which it functioned. In conclusion, she said that dugongs needed to be managed at biological scales of hundreds of kilometres and that the signing of the Memorandum of Understanding would represent significant progress towards the international cooperation that was essential for the conservation of the species. The presentation by Ms. Marsh can be found on the website of the Convention on Migratory Species (http://www.cms.int/bodies/meetings/regional/dugong/dugong_3.htm).

8. Mr. Douglas Hykle, Coordinator of the Indian Ocean and South-East Asia (IOSEA) Marine Turtles Memorandum of Understanding, gave an overview of the dugong Memorandum of Understanding and the Conservation and Management Plan. He summarized their historical development over the previous five years but said that it was important to concentrate on practical plans for the future. The approach taken had been to develop a non-binding agreement. The experience of CMS had shown that Governments were still willing to cooperate and to contribute financially in instances where agreements were not legally binding. Both the Memorandum of Understanding and the Conservation and Management Plan were solid and comprehensive tools and provided a strong basis for actual implementation on the ground. An impressive amount of information about the status of dugongs had been gathered in many areas and the need now was to focus attention on the

specific actions that needed to be taken to implement the agreement, based on the examples set out in the annex to the Conservation and Management Plan. In that regard it was important to take each of the nine themes of the plan and review progress made, document continuing work and base new action on identified priorities. Finally, he stressed that the added value of the agreement lay in those actions that would only succeed through concerted international work.

Presentations by countries and others

9. Representatives of the following countries made audiovisual presentations on aspects of dugong management and conservation within their jurisdictions, including consideration of status, actions taken, threats and recommendations for future action: Australia (Annex 4a), France (Mayotte and New Caledonia) (Annex 4b), Myanmar (Annex 4c..) and Thailand (Annex 4d). The presentations can be found on the website of the Convention on Migratory Species <http://www.cms.int/bodies/meetings/regional/dugong/dugong_3.htm>. The representative of Pakistan delivered a report in which he said that there had been no recent sightings of dugongs in Pakistan but the presence of seagrass off the eastern coast indicated that dugongs might migrate through the area.

10. The representative of the Secretariat of the South Pacific Regional Environment Programme (SPREP) provided an overview (Annex 4e..) of the revised Dugong Action Plan for the Pacific Region (2008–2012), which would take effect in January 2008. The presentation can be found on the CMS website <http://www.cms.int/bodies/meetings/regional/dugong/dugong_3.htm>.

11. A number of key themes emerged from the presentations. The importance of involving indigenous peoples and other local communities in monitoring and conservation activities was highlighted. In Australia, for example, the Turtle and Dugong Management Project sought to assist indigenous communities to develop their own management plans for turtles and dugongs based on customary values. Innovative methods of carrying out effective work with limited funding were noted. In Thailand, for example, monitoring and mapping had been done using microlight aircraft, and work in Myanmar using a grant of $1,000 from the Society for Marine Mammalogy showed that significant progress could be made through modest funding.

Interactive Mapping Exercise

12. The Workshop participants undertook an interactive mapping exercise in which country representatives marked on a regional map important areas for dugongs and their habitats. As well as providing a useful overview of dugong distribution, the exercise prompted informative discussion on several aspects of dugong status including threats, gaps in knowledge, regional cooperation, behavioural characteristics of dugongs, conservation efforts and projects and opportunities for further action.

Conservation and Management Plan

(a) Objectives 1, 3, 5, 7, 8: Threats and Management Tools

13. **Threats to Dugongs**. During an interactive discussion the Workshop participants compiled a matrix of threats to dugongs, listing them by country. The major categories of threats identified were incidental capture in fishing gear, marine debris, habitat destruction, boat strike, disturbance, pollutants, unsustainable hunting and poaching. For each country, the

threats were classified as of high, medium or low importance or not applicable. It was recognized that not all threats were found in all countries and that the impact of the identified threats varied in intensity. The matrix is set out in Annex 5 to the present report.

14. **Management Tools**. In another interactive discussion, a number of current management actions and tools were identified for the threat categories recognized in the previous exercise. Further potential management tools were also identified. The types of tools suggested were wide ranging and included education and awareness raising; fisheries management techniques (e.g., temporal and spatial closures and gear modification); community-based management regimes; environmental impact assessment; and legislation. The matrix of current and potential management tools for dugongs is set out in Annex 6 to the present report.

(b) Objectives 2, 4: Improving Understanding of Dugongs and their Habitats through Research and Monitoring

15. The representatives of Australia, Myanmar, New Caledonia, Pakistan, Thailand and SPREP identified a number of information needs in relation to dugongs and their habitats within their jurisdictions. Opportunities existed for international cooperation in research projects, for example, addressing knowledge gaps regarding the genetic characteristics of dugongs, for which international funding might be available. Information gaps were identified in a number of areas, including dugong movement and habitat use, mapping and monitoring of seagrass, traditional knowledge and practices and dugong management within traditional community structures. There was a significant lack of baseline data in many areas. The matrix compiled during the exercise also identified key national and international research priorities. The workshop sought to identify specific activities that might be carried out to fill knowledge gaps and the organizations and agencies that might be best placed to assist with the process.

16. The problem of attracting funding for dugong research and conservation was discussed; Mr. Hykle stressed the importance of ensuring that project proposals were clearly defined in order to attract funding. Another representative said it was possible that some existing or planned projects in the region had the potential to include dugong-related activities. Another suggested developing a pro forma on which initial project proposals could be laid out, following which advice might be sought from the CMS Secretariat as to which proposals were most appropriate for full development and most likely to attract funding. There was a budgetary surplus from the present meeting that could be used to fund some priority small-scale projects.

17. It was not possible to compile a comprehensive list of information needs and priorities as a number of countries were not represented at the workshop. The matrix of information needs and priorities for improving understanding of dugongs and their habitats is set out in Annex 7 to the present report.

(c) Objective 9: Enhance National, Regional and International Cooperation on Capacity-Building

18. During an interactive discussion, a number of suggestions were offered on ways in which national, regional and international cooperation might be enhanced in order to build capacity for dugong conservation.

19. Various internet options were discussed, including the establishment of a website for the Memorandum of Understanding, possibly modelled on the IOSEA website. In that context, it was recognized that setting up, maintaining and updating such a site would require substantial human resources. Using an international list server, such as the Sirenian International list server, to exchange information was also suggested.

20. Dissemination of information posed particular challenges, given the considerable geographical spread of the dugong, the wide range of stakeholders and communities with particular information needs and the budgetary limitations of the Memorandum of Understanding. Suggestions included promoting Memorandum of Understanding meetings and activities via the IUCN Sirenian Specialist Group newsletter, and sharing common resources and ideas, such as educational material.

21. Options for the governance structure of the Memorandum of Understanding were considered, including the establishment of a dedicated secretariat that would act as a coordination point for the agreement. That would again require significant resources and funding. It was generally considered advantageous to explore opportunities to carry out work in tandem with existing bodies within the region, for example the Southeast Asian Fisheries Development Center (SEAFDEC).

22. To assist research, sharing of technical support and knowledge could be promoted through the provision of internships, university degrees and marine studies courses by countries with specialist expertise.

Agenda Item 2: Dugong Workshop on key themes for the Western Indian Ocean sub-region

Opening remarks

23. Mr. Thabit Al Abdessalaam, Environment Agency–Abu Dhabi, opened the workshop on the conservation and management of dugongs in the Western Indian Ocean sub-region. He recalled the history of previous meetings on dugongs and noted the importance of the new focus on dugongs among States of the Western Indian Ocean region. He noted that previous attention had been largely focused on dugongs in the Eastern Indian Ocean and Pacific sub-region and said that his Government was willing to provide leadership for dugong conservation in the Western Indian Ocean sub-region.

24. Outlining the agenda for the workshop, Mr. Abdessalaam said that there were two topics to be addressed. First, representatives would review and, if necessary, update the available information on the status, conservation and management of dugongs and their habitats in each country. Second, representatives would review and finalize the Conservation and Management Plan for Dugongs (*Dugong dugon*) and their Habitats of the Arabian Gulf, Red Sea and Western Indian Ocean Sub-region, which had been developed to aid implementation of the regional Conservation and Management Plan within the sub-region.

25. Observing that the present meeting would conclude with a signing ceremony for a new Memorandum of Understanding on the Conservation and Management of Dugongs, Mr. Abdessalaam said that the United Arab Emirates was prepared to be a founding signatory and

further expressed the hope that many other representatives of States from the Western Indian Ocean sub-region would commit their Governments to the proposed new accord.

Review of the status, current threats and management concerning dugongs and dugong habitats within the Arabian Gulf, Red Sea and Western Indian Ocean

26. Mr. Abdessalaam called on Mr. Himansu Das, Environment Agency–Abu Dhabi, to present a consolidated overview of the available information pertaining to dugongs and dugong habitats, as prepared by and collected from Governments of countries in the sub-region.

27. In his presentation, Mr. Das highlighted the research and conservation efforts on dugongs undertaken by the United Arab Emirates. Information regarding dugong populations in the territorial and adjacent waters of that country included qualitative and anecdotal reports, quantitative data and aerial survey observations. Dugong mortality was largely due to incidental catch in fishing nets and vessel strikes, while habitat destruction resulted from coastal development activities and marine pollution. In response, the Government had already developed and implemented a Conservation and Management Plan that involved the passage of protective legislation in 1999 and the establishment of three marine protected areas encompassing zones of known dugong population concentrations and critical dugong habitats.

28. Turning to information on dugongs and their habitats from other countries in the Western Indian Ocean sub-region, Mr. Das reviewed the quality of available data on a country-by-country basis. He noted that there was a need for greater knowledge concerning the size, range and habitats of dugong populations. Human threats to dugongs, including hunting, destructive fishing practices, incidental catch, vessel strikes, habitat destruction, marine pollution and other local or specific risks, also needed further elaboration through expanded research. Summary data from the sub-region indicated that only three countries had implemented legislation related to dugong conservation and only five countries had gathered reliable, quantitative data on dugong populations in their waters. Dugong habitat degradation was widespread in all of the Range States and, while causes of mortality had not been well studied, it was clear that fishing equipment and practices harmful to dugongs such as the use of underwater explosives, gill and fish nets and trawlers and traps were in widespread use across the sub-region. In concluding his remarks, Mr. Das highlighted three priority areas for dugong conservation in the Western Indian Ocean: basic research on dugong populations and causes of mortality; legislation; and implementation of management actions.

29. Ms. Patricia Davis, Community Centred Conservation, made a presentation on dugong conservation and management in the Union of the Comoros, including its coordination of work with Mayotte, an overseas department of France. She briefly reviewed the recent history and current status of dugongs and their range in the Comoros Islands. Dugongs were now found around only one of the three islands, in large part due to past hunting, and across the East African coast and islands their populations were drastically reduced. Although data on dugong sightings by fishermen extended back to 1950 there was a lack of awareness concerning dugongs even among fishermen and the public was largely unaware of their presence in the Comoros. In response, Community Centred Conservation, a non-governmental organization working in partnership with the Government of Comoros on coastal research and development, was implementing a dugong conservation programme involving community participation in research, awareness raising and development of a national action plan. Public involvement in conservation activities and other dugong

management efforts were being pursued in preference to continued aerial surveys, which were not considered cost-effective in the current context. She concluded by noting that the Government of Comoros would sign the Memorandum of Understanding in the near future and expected to be the first State to pass legislation to implement it.

30. In the ensuing discussion, representatives welcomed the information presented and a few indicated that they might be able to provide supplementary data from their respective countries. Mr. Abdessalaam expressed his thanks for the presentations and said that they would inform and guide the discussions on the Conservation and Management Plan for the Western Indian Ocean sub-region.

Conservation and Management Plan

31. Mr. Abdessalaam served as Chair of the Workshop review of the draft Conservation and Management Plan for the Western Indian Ocean sub region. He introduced the draft plan and led a systematic review of its goals, objectives and actions.

32. Three issues dominated the discussion of the draft plan. Particular attention was paid to the need for further research on the status of dugong populations and evaluation of the threats to both dugongs and their habitats. A need to expand stakeholder involvement was also recognized; and local communities, the private sector and other international conventions were identified as appropriate partners for implementation of the plan. Toward that end, it was considered useful to promote the dugong as a flagship species, similar to the dolphin and the giant panda, in order to generate public interest and goodwill and concomitant additional financial support. Finally, the relative prioritization of management actions was debated extensively and it was ultimately agreed that Signatory States would accept the sub-regional Conservation and Management Plan as a whole and make individual prioritizations of activities according to their local circumstances.

33. At the conclusion of the review and debate, representatives agreed that the final version of the Conservation and Management Plan for the Western Indian Ocean sub-region would be forwarded to the Plenary Meeting for consideration.

Agenda Item 3: Session for Integration of Outcomes of Workshops and Working Groups

Synthesis Report and Discussion

34. The representatives of the Eastern Indian Ocean and Pacific sub-region and the Western Indian Ocean sub-region came together in a joint meeting to synthesize their observations and findings. In her summary of the two sub-regional technical workshops, Ms. Dobbs said that both had received updated information from countries on threats to dugongs and current management actions and research. The workshops, while adopting different approaches, had both used the regional Conservation and Management Plan as the basis for discussion of threats to dugongs and their habitats; potential management tools to address the threats; research and information needs for Dugongs and their habitats; and ideas for cooperation, information sharing and capacity-building at the national, regional and international levels. It was recognized that not all countries across the range of the dugong were represented at the Workshops. Further updated information on management of, threats to

and status of research on dugongs was therefore required for those Range States in order to obtain as full a picture as possible of dugong status and identify priorities.

Presentations to joint session

(a) Presentation by Coordinator of IOSEA

35. To assist representatives in their deliberations regarding a possible governance structure for the dugong Memorandum of Understanding, Mr. Hykle gave a presentation on the IOSEA Marine Turtle Memorandum of Understanding, which had 27 Signatory States and covered a similar geographical range to that of the dugong. The IOSEA website (www.ioseaturtles.org) had proved very successful in assisting in the exchange of information on seas turtles. It was updated regularly and contained a "profile of the month" featuring a particular activity. It also included an electronic library of reference materials, a project database, an interactive mapping system and information on tagging. National reports could be submitted and viewed online. The Year of the Turtle 2006 campaign had proved very successful in raising awareness among Governments, non-Governmental organizations and grass-roots organizations.

36. The Memorandum of Understanding, he said, facilitated cooperation with a range of agencies, for example fisheries organizations, now that solid agreement had been reached on such matters as by-catch, and acted as a focus to bring Range States together in regional meetings. Finally, it opened up further funding opportunities, allowing the establishment of a Secretariat to coordinate activities across the region.

(b) Presentation on Justification for Dugong Memorandum of Understanding

37. Ms. Marsh gave a further presentation on aspects of dugong biology and behaviour that justified the development of a conservation agreement under CMS. In response to queries following the presentation, she said that the analysis of DNA to identify dugong populations could be carried out in any modern genetics laboratory and offered considerable scope for international collaboration. She saw great advantage in a website similar to that of IOSEA which countries could use to easily update information on dugong-related matters, including status and protected areas. She drew attention to the western Red Sea as a high-priority area for which up-to-date information was lacking.

(c) Preparation for signing the Memorandum of Understanding

38. Mr. El Kabiri presented the text of the draft Memorandum of Understanding, as amended. The text was in Arabic, Chinese, English and French. After some discussion it was agreed that only Range States could sign the MoU; other organizations could attend meetings as observers. Further, based on a submission from the representative of France, it was decided that all language versions of the Memorandum of Understanding would be considered equally authentic.

II. MEETING OF SIGNATORY STATES

Agenda Item 4: Welcoming remarks

39. The Meeting of Signatory States was opened by Ms. Khansa Al Blouki, Environment Agency-Abu Dhabi. She welcomed representatives to the Meeting on Dugong Conservation and called on Mr. Majid Al Mansouri, General Secretary of the Environment Agency–Abu Dhabi, Mr. El Kabiri and Mr. Abdessalaam to address the participants.

40. In his remarks, Mr. Al Mansouri welcomed representatives to the United Arab Emirates and to the Emirate of Abu Dhabi and expressed his hope that the meeting would prove productive, particularly given the recent efforts in the just-concluded Workshops. He noted the long-standing commitment of the United Arab Emirates and of the Emirate of Abu Dhabi to the Marine Environment, which reflected its fishing and sea trading heritage and its rich endowment of dugongs and other marine species. The Conservation and Management Plan for Dugongs adopted by the United Arab Emirates was consistent with the proposed plan for the dugong Range States. He concluded by urging the signing of the Memorandum of Understanding and the adoption of the proposed Conservation and Management Plan as first steps toward implementation of programmes for dugong conservation.

41. In his remarks, Mr. El Kabiri noted that the Convention on Migratory Species (CMS) was a global Convention concerned with migratory species, hosted by UNEP in Bonn, Germany, that promotes species conservation and habitat preservation through its operational instruments (CMS Article IV). Under the auspices of the Convention on Migratory Species, more than 140 Range States had signed around 20 agreements and memoranda of understanding for the conservation and management of migratory wild animals and five new CMS initiatives were underway. The Memorandum of Understanding on Dugong conservation would lead to important outcomes for regional cooperation and for the promotion of biodiversity.

42. In his opening statement, Mr. Abdessalaam said that the impetus for the development of the Memorandum of Understanding had been the increasing vulnerability of the dugong and its habitat, the declining numbers of dugong throughout much of its range and the animal's ability to migrate over great distances. In his overview of the Memorandum of Understanding, he stressed that it was a voluntary agreement, of which the Conservation and Management Plan was an integral component. The Memorandum of Understanding would take effect with two signatures. The original text, in Arabic, Chinese, English and French, would be deposited with the Secretariat of the Convention on Migratory Species.

Agenda Item 5: Adoption of the Agenda and Work Programme

43. The Meeting participants adopted an agenda and work programme on the basis of the Provisional Agenda (CMS/DUGONG/Doc.1) (Annex 2) and the Annotated Provisional Agenda and Meeting Schedule (CMS/DUGONG/Doc.2/Rev.2).

Agenda Item 6: Election of Officers and a Credentials Committee

44. Mr. Abdessalaam was proposed as Chair of the Meeting by the representative of the United Republic of Tanzania and was duly elected.

45. Mr. El Kabiri and the representatives of Myanmar and Saudi Arabia were proposed as members of the Credentials Committee and duly elected. Members of the Credentials Committee were not required to be signatories of the Memorandum of Understanding. Mr. El Kabiri asked delegates who had not yet presented their credentials to do so in order to enable them to sign the Memorandum of Understanding.

Agenda Item 7: Secretariat's Report on advancement of the MoU adoption progress

46. Mr. El Kabiri presented a note by the Secretariat on progress on adoption and implementation of the dugong Memorandum of Understanding (CMS/DUGONG/Doc.4). He gave a brief overview of the process by which the Memorandum of Understanding had been developed. He noted that a number of outstanding issues remained, including the next actions to be taken, the governance structure of the Memorandum of Understanding, the establishment of a website, the format for reporting and the frequency of meetings.

47. Regarding the location of the Secretariat of the Memorandum of Understanding, Mr. Hykle said that several options were being considered. The minimum that might be expected of a host organization was the provision of offices and staff, development of a website and assistance with coordinating the activities of signatory countries across the range of the dugong. IOSEA was co-located with the United Nations Environment Programme in Bangkok, but there was no fixed model, with different arrangements pertaining to the various agreements under CMS. The issue was often one of finance, and which organization in which country was in a position to offer the services required in addition to having the resources, capacity and skills to host a secretariat.

Agenda Item: 8: Brief Statements from Range States and Observers

48. The representatives of the following Range States made brief statements: Australia, the Comoros, Eritrea, France (New Caledonia), the Islamic Republic of Iran, Kenya, Madagascar, Myanmar, Pakistan, Qatar, Saudi Arabia, Seychelles, Thailand, United Arab Emirates, United Republic of Tanzania and Yemen. The representative of Iran said that his country was willing to assist in the administration of the Memorandum of Understanding. Statements were also made by the representatives of some commercial organizations and non-governmental organizations, who underlined their commitment to the protection of the dugong.

Agenda Item 9: Report of the Credentials' Committee

49. The representative of Myanmar presented the Report of the Credentials Committee. He said that original credentials had been received from the representatives of Australia, Eritrea, the Islamic Republic of Iran, Madagascar and Myanmar. In addition, he said that the Ambassadors of France and the United Republic of Tanzania to the United Arab Emirates and

the Minister for Environment and Water of the United Arab Emirates would attend and sign the Memorandum of Understanding.

Agenda Item 10: Official opening for signature of the Memorandum of Understanding

50. Introducing the official signing of the Memorandum of Understanding, Mr. El Kabiri expressed his gratitude to those Range States that had committed to signing the MoU, thereby founding a new era of cooperation in the region. The MoU was then formally signed by the Ambassadors of France and the United Republic of Tanzania, the Minister for Environment and Water of the United Arab Emirates, and the representatives of Australia, Eritrea, Madagascar and Myanmar. The Memorandum of Understanding is attached as Annex 8 and the associated Conservation and Management Plan as Annex 9 to the present report.

Agenda Item 11: Any other business

51. Mr. Abdessalaam noted that documents for the current meeting would remain available on the website of the Environment Agency–Abu Dhabi, at www.ead.ae, which would also include a list of meeting participants.

52. Mr. El Kabiri said that, in consultation with all dugong Range States and, while an offer was presented to host a unit for the coordination of dugong activities, the Secretariat for the new Memorandum of Understanding was assured by the CMS Secretariat. The Secretariat would pursue conservation and management efforts within the region.

Agenda Item 12: Closure of the Meeting

53. Mr. Mansouri, on behalf of His Highness Sheikh Hamdan bin Zayed al Nahyan, Deputy Prime Minister of the United Arab Emirates and Chair of the Board of Directors of the Environment Agency, thanked all those who had attended the meeting. After the usual exchange of pleasantries, Mr. Abdessalaam declared the Meeting closed at 2.42 p.m. on Wednesday, 31 October 2007.

ANNEX 1

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Convention on the Conservation of Migratory Species of Wild Animals

TECHNICAL WORKSHOPS AND MEETING TO SIGN THE MEMORANDUM OF UNDERSTANDING CONCERNING CONSERVATION AND MANAGEMENT OF DUGONGS *(DUGONG DUGON*) AND THEIR HABITATS THROUGHOUT THEIR RANGE

28 - 31 October 2007, Abu Dhabi, United Arab Emirates

CMS/DUGONG/Doc.1

AGENDA

WORKSHOPS:

1. Dugong Workshop on issues concerning the Eastern Indian Ocean and the Pacific sub-region and other issues related the general implementation of the Dugong Conservation and management Plan

2. Dugong Workshop on key themes for the Western Indian ocean sub-region

3. Session for Integration of outcomes of Workshops and Working Groups

MEETING OF SIGNATORY STATES:

4. Welcoming remarks

5. Adoption of the agenda and work programme

6. Election of Officers and a Credentials Committee

7. Secretariat's Report on advancement of the MoU adoption progress

8. Brief statements from Range States and Observers

9. Report of the Credentials' Committee

10. Official opening for signature of the Memorandum of Understanding

11. Any Other Business

12. Closure of the meeting

Dugong biology: the case for a CMS agreement

Helene Marsh
James Cook University Australia

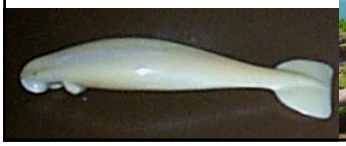
Conservation significance of dugongs

- Only member of family Dugongidae
- Only strictly marine herbivorous mammal
- Largest population size and range of extant Sirenia (dugong and manatees)
- Currently classified as vulnerable at global scale by IUCN

Cultural importance of dugongs

- High cultural value in many parts of range
- Valued source of food, medicine and artefacts in many countries
- Flagship species for coastal peoples

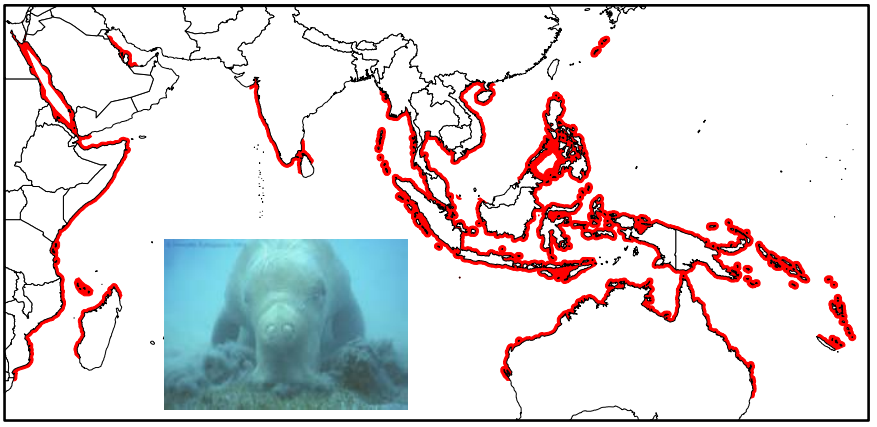




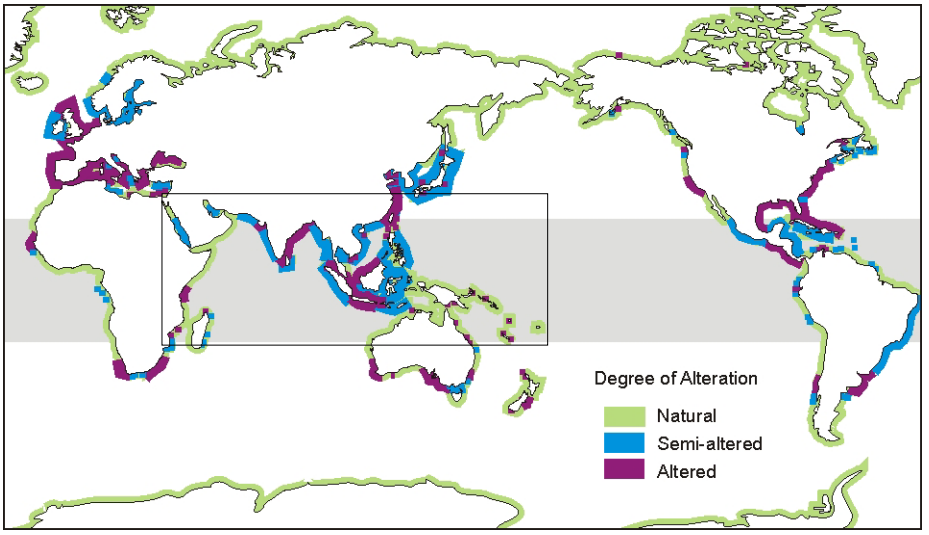
Convention for conservation of migratory species

- Objective:
  - To conserve terrestrial, avian and marine species over the whole of their migratory range.
- Recognition of the need for countries to cooperate in conserving animals which migrate across national boundaries or between national territorial waters and the high seas.

Extent of occurrence : 140,000 km of coastline across 48 countries

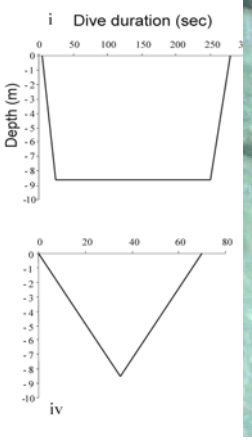


Still present at extreme ends of range but reduction in area of occupancy within range



from World Resource Institute

Dive computers show dugongs spend most of their time feeding in shallow water < 10m, 72% dives< 3m



Seagrass specialist

Area of occupancy: shallow coastal waters

potentially > 125,800 km^2

Critical habitat seagrass beds < 10m especially <3m

Dugongs farm seagrass – when dugongs are lost from an area it may decline in habitat quality

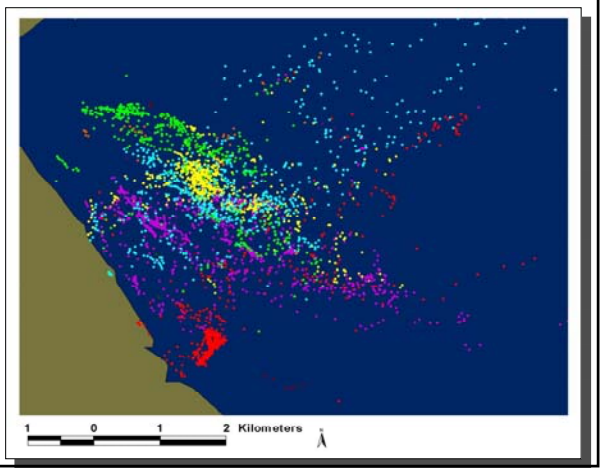
Space age technology to study dugong movements and diving

Acknowledgment James Sheppard

Small-scale commuting movements

Dugongs target specific areas with high biomass of preferred seagrass species

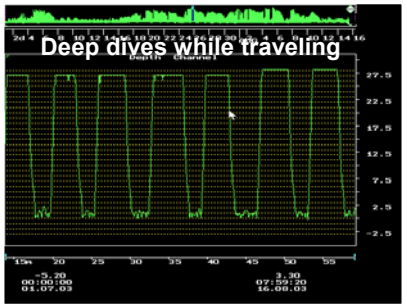
- **Each colour an individual dugong**
- **Each dot a location fix**

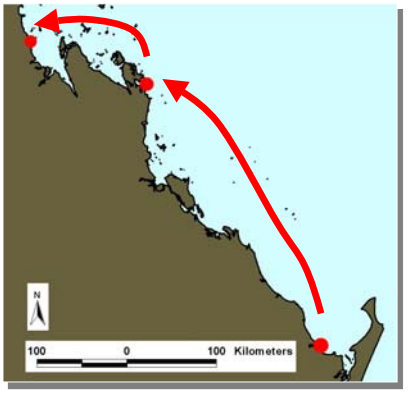


Acknowledgment James Sheppard

Long distance movements:

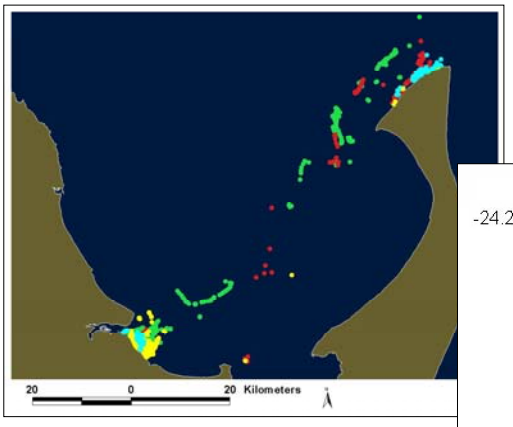
- Moves common yet unpredictable
- 44/72 >30km; 14>100km
- All size/age/sex classes make large-scale moves
- Moves up to 500km in 12 days
- Some make return trips

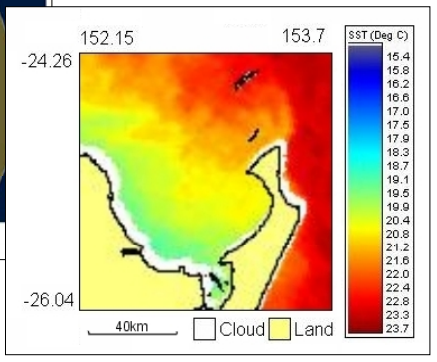




Acknowledgment James Sheppard

Thermoregulatory movements at high latitude limits to range

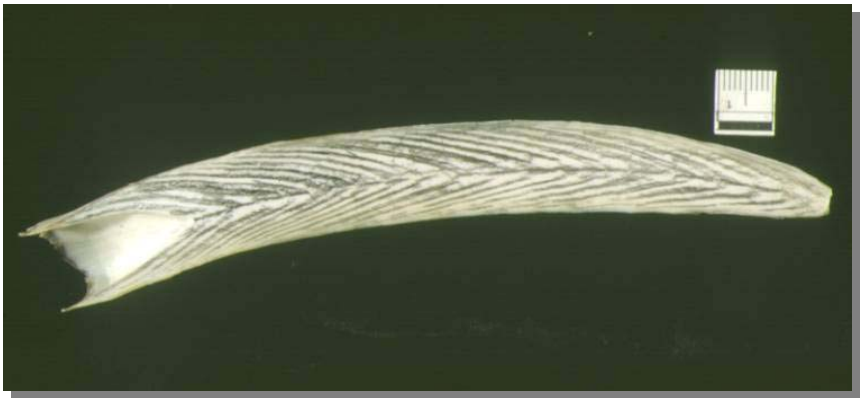




Acknowledgment James Sheppard

Occasionally cross ocean trenches

Maximum age > 70 years



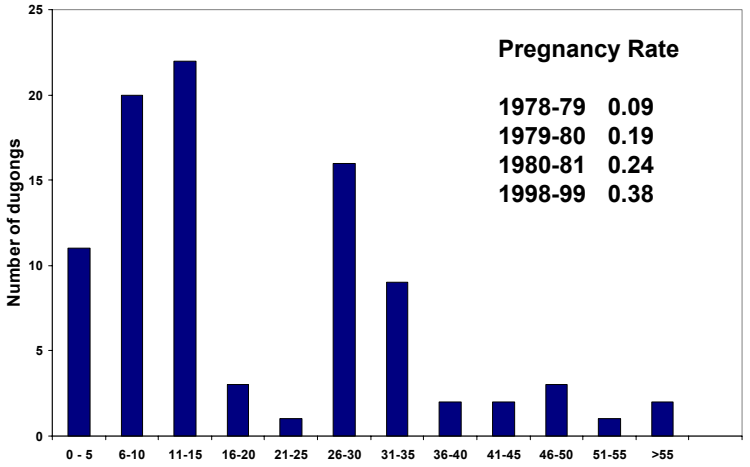
First breeds at age 6-17 years suckles young for up to 18 months

Acknowledgment
Amanda Hodgson

One calf every 2.5 to 7 years depending on food supply

If food supply is damaged dugongs postpone breeding and/or move

Impact of seagrass dieback 20- 25 years previous in age structure of sample



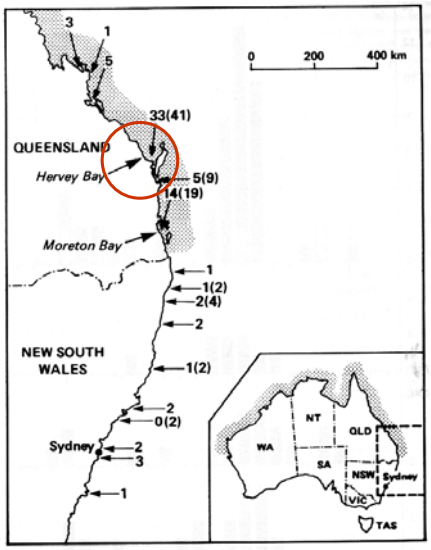
Acknowledgment Donna Kwan

Cause of 1992 decline (emigration + mortality): *Habitat loss, due to extreme weather*

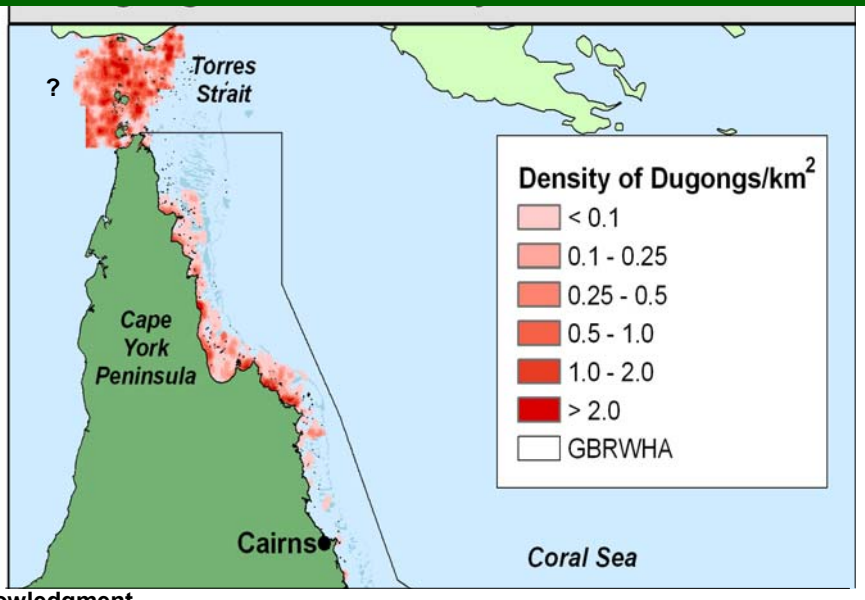
1000 km^2 of seagrass habitat were lost in Hervey Bay in 1992 after two floods and a cyclone

After large scale seagrass loss dugongs move or delay breeding

Recovery of dugong carcasses after Hervey Bay seagrass loss



Habitat extends across international boundaries



Acknowledgment
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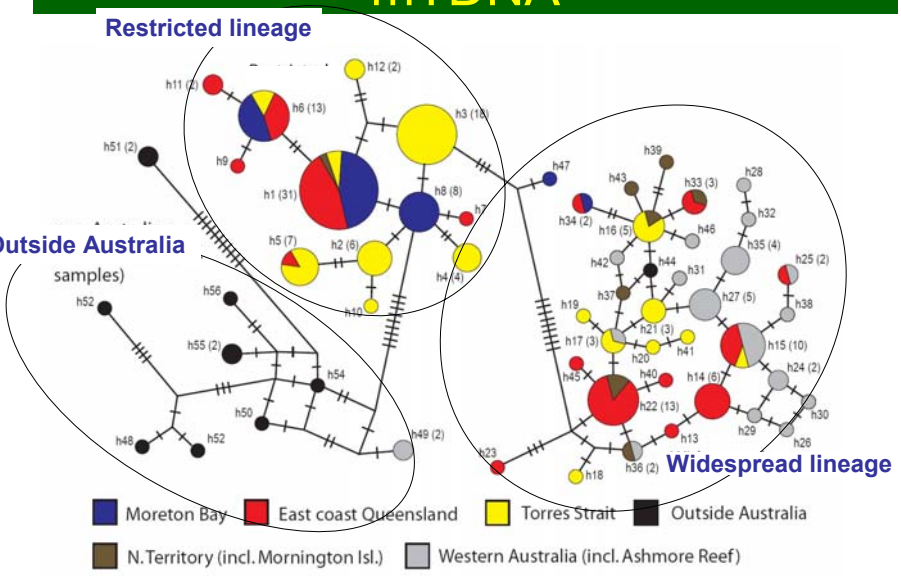
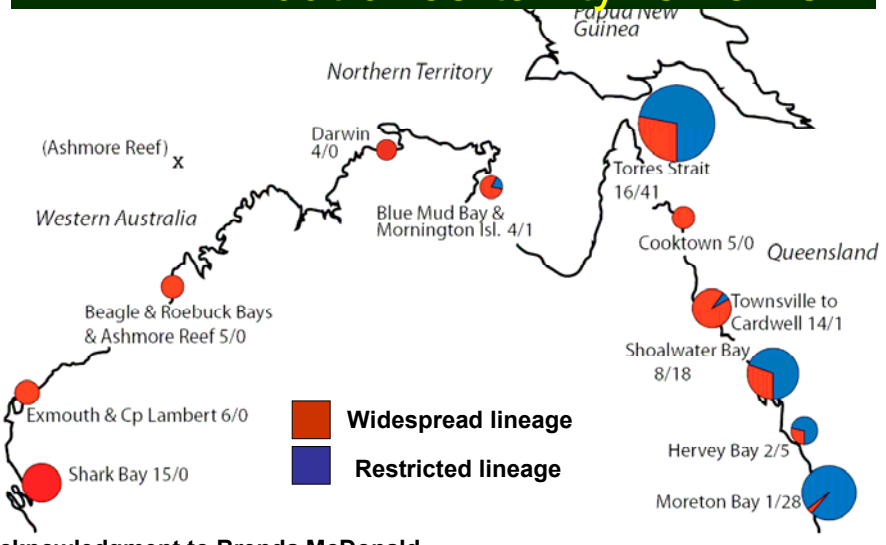
Biological scale? Clues from mTDNA



Acknowledgment to Brenda McDonald

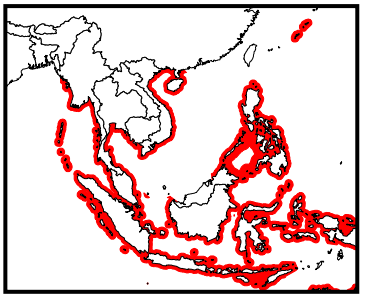
Biological scale? Clues from mTDNA but uncertainty remains



Acknowledgment to Brenda McDonald

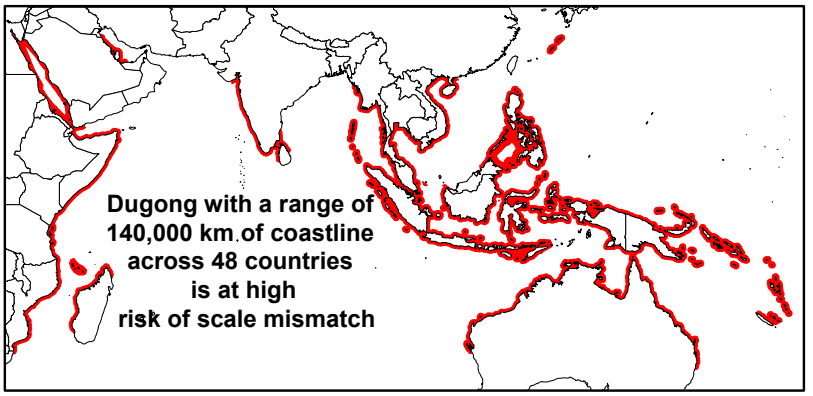
Microsatelitte markers

- Preliminary data from markers inherited from both parents consistent with isolation by distance at scale of hundreds of km



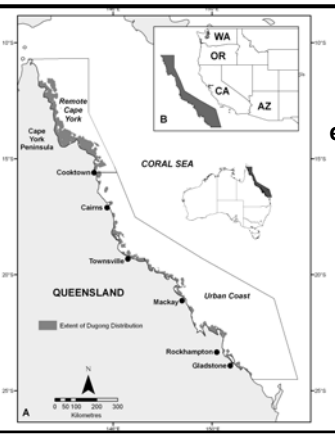
Scale Mismatches

- Occur if mismatch between geo-political scale(s) at which resource managed and biological scale at which resource functions
- Major impediment to successful management



Question?

Is there a scale mismatch between the scale at which risks to dugongs from anthropogenic impacts are managed in the Great Barrier Reef region and the scale at which dugong populations function?



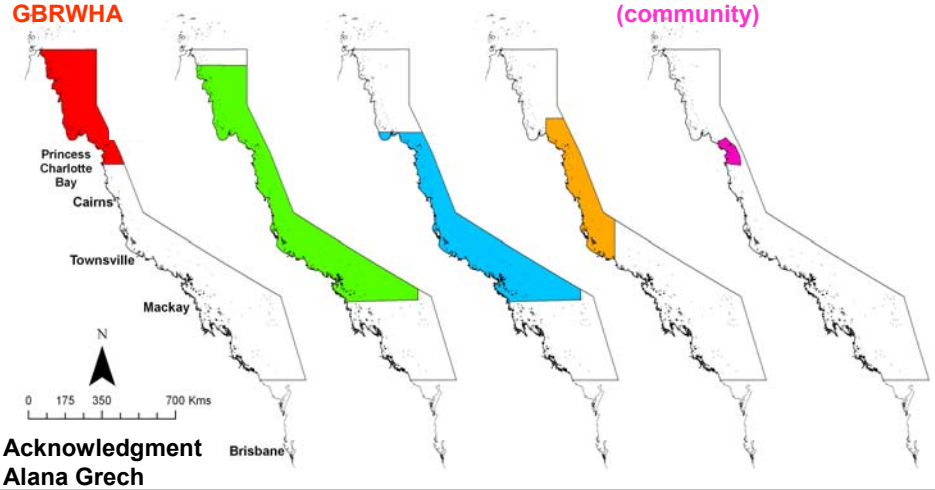
GBRWHA 348,000 km^2 ecosystem level planning

5 scales in Great Barrier Reef World Heritage Area

uncertainty

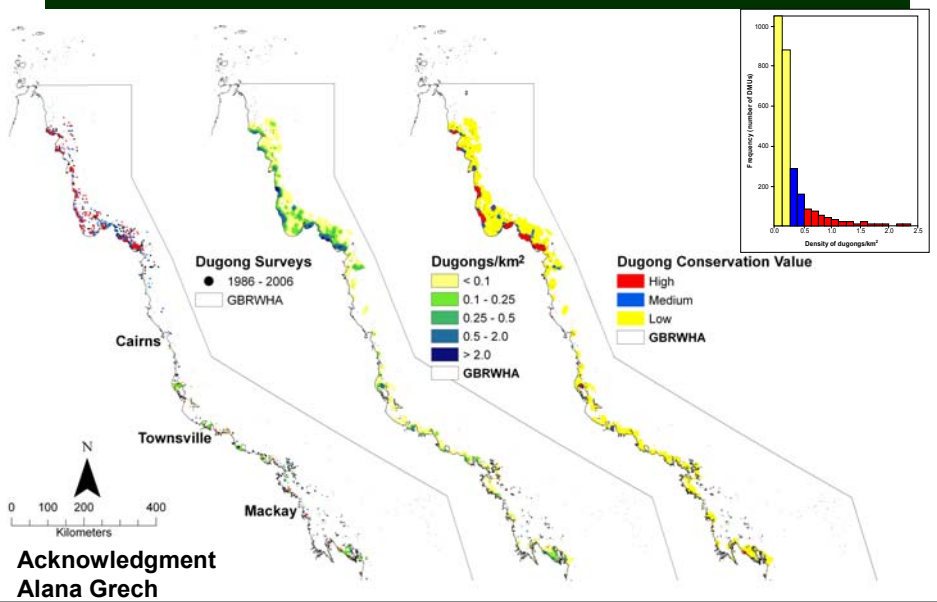
Geo-political **Biological 1** **Biological 2** **Biological 3** **Local**

GBRWHA **(community)**



Acknowledgment
Alana Grech

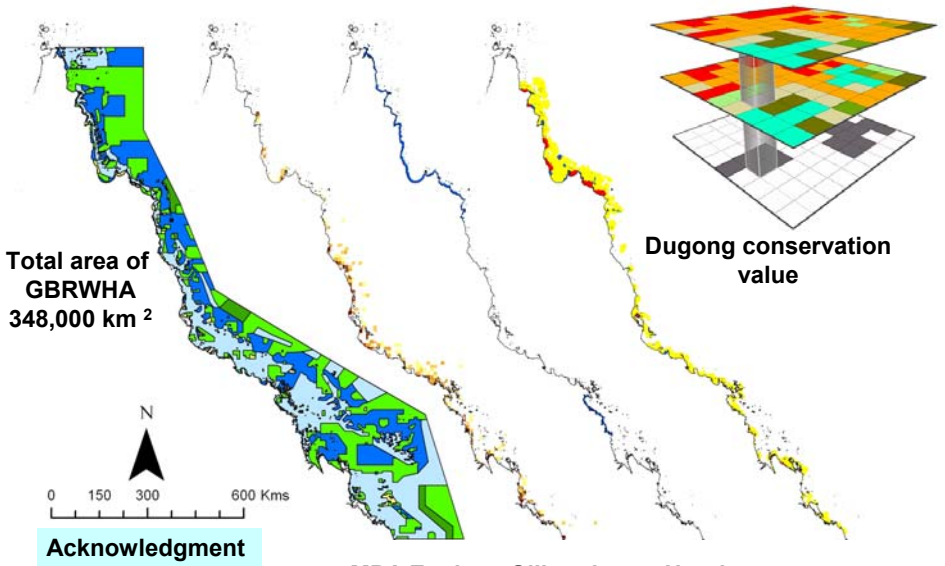
Spatial model of dugong distribution and abundance based on 20 years of aerial surveys



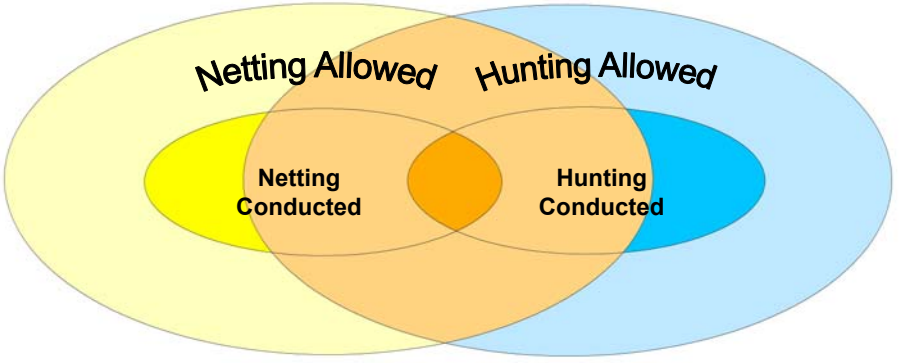
Acknowledgment
Alana Grech

Two major sources of anthropogenic mortality

Layers in 2x2 km grid



Acknowledgment Alana Grech



Acknowledgment Alana Grech

% of area of high and medium Dugong Conservation Value

Scale	Netting Allowed	Netting Conducted	Hunting Allowed	Hunting Conducted	Netting and unting Allowed	Netting and Hunting Conducted
Geo-political	44	7	100	30	44	4
Biological 1	41	6	100	28	41	4
Biological 2	33	1	100	27	33	0
Biological 3	38	4	100	20	38	0
Local	38	9	100	23	38	1

No evidence of scale mismatch because environmental planning in Great Barrier Reef region done at ecosystem scale

Acknowledgment Alana Grech

Conclusions

- Dugongs need to be managed at biological scales of hundreds of km
- Most geo-political scales are much smaller than this
- Spatial scale mismatch is a serious impediment to successful management
- Spatial scale mismatch can be prevented by ecosystem scale management planning
- CMS MOU is significant advance

Thanks to:

Reef & Rainforest Research Centre

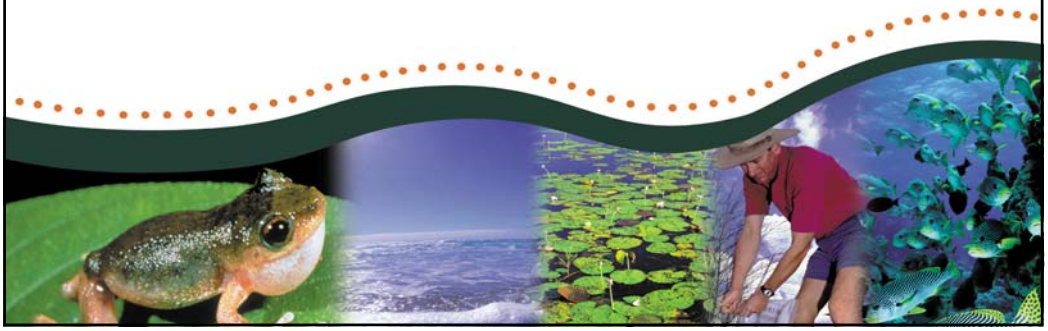
JCU

Australian Government Great Barrier Reef Marine Park Authority

Queensland Government

Amanda Hodgson
Donna Kwan
Brenda McDonald
Alana Grech
Rob Coles
James Sheppard

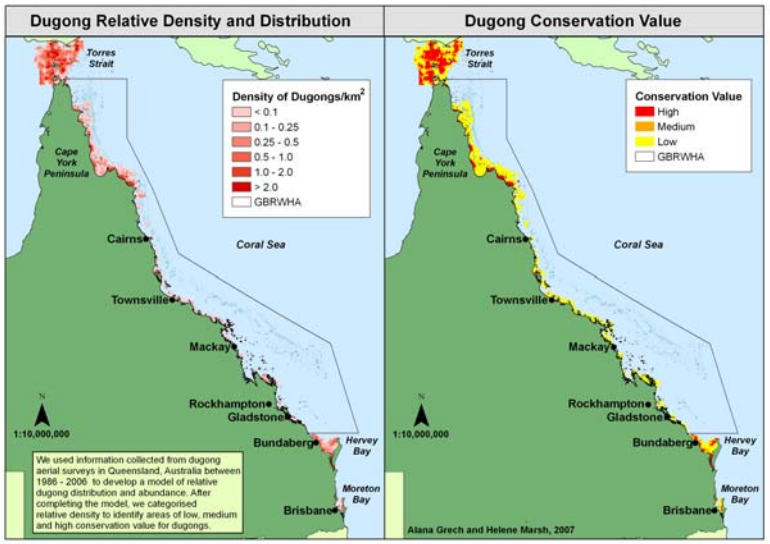
Overview of Australian Dugong Activities



Australian Government
Department of the Environment and Water Resources

Dugong in Australia

- Dugong are protected under Commonwealth, State and Territory legislation
- Listed as 'Migratory' under the Commonwealth EPBC Act but not 'Threatened'
- Special recognition given in statutory regulations for traditional use



Alana Grech, JCU

Australian Government
Department of the Environment and Water Resources

Initiatives helping to protect dugong

- Management Plans for Commonwealth/State Reserves help protect critical habitat
- Strategic Assessment of the sustainability of the Torres Strait dugong fishery
- A threat abatement plan identifies ways to address issues of harmful marine debris
- ‘Go Slow Zones’ help avoid boat strikes
- Dugong Protected Areas

Priority issues

- Community Engagement
  - Sustainable harvesting of dugongs by Indigenous Australiana
- Research and Monitoring Projects

Australian Government
Department of the Environment and Water Resources

Community Engagement – National Partnership Approach

- A partnership between government and Indigenous communities to discuss sustainable harvest of turtle and dugong
- To understand the experiences and aspirations of Indigenous Communities for management
- Meetings are held ‘on country’ to ensure greater Indigenous involvement
- Reporting to Commonwealth and State Ministers
- Inform Government’s policy and programme development

Australian Government
Department of the Environment and Water Resources

Community Engagement – Turtle and Dugong Management Project

- A partnership between 5 regions across Northern Australia
- $4.5m of funding over 4 years
- To assist Indigenous Communities develop their own management plans for turtle and dugong - based on Indigenous customary values
- To understand Indigenous harvest and other causes of mortality

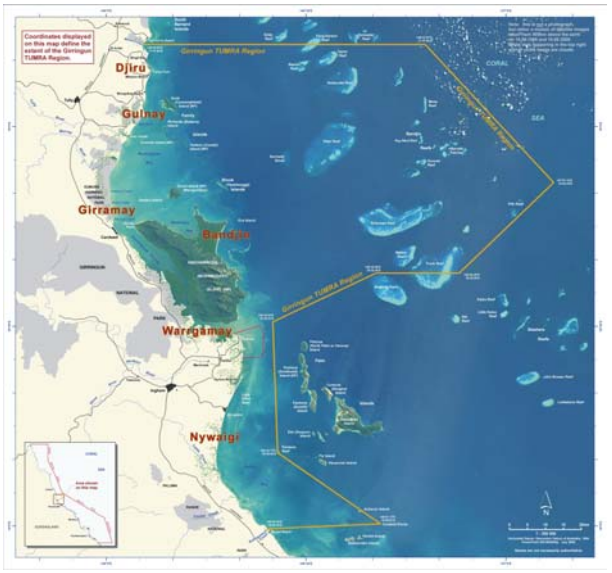
Australian Government
Department of the Environment and Water Resources

Community Engagement – Traditional Use of Marine Resources Agreements (TUMRAs)

- Agreement between Commonwealth and state Governments with Traditional Owners about how to sustainably manage traditional take of turtles and dugong in their region

- Australia has two TUMRAs:
  - Girringin TUMRA, 2005
  - Woppaburra TUMRA, 2007

Girringun TUMRA



Australian Government
Department of the Environment and Water Resources

Research and Monitoring Projects

- The Australian Centre for Applied Marine Mammal Science
  - Established in 2006
  - First major national research centre for whales, dolphins, seals and dugongs in our region.
  - 4 dugong projects funded in 06/07
- Australian Research Council supports the CRC Reef Research Centre at JCU
- Aerial Surveys used to estimate dugong distribution and abundance
- ‘Seagrass watch’ – community engagement project assessing health of seagrass beds in the Great Barrier Reef Marine Park.

International Activities

- CMS Dugong Regional Memorandum of Understanding
- Convention on the Conservation of Migratory Species of Wild Animals
- Regional Action Plan for Dugong for the Pacific Region (SPREP)
- Torres Strait Treaty – between Australian and PNG Governments to protect livelihood of traditional inhabitants in the Torres Strait
- CITES export approvals required

Australian Government
Department of the Environment and Water Resources

Future Challenges

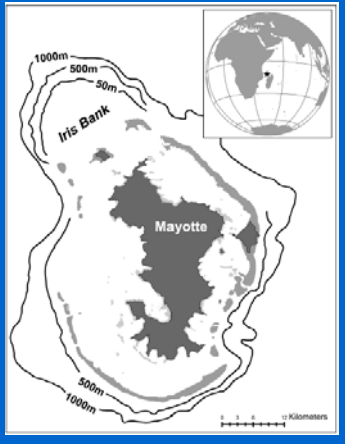
- Increasing community engagement
  - More TUMRAs
  - Education/awareness
- Continued funding for research
- Working with local and state authorities to implement coordinated conservation and management actions

Thank you

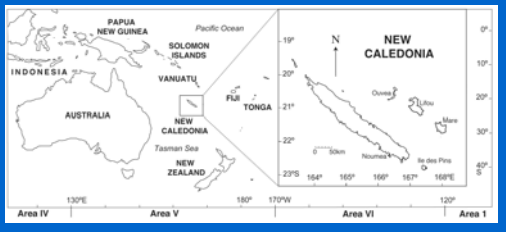
Dugong conservation activites in France

Dr Claire Garrigue
French Gouvernment

Dugong inhabits two archipelago



☆Mayotte



☆New Caledonia

Research activities

Mayotte :

➔ Distribution

➔ Threats

➔accidental catches

➔Seagrass assesment

New Caledonia :

➔ Distribution

➔Abundance

➔Threats :

➔Consumption

➔Seagrass beds distribution

Dugongs in Mayotte

➔ Still occurred

➔ But low number

➔ mother and calf

➔Threats

➔Incidental catches in fishing nets

➔Habitat destruction

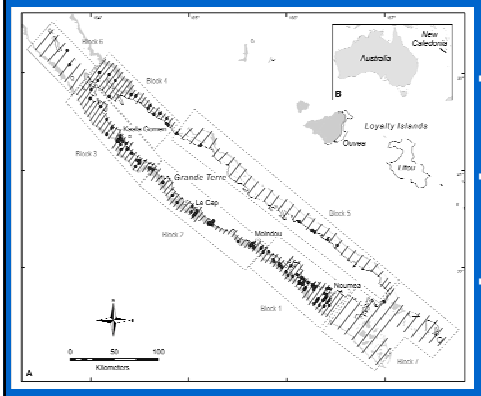
➔Pollution

➔Disturbance

➔Boat strike

From Kiska, J., Muir, C., Jamon, A. 2007. Status of marginal dugong (*Dugong dugon*) population in the lagoon of Mayotte (Mozambique Channel) in the Western Indian Ocean. Western Indian Ocean J. Mar. Sci. 6(1): 111-116.

Dugongs in New Caledonia

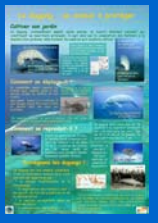


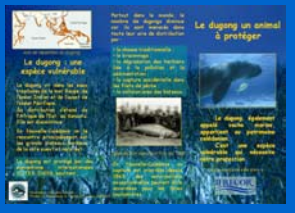
- Largest concentration of dugong in Melanesia
- One of the largest population of the world
- Population estimate = 1814 se = 332
- Threats :
  - Overfishing
  - Pollution
  - Poaching

From Garrigue, C., Patenaude, N., Marsh, H., (in press). Distribution and abundance of the dugong in New Caledonia, South West Pacific. Marine Mammal Science.

Education programmes

- At school
- During environmental venues
- For fishermen in Mayotte
- Educational tools created and distributed in New Caledonia





Protection measures

International management

- Protected by international convention as CITES or Convention on Migratory Species

National Legislation

- Protected under French law (1995) which prohibits the purchase, killing or harassment of dugongs in French coastal waters

Regional management in Mayotte

- Arrêté préfectoral 109 SG/DAF (28 December 2004)
- Arrêté préfectoral n°60/DAF (28 July 2004)
- The penalty for killing a dugong is 6 months imprisonment or a fine of US$13,500
- Network of MPA

Protection measures

Regional management in New Caledonia

- Resolution 68 dated 25th June 1963

Provincial management in New Caledonia

- Délibération 03-2004/APS
- Délibération 23-2001 APN et 85-2001/BPN
- Dugongs are culturally significant to Melanesians traditional hunting could be permitted under special permit for “special customary feasts”
- Main dugong areas included in the project of inscription to the Unesco World Heritage

The Present Status and Threats of Dugoung (*Dugong dugon*) in Myanmar.

By

Mya Than Tun
Assistant Director
Environment and Endangered Aquatic Animal Conservation Unit
Department of Fisheries

Introduction

- Union of Myanmar located Latitude 09° 32´ N and 28° 31´ N, Longitude 92° 10´ E and 101° 11´ E.
- Total land area 675,000 sq kilometer, its stretches 936 km from East to West, 2051 km from North to South.
- The total coast line 2832 km, more than 804 island forming Myeik Archipelago.
- The continental shelf covers 228,781 sq km, EEZ covering 486,000 sq km.

Methodology

- Semi-structure interview
- Questionnaire to native elder
- Influence and knowledge person along the coastal area

Methodology

- Interview to the local fisher and people, all stake holder along the coastal area

Survey Area

- Rakhine coastal area &
- Myeik Archipe

Survey Area at Myeik Archipelago

- Ross island
- Courts island
- Jacks island
- Thompson island
- Bentick island
- Letsok-aw
- Anne island
- Bushby island
- Lampi island
- Kyunphila island
- Buda island
- Russel island

Evidence from the past

the first Dugong (Man Aung Island)

Since 2nd Nov; 1966 a female Dugong caught by fishermen of Rakhine Coast between Lahpetkyun Light House and Kanthaya

DUGONG. *Dugong dugong* Müller.

A female Dugong caught by fishermen of the Arakan coast between Lahpetkyun Light House and Kanthaya and presented to the Zoological Gardens, Rangoon. Seen on arrival at the Zoological Gardens on November 2, 1966.

From The *Guardian*, Friday, November 4, 1966.

Courtesy: U Ba Kyaw.

Information of Dugong at Rakhine Coastal Area (Kanthaya)

- April; 2004 female Dugong was caught in the fishermen gill-net at Rakhine Coast, Kanthaya beach

Information of Dugong at Rakhine Coastal Area (Kanthaya)

- April; 2004 – female Dugong were identified at Kanthaya beach

Recent Information

1966 - Nov: near La phet Kyun light house, Gwa Township (alive)

1989 - Kyein ta li near Than dwe River mouth (dead)
Caught by - Shark / Rays net

1998 - Ma gyi ngu village, Gwa Township (dead)
Caught by - Shark / Rays net

1998 - Dec: Ma gyi ngu, Gwa Township (dead)
Caught by - Shark / Rays net

1998 - Dec: Ma gyi ngu, Gwa Township (dead)
Caught by - Shark / Rays net

2000 - Feb: Ma gyi ngu, Gwa Township (dead)
Caught by - Lobster net

2004 - Apr: Kan tha ya, Gwa Township (dead)
Caught by – Hilsa drift - net

2005 – Taung gup Township, Man aung Island (dead)
Caught by - Gill - net

Informatiom of Dugong at Rakhine Coastal Area (Taung gyot)

- 2005 one of the Dugong was caught gill-net at Taung gyot Rakhine Coast

Information

- Dugong bone and skin collected from Kanthaya, Rakhine coastal area.

Information of Dugong at Rakhine Coastal Area (Chaung Tha)

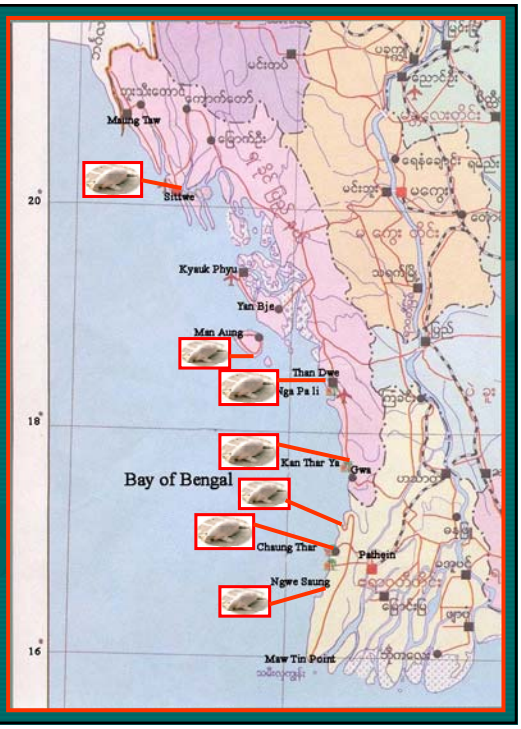
- 2006 male Dugong was also caught near Chaung tha, Rakhine Coastal area

Information of Dugong at Rakhine Coastal Area (Chaung Tha)

- 2006 male Dugong was also caught near Chaung tha, Rakhine Coastal area

Range Distribution at Rakhine coastal area

- Dugong distribution range should be considered from the South Ngwe saung up to North Sittwe.
- Dugong is occur from the past, and its still present at the Rakhine coastal area.



Legislation

- The State Law and Order Restoration Council Law No.6/94, Title
- " The Protection of Wildlife and Protected area Law" on 8th June, 1994.

- **The Objective of the Law are as follow:**
- A) to implement the policy of protecting wildlife of the state.
- B) to implement the policy of conserving the protected of the state.
- C) to carry out in accordance with International Conservations agreed by the State in respect of the protection of wild species of both flora and fauna and representative ecosystems occurring in the country.
- D) to protect endangered species of wild flora and fauna and the habitat.
- E) to contribute for the development of research and natural resources.
- F) to established zoological and botanical gardens for the protection of flora and fauna.

Dugong is Completely Protected in Myanmar

- In accordance with Chapter V, Article 15(a) of the protection of Wildlife and Protected Area Law, the Forest Department of the Ministry of Forestry, Union of Myanmar issued Notification No. 583/94, dated 26th October 1994 under which, the Dugong was listed in the " Completely Protected Animals" category. Since 1994, the dugong is a species that is totally protected by law in Myanmar.

Information gathering

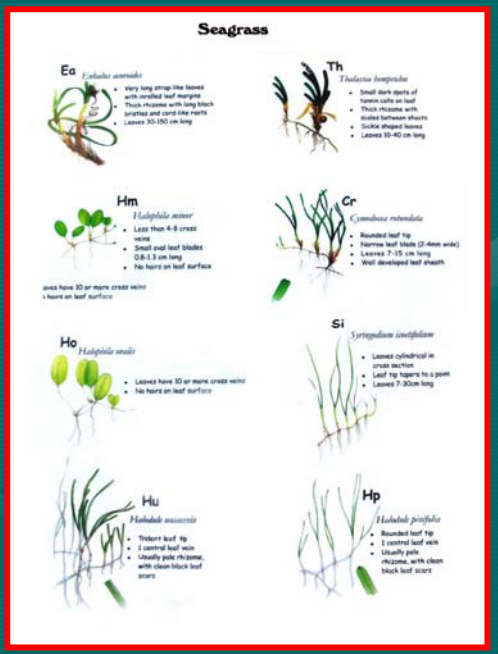
- Inside the Myeik Archipelago Island to Island all communities.
- All stake holder

Main Threats

- Accidentally caught by Gill-net
- No hunting
- No demand for local (or) other place

Seagrass species from Myeik Archipelago

- Ea, *Enhalus acoroides*
- Th, *Thalasssia bemprichii*
- Cr, *Cymodocea rotundata*
- Hm, *Halophila minor*
- Si, *Syringodium isoetifolium*
- Ho, *Holophila oralis*
- Hu, *Holodule uninervis*
- Hp, *Holodule pinifolia*



Discussion

- Dugong is presently occurring in Myammar waters, since long time ago.
- There is no systematic survey and document during the past four decade.
- It is to be considering the information from the present survey, Rakhine Coastal area is important in the stage, because recent global assessments and the action plans have not listed for Myanmar as a country that still supports a population of dugong in her waters.
- Dugong appears not list in the whole waters but quite common in Rakhine Coastal area than other Coastal area and it's also range to South and Southeast Asia.
- The data and information from present survey confirmed that the dugong species in this area seem to be healthy and good population still present along the coastal waters.
- There is no stress from human hunting, local consumption and other factors, the main threats is sometimes accidentally entangle by gill-net.

Discussion

- Myanmar is different from other Asian countries, they are generally hunted for food and other parts for medicinal used, and their beliefs.
- Myanmar is the only country and the absence of these factors for this species, and it's still support in her waters, Myanmar can make a future survival of the dugong population and much brighter than among the neighboring countries.
- Total nine species of seagrass have been recorded in Myanmar coastal area, eight of them occurring on the Rakhine Coastal area, Hydrocharitaceae represent the most dominant genera in both Rakhine and Taninthayi Coastal area, Cymodoceaceae occurs mainly on the Rakhine Coastal area.
- Seagress meadows along the coastal area of Myanmar are in pristine, climax condition.

Recommendation

1, To conserved and protect the endangered species of Dugong (*Dugong dugon)* along the coastal area of Myanmar.

2, To conduct scientifically survey along the distribution of the seagass bed and dugong at the Rakhine and Taninthayi coastal area of Myanmar.

3, To promote collaboration workshop and survey with other international scientists, organization, and institutions, who conserve survey, scientifically research and conservation of dugong species.

4, To educate the local fisherman, the fisheries officers who stationed along the coastal area, for the knowledge of dugong and other marine mammals regional and internationally prohibited for killing, hunting and selling.

Recommendation

5, To prohibited the fishing grounds and fishing gears and technique, to conserve the dugong and other marine mammals which habitat at the seagrass bed areas along the Myanmar waters.

6, To propose research grant and funding from international organization, institutions and NGOs for the purpose of the conservation survey and management, education program of dugong, along the coastal area of Myanmar.

7, To be establishing research station on the baseline information is available along the Rakhine coastal area.


Thank You
15.01.2007 22:13

Preliminary Assessment of Cetacean Catches in Coastal Waters Near Myeik and Dawei in Southeastern Myanmar

Prepared by
Tint Tun

In collaboration with
Brian D. Smith, Mya Than Tun and **Nang Mya Han**

A report submitted to the
Department of Fisheries, Myanmar, Wildlife Conservation Society
and Convention on Migratory Species

June 2006

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Associate Conservation Zoologist, WCS.

Mya Than Tun

Assistant Director, Department of Fisheries, Myanmar.

Nang Mya Han

Professor, Department of Marine Science, University of Myeik, Myanmar.

Table of Contents

List of Figures

Preliminary Assessment of Cetacean Catches in Coastal Waters Near Myeik and Dawei in Southeastern Myanmar

A report submitted to the Department of Fisheries, Myanmar,
Wildlife Conservation Society and Convention on Migratory Species
June, 2006

Prepared by
Tint Tun

In collaboration with
Brian D. Smith, Mya Than Tun and Nang Mya Han

Executive Summary

During October 2005 and March 2006 two preliminary trips were made to assess cetacean bycatch and directed catch in coastal waters near the towns of Myeik and Dawei in the Taninthayi Division of Myanmar. Fish landing sites and local markets were monitored for cetacean carcasses and body parts. Skippers from bottom trawlers, artisanal fishermen, fish sellers and local people were interviewed about cetacean sightings, strandings, catches, traditional beliefs and attitudes about the animals. Thityawa and Kyaukphya villages near Myeik, and Thabausaik, Sakhanthit, Pantin Inn and Maungmagan villages near Dawei were visited as well as the fishing grounds at Thitya and Kadan near Myeik.

Whales are called "*Nga Wun*", "*Nga Wun Gyee*", "*Wai La*" or "*Wai La Nga*" along the coast near Myeik and Dawei. Fishermen from Myeik call all dolphins and porpoises "*Lann Shuu*". Fishermen from Dawei call cetaceans without a beak "*Lann Shuu*" and those with a beak "*Lann Phai*". In this report, "dolphin" refers to

both "*Lann Shuu*" and "*Lann Phai*" , but "porpoise" is used specifically for the finless porpoise.

Accidental entanglement of cetaceans in purse-seine nets, beach-seine nets, gill nets and long lines were reported. Except for a case in which a whale was accidentally entangled in purse seine net near the West Sular Island in 2004, no whale bycatch was reported. Crews reported releasing the whale but they were not sure whether it lived. Fishermen reported that dolphins usually became entangled in head rope of fishing nets by their flukes and that most accidental killing occurred in nearshore waters. Several fishermen remarked that dolphin entanglements were most likely to occur in "*Paik Kyee Hlay*" (net-fishing boats) and "*Wa Dan*" (purse seines). A fisherman from Sakhanthit village near Dawei reported catching about 20 dolphins while a beach seine fishing in 2000. But, no dolphin bycatch in their beach seine fishing for a few years may indicate a decline in the number of dolphin and porpoise in waters near Sakhanthit.

Opportunistic catch of dolphins was reported from the Myeik and Dawei areas. Some fishermen from Dawei will try to kill dolphins with a hand harpoon, locally called "*Zit*", when they encounter them at-sea during fishing trips. Deliberate catching of cetaceans, including Irrawaddy dolphins *Orcaella brevirostris,* has been practiced for many years in the waters near Maungmagan. Some fishing boats carry hand harpoons. They will chase and kill dolphins opportunistically during other fishing activities or search for them if they are not encountered by chance. Some fishermen from Kyaikkhami Town in the Mon State are also reported to practice this type of dolphin killing.

Fish sellers estimated that two or three dolphins per month could be found in the *Mee Kwet Zay* (early morning fish market) in Myeik, and about 30 cetaceans of various species are put on sale per month during all seasons at the Maungmagan fish market.

The Maungmagan fish market is the main distribution point to local villages, including Dawei, for dolphin meat and body parts. Dried and salted dolphin meat,

skin, fins and internal organs were found every day at this market. Carcasses and body parts were delivered almost every day from fishing boats arriving to Maungmagan and nearby villages, such as Thabausaik and Pantin Inn. About 300 artisanal fishing boats of various sizes land at Thabausaik. Seven Indo-Pacific bottlenose dolphins *Tursiops aduncus* were sold on 9 March at the Maungmagan market. A dolphin was sold for 35,000 kyats (ca. 35 USD) on 30 October 2005 at the *Mee Kwet Zay* in Myeik.

During fish market and landing site surveys carcasses of 13 Indo-Pacific bottlenose dolphins *Tursiops aduncus*, one Indo-Pacific humpback dolphin *Sousa chinensis* and three spinner dolphins *Stenella longirostris* were observed at the Maungmagan market. Five Indo-Pacific bottlenose dolphins and three Irrawaddy dolphins *Orcaella brevirostris* were reported sold by fish sellers from the Maungmagan market. One finless porpoise was reported sold at this market by Nang Mya Han, Professor of Marine Science at Myeik University. Two unidentified dolphin carcasses were reported sold at both the Myeik *Meekwet zay* and Dawei *Kanna Zay* markets.

Some fishermen reported banging two iron bars together underwater to scare dolphins away from their fish catch and interfering with fishing operations. Cetacean bycatch and directed catch appear to be most common in the coastal waters near Dawei. All information on cetacean catches reported by fishermen was from nearshore waters. Net entanglement and deliberate killing by hand harpoon appears to be the most common source of human-caused mortality. Although bottom-trawlers are the most numerous offshore fishing vessels operating from the Taninthayi Division, no cetacean bycatch was reported in this fishery.

Based on this preliminary study provisional conclusions are that (1) seine nets, gill nets and hand harpoons are the main threats to the small cetaceans in Myeik and Dawei waters; (2) consumption of cetacean meat is probably localized in Maungmagan and neighbouring villages; and (3) cetacean catches appear to be on the order of at least a few hundreds per year from vessels originating in the Dawei area, and at least low tens per year from vessels originating in the Myeik

area. Public education on the conservation of cetaceans and the prohibition on their killing and the sale is urgently needed. Additionally, a systematic survey for coastal cetaceans between the Thanlwin River mouth and Myeik in the Mon and Taninthayi Divisions is needed to investigate species occurrence, abundance and distribution.

1 Introduction

The greatest threat to whales, dolphins and porpoises is "bycatch" and at least 300,000 whales, dolphins and porpoises in the world's oceans are killed in fishing gears each year. At this rate, if nothing is done, several species and many populations will be lost in the next few decades (WWF, 2006).

The International Whaling Commission (IWC) declared north of the latitude 55˚S of the Indian Ocean as a Sanctuary for Whales in 1979. The Sanctuary not only protected whales but also promoted research on cetaceans.

The Union of Myanmar is a coastal country of the Indian Ocean. During February and March 2005 a survey for coastal cetaceans was conducted between Kawthoung and Myeik in southeastern Myanmar by a team of 12 international scientists and conservationists (including four from Myanmar) as a part of a Training Course for South Asian Scientists and a Population Assessment of Coastal Cetaceans in the Bay of Bengal sponsored by the Convention on Migratory Species, Whale and Dolphin Conservation Society and Wildlife Conservation Society (Mya Than Tun and Han Win, 2005; Smith 2006). As part of the same project, two trips were made to assess cetacean catches in coastal waters near the towns of Myeik and Dawei (Figure 1, 2 & 3).

Myeik was the focus of the first field trip due to an Indo-Pacific bottlenose dolphin *Tursiops aduncus* carcass collected from a local market and kept at a company's cold storage in Myeik (Nang Mya Han and Tint Tun, 2004) and another carcass of the same species recorded in February 2005 by the Myanmar team (Tint Tun, unpublished). There was also concern about potential bycatches of Irrawaddy dolphins *Orcaella brevirostris* and finless porpoises *Neophocaena phocaenoides* due to the large number of artisanal gill net fishing boats which were recorded in nearshore waters during the March 2005 survey referred to above. During the first trip, information was received about directed killing of small cetaceans in the Dawai area which led to a focus on this area during the second trip.

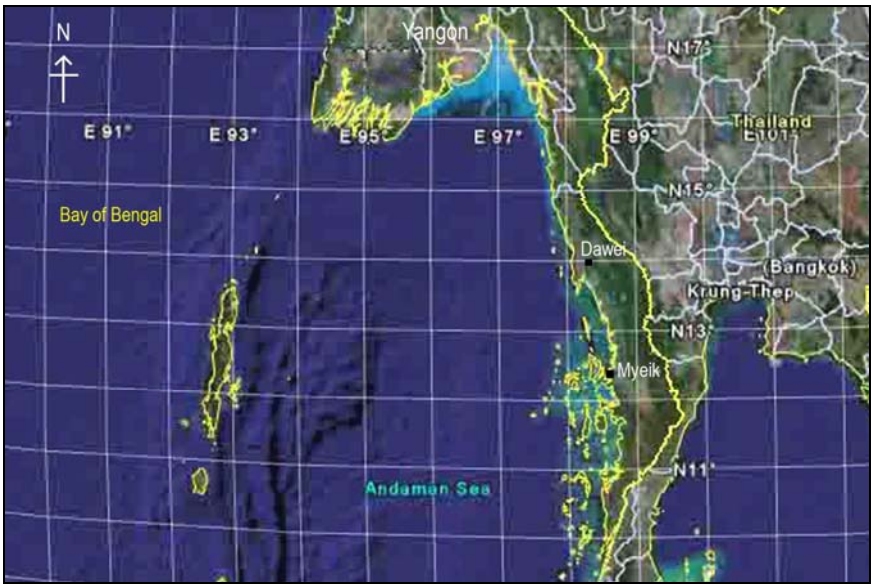


Figure 1. Map showing the Myeik and Dawei area on Taninthayi Division, Myanmar.

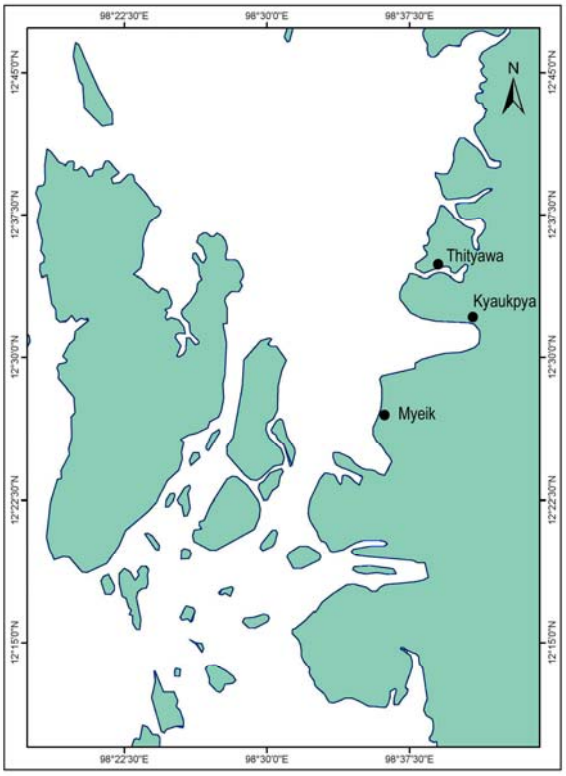


Figure 2. Map showing the Thityawa and Kyaukpya villages, and Myeik area.

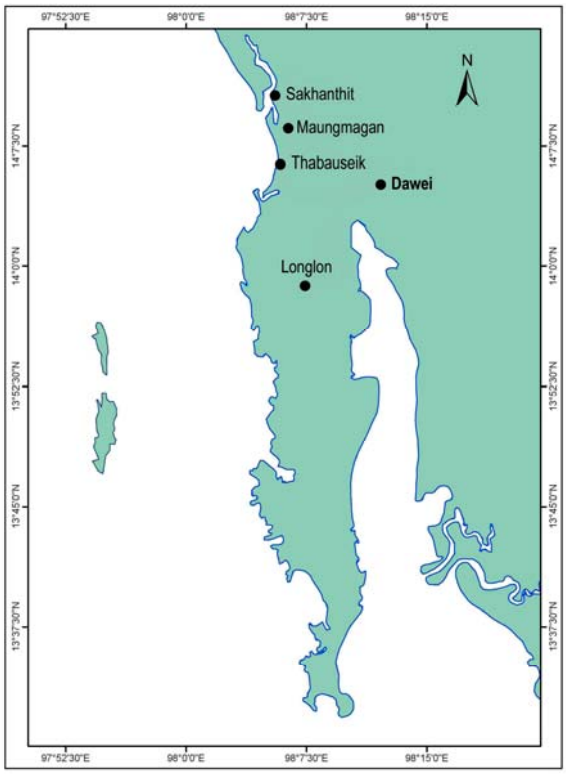


Figure 3. Map showing the Maungmagan, Thabausaik, Sakhanthit villages and Dawei area.

2 Study Areas

2.1 Myeik


Figure 4. Myeik port.

The town of Myeik is a busy port for coastal traffic and fishing in the Taninthayi Division. The Myeik (also known as Mergui) Archipelago comprises more than 800 islands and it is known for its rich natural resources. Myeik port is always busy with fishing, cargo and passenger boats and receives occasional large vessels (Figure 4). Some small artisanal fishing boats from Myeik go to sea for just one day of fishing. Bottom-trawlers and purse seiners go farther offshore, spending about one month at sea. *Meekwet Zay* is the early morning fish market in Myeik where catches from the nearshore fishery are sold (Figure 5).


Figure 5. *Meekwet Zay* in Myeik.

Thityarwa fishing village is situated on an island in the north of the Myeik Archipelago. It is surrounded by mangrove forest. Small motorized ferry boats shuttle between Myeik and the village daily. Irrawaddy dolphins occur in waters adjacent to the village. Waterways are shallow and narrow at low tide due to sand flats at the entrance of Thitya creek. Thityawa fishing grounds are located in shallow nearshore waters (Figure 6). Kadan Kyun (Island) is situated in the north of the Myeik Archipelago and some fishermen go fishing there. Kyaukpya village is situated on the north bank of the Kyaukpya River


Figure 6. Fishermen at work on Thityawa fishing ground.

mouth and on the main road between Myeik and Dawei. In the near future some fishing ports are planned to be moved from Myeik to Kyaukpya.

Figure 7. Some artisanal fishing boats at Dawei *Kanna Zay* port.

2.2 Dawei

Dawei also has good air and land access. Some nearshore fishing boats come to Dawei but they need to wait until flood tide before coming to there (Figure 7). Passengers on high speed ferries must go to a port which is about 20 miles south of Dawei. The *Kanner Zay* (strand market) in Dawei is a major fish landing site, busy only in the morning with both wholesale and retail sales (Figure 8).

Figure 8. Fish market place at *Kanna Zay* in Dawei.

Maungmagan Beach is a popular resort located about 10 miles northwest of Dawei and one mile from Maungmagan village (Figure 9). Maungmagan village market is a busy fish market with traders from nearby villages and Dawei. There are plans to construct a sea port and hotel complex in Maungmagan.

Figure 9. Artisanal fishing boats at Maungmagan beach.

Figure 10. Artisanal fishing boats at Thabausaik village.

Thabausaik village is located about two miles south from Maungmagan and it is also a busy fish landing site (Figure 10). According to a fisherman from Thabausaik village, the village is a promising fish market as some leftover fish from other markets, even from Dawei, can be sold out

at there. Some fishing boats from other areas are also temporarily stationed at this village due to its easy access to Dawei. Some vessels spend only one day at sea but others go on trips lasting about two weeks.

Pantin Inn and Sakhanthit (Pitat) villages are located about one mile north of Maungmagan (Figure 11). They are also fishing villages and some of their catches are put on sale at the Maungmagan market. Fishermen from these villages also operate in the Ayeyawady Delta all the way northwest to Mawtinsun.

Figure 11. Artisanal fishing boats anchored at Sakhanthit village.

3 Definitions

The term fisheries bycatch is used extensively but sometimes it causes confusion. It is also called incidental catch. There are many definitions of bycatch but, according to Alerson *et al.* (1994), there are at least three different uses of the word.

(1) Bycatch may refer to catch which is retained and sold but which is not the target species for the fishery.
(2) Particularly in the Northeast and Western Pacific and in American legislation bycatch means species/sizes/sexes of fish which are discarded.
(3) Bycatch is used to describe all non-target fish whether retained and sold or discarded (Hall, 1996).

One definition refers to species caught in a fishery intended to target another species, as well as reproductively immature juveniles of the target species (en.wikipedia.org/wiki/ Bycatch, 2006).

Some phrases like “caught by accident …”, “non-targeted sea life …”, “incidentally caught with the targeted species …”, “non-target organisms …”, “unwanted fish …”, “species unintentionally caught …”, “all non-targeted catch …”, “unwanted or unmarketable things …”, “anything caught unintentionally” are also used in the definition of bycatch. It is clear that dolphins caught by accident are considered “bycatch”.

In some incidences, fishermen may encounter dolphins opportunistically during other fishing operations and, in favorable circumstances such as when dolphins are swimming close to their boats or stranded or entangled in their nets but found still alive, they may kill them opportunistically for sale in local markets. Fishermen from Maungmagan generally target fishes but they also bring along hand harpoons, locally called “*Zit*”, which are attached with buoys, to opportunistically kill dolphins and porpoises. In other cases, the fishermen may search for dolphins. The term “directed catch” used in this paper includes both the opportunistic and deliberate killing of cetaceans.

4 Methods

Field trips were made to the towns of Meik and Dawai and surrounding coastal villages during 19 October to 9 November 2005, and 27 February to 27 March 2006. Fish landing sites and local markets were monitored and fishing villages and grounds were visited. Offshore and nearshore fishermen, fish sellers and other local people were interviewed. Fish markets including the *Meekwet Zay* (early morning fish market) in Myeik, *Kanner Zay* (strand market) in Dawei, and the Maungmagan fish market were visited to monitor the landings and sale of cetacean carcasses and body parts. Fishermen were interviewed at these markets, landing sites, and onboard their vessels in Myeik, Thityawa, Kyaukpya, Dawei, Maungmagan, Sakhanthit and Thabausaik (Table 1, Figure 12 – 19).

Table (1). No. of interviews, markets, landing sites, and fishing grounds visited during the study.

	Myeik	Dawei
Interview	47	17
Markets	5	4
Landing site	6	4
Fishing ground	2	-

Figure 12. An interview with artisanal fishermen in Myeik.

Figure 13. An interview at the fishing vessels check-point in Myeik.

Figure 14. An Interview at Myeik.

Figure 15. An interview at Thityawa village.

Figure 16. An interview on Thityawa fishing ground.

Figure 17. An interview on Kadan fishing ground.

Figure 18. An interview at Sakhanthit village.

Figure 19. An interview at Thabausaik village.

5 Results

5.1 Local names

5.1.1 Whale

Whales are called "*Wai La Nga*" in Myanmar language. But they are also called "*Nga Wun*", "*Nga Wun Gyee*", "*Wai La*", or "*Wai La Nga*" along the coast near Myeik and Dawei.

5.1.2 Dolphins and porpoises

"*Labine*" is the common name of dolphins and porpoises in Myanmar. However, fishermen from Myeik call all dolphins and porpoises "*Lann Shuu*". But, fishermen from Dawei call cetaceans without a beak "*Lann Shuu*" and those with a beak "*Lann Phai*". In this report, "dolphin" refers to both "*Lann Shuu*" and "*Lann Phai*" (i.e. dolphins and porpoises) but "porpoise" is used specifically for the finless porpoise.

5.2 Reported sightings

5.2.1 Whales

Whale sightings were reported by offshore fishermen and some artisanal fishermen who go far out to sea. According to these fishermen, at first a whale looked like a rock and then they realized it was moving. Some fishermen saw blows and others reported whales feeding on small shrimps with an open mouth. Some said that whales could be sighted most frequently at the beginning of the rainy season.

Of the 23 artisanal fishermen interviewed in Myeik, only two had sighted whales, both while working on offshore bottom-trawlers. A fisherman from Thityawa village said that about eight months ago he saw an injured whale which

was helped by two small whales near Kyun Me Gyee Island and Lagyan Aw of Kyunn Tann Shey (Lampi) Island. Because it was a strange view, the skipper called the rest of his crew to watch the event but they had no idea about the cause of injury. The fisherman said that the injured whale had a blunt head and was bleeding. The injured whale and two helpers surfaced alternately and they were swimming towards the open sea. The fisherman estimated that big one was almost six times bigger than the two helpers which were almost the same size and black.

Fourteen out of 19 offshore bottom trawler skippers interviewed (i.e. 74%) had sighted whales (Figure 20). One skipper reported sighting whales about 10 times during his eight years of experience at sea. He said that in 2004 a group of whales was sighted near Kunn Thee Island. He described them as mostly black except for a portion under the lower jaws which was white, and that they lived in a group of four animals. He said that they looked like dolphins but conspicuously bigger and indicated that they were killer whales *Orcinus Orca* after being shown illustrations of the world's cetaceans. He also sighted the same type of whales in 1996. A total of 11 artisanal fishermen were interviewed in Dawei. Only three had sighted whales.

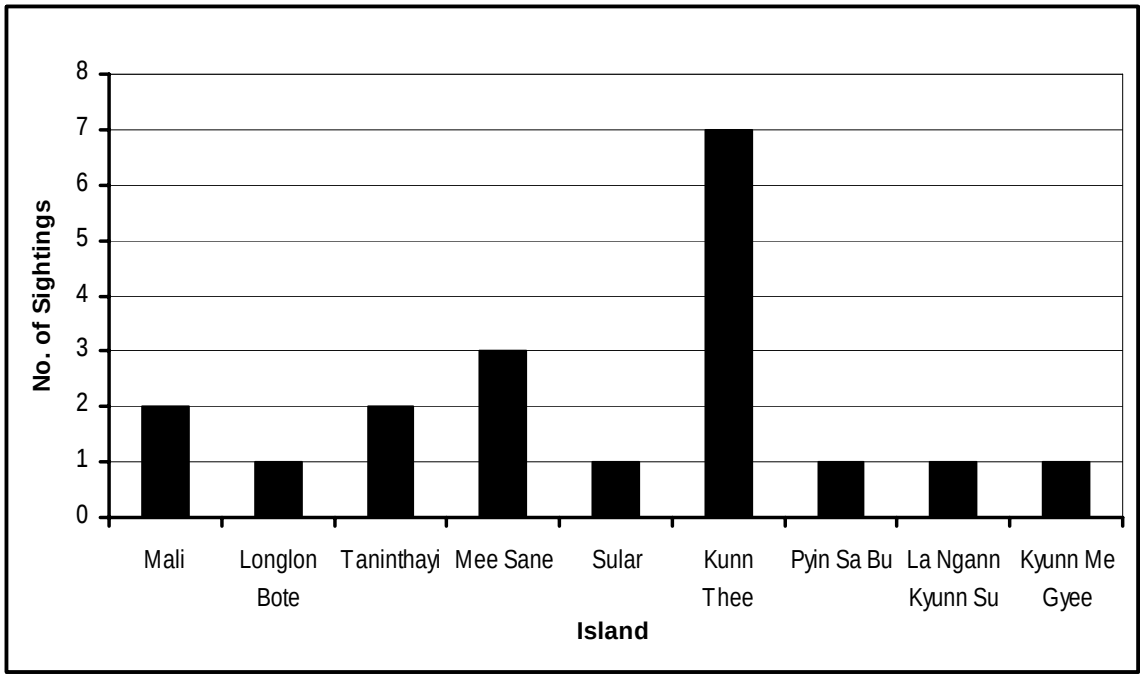


Figure 20. Number of whale sightings reported by fishermen with reference to nearby islands.

5.2.2 Dolphins and porpoises

Dolphins were sighted by all fishermen from Myeik and Dawei. Some fishermen from Thityawa and Myeik said that dolphins were sighted mostly during neap tide. Fishermen said that dolphins were abundant and could be found almost everywhere at sea especially during fine weather. A bottom-trawler skipper said that he saw dolphins in groups of up to 100. Dolphins were reported to sometimes come into the Kyaukpya River and Thityawa Creek. Dolphins without beaks were sighted mostly by nearshore artisanal fishermen. The author sighted a group of 6-7 Irrawaddy dolphins, including a calf, at the mouth of Thityawa Creek on 29 October 2005 (Figure 21).

Figure 21. Irrawaddy dolphins sighted near the Thityawa creek mouth.

5.3 Reported strandings

5.3.1 Whales

Fishermen reported that whales had stranded at Sakhanthit, Maungmagan and Hmyawyit villages near Dawei, and at Pannataung (near Thityawa village) and at Kyunn Tann Shey (Lampi Island) near Myeik. A midwife from Thityawa village showed the author photographs taken of a stranded whale during her visit to observe the whale at Pannataung in 2001 (Figure 22).

Figure 22. A whale stranded at Pannataung beach near Thityawa village.

A rotten whale (c. 37 feet or 11 meters in length) stranded near Hmyawyit village (near Thabausaik) in June 2005 and its bones were collected and displayed by the Department of Zoology, University of Dawei. A whale (c. 57 feet

or 17 meters in length) was reported stranded near Sakhanthit village in October 2005.

5.3.2 Dolphins and porpoises

Dolphin strandings were reported from Thityawa village and Myeik. Dolphins sometimes came into the shallow water and became trapped on the sand/mud flats when the tide receded. Dolphin strandings were also reported in the mouth of the Dawei River, Maungmagan Bay and near Sakhanthit (Pitat) village.

5.4 Reported bycatch

5.4.1 Myeik

Based on interviews with fishermen, cetaceans could become entangled with long lines and purse seine nets, beach seine nets, and gill nets. Most accidental killings happened during nearshore fishing. Bottom-trawler skippers explained that dolphins did not become entangled in their nets as they were dragged on the bottom. Several fishermen from Myeik and Dawei remarked that dolphin entanglements were likely to happen with "*Paik Kyee Hlay*" (net-fishing boats) and "*Wa Dan*" (purse seines).

Except for one case in 2004, no whale bycatch was reported. A fisherman from Myeik said that a whale was accidentally entangled in a purse seine net near West Sular Island. Crews released the animals by using a winch and cutting the rigging but they were not sure whether it remained alive or not. A skipper of a bottom-trawler said that a badly rotten whale was included in his catch near Kunn Thee Island about six years ago.

Dolphin entanglements with gill nets in 2000 and 2003 were reported by fishermen from Thityawa. They said that dolphins normally became entangled by their flukes in the head rope of the net. Some fishermen from Myeik said that cetacean entanglements happened more often in the rainy season because some

net-fishermen changed from gill netting to squid fishing during the dry season. One fisherman said that twice he accidentally caught dolphins while long line fishing in 2004 near Sakhanthit south of Myeik. A fisherman from Kyaukpya village reported a dolphin becoming entangled in his gill net set near Kadan Island. A fisherman from the same village said that three dolphins were accidentally caught in his gill net during one haul about nine years ago.

5.4.2 Dawei

Accidental killing of cetaceans in fishing nets was also reported from waters near Dawei. Some dolphins were accidentally encircled with beach seines. Fishermen from Sakhinthit said that dolphins came close to the shore to find refuge during strong east winds. A fisherman from Sakhanthit said that he caught about 20 dolphins while hauling a beach seine net in 2000. However, he said that dolphins had not caught in his net during the last few years. A fishermen from Thabausaik said that two dolphins were accidentally caught in his gill net about nine and ten years ago each. Two dolphins were also reported entangled with the seine nets nearshore of the Longlon coast. Marks observed on two spinner dolphins *Stenella longirostris* for sale at the Maungmagan market indicated that they had become entangled in fishing nets (Figure 23).

Figure 23. A clear net-mark on the head of a dolphin.

5.5 Directed Catch

5.5.1 Myeik

A fisherman from Myeik said that a dolphin was killed opportunistically after being caught in a gill net during October 2005. No directed fishery for small cetaceans was reported by fishermen from Myeik.

5.5.2 Dawei

Directed killing of dolphins has been practiced in waters near Maungmagan for many years. According to interviews with fishermen some fishing boats carry hand harpoons, locally called "*Zit*", attached by a rope to plastic buoys. These boats will search for dolphins if they do not find them during normal fishing operations.

Figure 24. A dolphin with piercing wounds was put on sale at Maungmagan market.

Figure 25. A puncture wound observed on the back of a spinner dolphin.

The fishermen said the dolphins die within a few minutes after being harpooned and are easily pulled in by the attached rope. Large puncture wounds observed on a spinner and two Indo-Pacific bottlenose dolphins at the Maungmagan market indicated that they were killed by a hand harpoon or other pointed tools (Figure 24 & 25).

5.6 Landings and Sales

5.6.1 Myeik

Landings of cetaceans were not reported by the skippers of offshore fishing vessels. There are many fish landing sites in Myeik but *Mee Kwet Zay* (an early morning fish market) is a popular market where nearshore artisanal fishermen sell their catch. Some fish sellers at *Mee Kwet Zay* estimated that about two to three dolphins were sold per month at this market. In October 2005 they reported selling a dolphin as a whole animal for 35,000 kyats (c. 35 USD). No dried dolphin meat was observed in Myeik and dried fish sellers said they did not sell dried dolphin meat.

5.6.2 Dawei

Landings of cetaceans were reported from Dawei and nearby villages. Dolphins came to Dawei directly from nearshore fishing boats and were sold at "*Kanna Zay*" (strand market) as whole carcasses. No fresh chopped dolphin meat was found with fish retailers at the strand market but it was reported that a dolphin carcass was sold there in February 2005.


Figure 26. A dolphin on sale at Maungmagan market.

Dried fish sellers at Dawei bazaar and "*Kanna Zay*" said that they usually do not sell dried dolphin meat but, sometimes, it arrives from other villages and they can order the meat if requested. Fresh, dried and salted dolphin meat, flippers, flukes and internal organs were available at the Maungmagan fish market (Figure 26 – 35). Dried and salted dolphin meat, skin, fins and internal organs were found every day at the Maungmagan market, which is the main distribution point for these products to nearby villages and Dawei. Fresh dolphin meat arrives either as whole carcasses or already chopped. The meat was reported to come from local waters near Maungmagan, Thabausaik and Pantin Inn. Some retailers from Maungmagan bought dolphin carcasses and then resold the pieces at the same market or the *Myo Houn* (Old Dawai) market. Some fish sellers from other areas also bought dried and salted dolphin meat at the Maungmagan market.


Figure 27. Chopping a dolphin at Maungmagan market.


Figure 28. Fresh dolphin meats on sale at Maungmagan market.

Figure 29. Dried dolphin meat on sale at Maungmagan market.

Figure 32.Dried dolphin ribs and parts.

Figure 34. Salted dolphin parts on sale at Maungmagan market.

Figure 30. Fresh dolphin meat.

Figure 31.Dried dolphin meat.

Figure 33. Dried dolphin skin, fins and flukes.

Figure 35. Salted dolphin skin, fins and flukes.

Table (2). Cetaceans on sale at Myeik, Dawei and Maungmagan.

Sr. No.	Date	Location	Species	No. of Dolphin	Whole / Chopped	Remarks
1	-/10/05	Myeik, *Meekwet zay*	unidentified	1	Whole	Reported by fish sellers
2	30/10/05	Myeik, *Meekwet zay*	unidentified	1	Whole	Reported by fish sellers
3	-/2/06	Dawei, *Kanna zay*	unidentified	1	Whole	Reported by fish sellers
4	-/3/06	Maungmagan market	ID	1	Whole	Reported by fish sellers
5	7/3/06	Dawei, *Kanna zay*	unidentified	1	Whole	Reported by fish sellers
6	7/3/06	Maungmagan market	IHD	1	Whole	Observed
7	9/3/06	Maungmagan market	IBD	7	Chopped	Observed
8	11/3/06	Maungmagan market	IBD	1	Chopped	Observed
9	12/3/06	Maungmagan market	SPD	2		Observed
10	13/3/06	Maungmagan market	SPD	1	Whole	Observed
11	15/3/06	Maungmagan market	IBD	2		Observed
12	16/3/06	Maungmagan market	IBD	1	Whole	Observed
13	17/3/06	Maungmagan market	IBD	2	Chopped	Observed
14	19/3/06	Maungmagan market	IBD	2	Whole	Reported by fish sellers
15	21/3/06	Maungmagan market	IBD ID	2 1	Whole Whole	Reported by fish sellers Reported by fish sellers
16	22/3/06	Maungmagan market	ID	1	Whole	Reported by fish sellers
17	2/4/06	Maungmagan market	IBD FP	1 1	Whole Whole	Reported by Nang Mya Han

IBD = Indo-Pacific bottlenose dolphin
IHD = Indo-Pacific humpback dolphin
SPD = spinner dolphin
ID = Irrawaddy dolphin
FP = finless porpoise

Seven Indo-Pacific bottlenose dolphins were sold on 9 March 2006 at the Maungmagan market (Figure 36). According to some fish sellers at this market, about 30 cetaceans per month of various species are available for sale during all seasons. Landings vary depending on the number of boats arriving from fishing grounds to Thabausaik, Pantin Inn and Maungmagan villages. It was reported that landings of dolphin carcasses, dried body parts and sometime live dolphins occurred at Thabausaik.

Figure 36. Fresh dolphin meat on sale at Maungmagan market.

Figure 37. Some dolphin meat buyers at Maungmagan.

5.7 Consumption

Most local people abstain from eating big fish and dolphin meat, although some people living in suburban areas do consume small cetaceans. The demand for dolphin meat at the Maungmagan market is high (Figure 37 & 38). According to some consumers, fresh dolphin meat is palatable although a little oily. Dried fins, flukes or skin need to be boiled tender before being eaten.

Figure 38. Dolphins on sale and some buyers at Maungmagan.

5.8 Species

Whales could not be identified from the fishermen's descriptions. Indo-Pacific bottlenose dolphins *Tursiops aduncus*, Indo-Pacific humpback dolphins *Sousa chinensis*, and spinner dolphins *Stenella longirostris*, were identified during visits to Maungmagan market. Irrawaddy dolphins *Orcaella brevirostris* were reported caught by local fishermen. Finless porpoise was observed by Nang Mya Han, a Professor of Marine Science at Myeik University, during her field trip to Dawei and reported to the author.

5.9 Fishing Gears

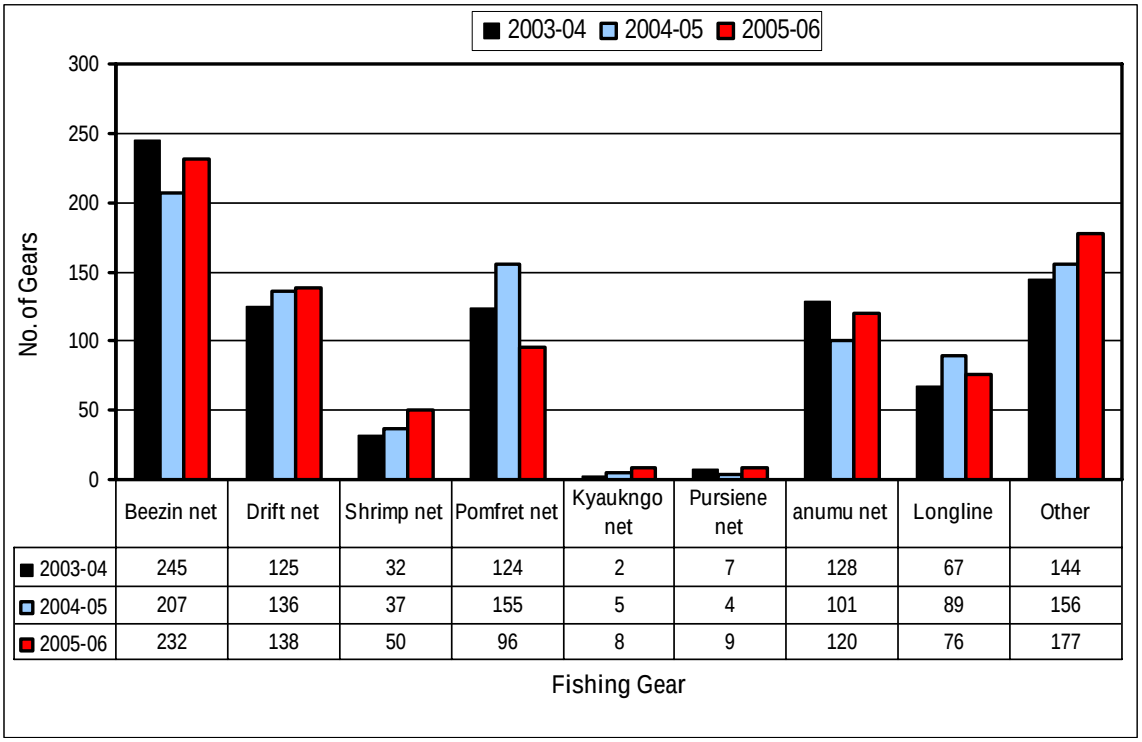
About 300 fishing boats of various sizes use Thabausaik as their landing site (Figure 39 & 40). Thabausaik village is situated in Longlon township. Fishing gears registered at Longlon township fisheries office are described in Figure 41 and Table 3. Many types of passive and active fishing gears are used for nearshore and offshore fishing in the Tanintharyi coastal waters (Figure 42).

Table 3. Motorized and non-motorized inshore fishing gears registered at Longlon Department of Fisheries.

Year	Motorized Vessels	Non-motorized Vessels	Total
2003-04	597	277	874
2004-05	667	222	889
2005-06	741	165	906

Figure 39. Some artisanal fishing boats at Thabausaik village.

Figure 40. Some artisanal fishing boats at Thabausaik village.



	Beezin net	Drift net	Shrimp net	Pomfret net	Kyaukngo net	Pursiene net	anumu net	Longline	Other
2003-04	245	125	32	124	2	7	128	67	144
2004-05	207	136	37	155	5	4	101	89	156
2005-06	232	138	50	96	8	9	120	76	177

Figure 41. Near shore fishing gears registered at Longlon Department of Fisheries in 2003-2006.

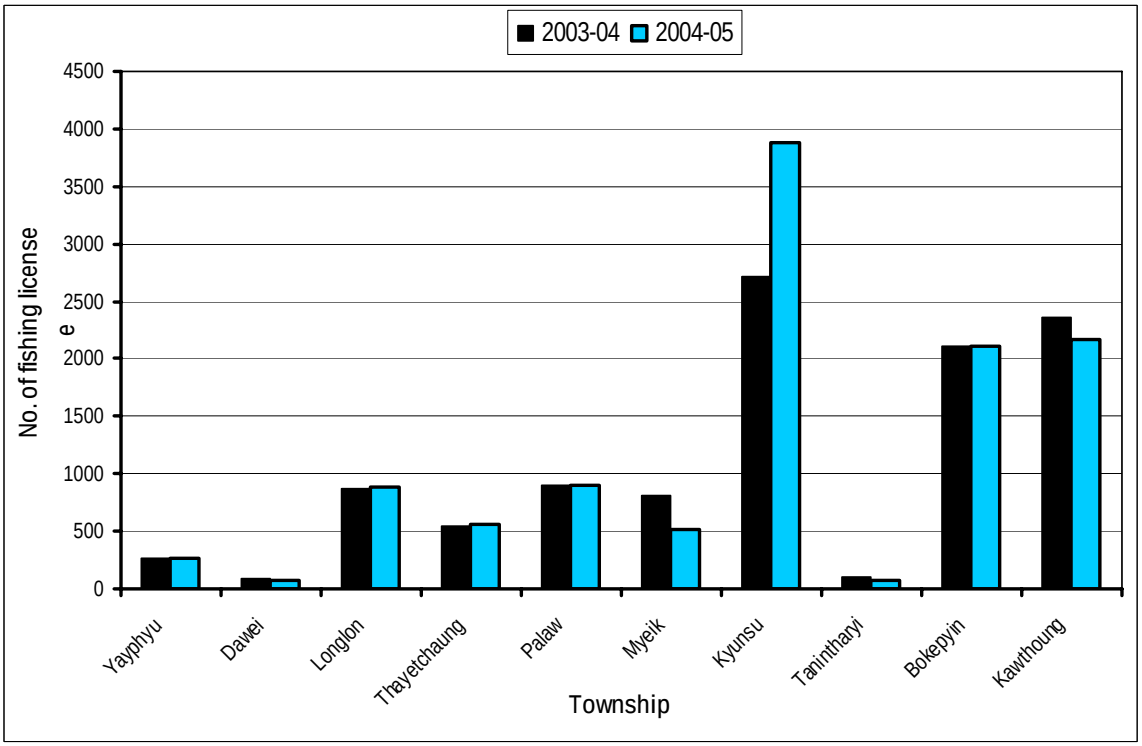


Figure 42. Township-wise no. of fishing licenses registered in 2003 – 05 in Tanintharyi Division.

5.10 Traditional beliefs and attitudes

Fishermen believe that seeing a whale at sea is a warning sign of their wrong way of action, speech, mind or body to which the celestials concerned with the sea do not like. They throw water and rice into the sea when they see a whale to excuse their wrong way of action. Therefore, some fishermen do not want to encounter a whale at sea because they believe that it is a warning sign. Fishermen said that a whale looked like a massive rock and they were afraid when it surfaced near their boats because they thought it could endanger them.

Figure 43. U Shin Gyee shrine with some whale jaws offerings at a Dry Dock in Myeik.

Some whale jaws found together with offerings are located near the "*U Shin Gyee*" shrine at a dry dock in Myeik (Figure 43). "*Oo Shin* Gyee" is a "*Nat*", or a celestial, who is the guardian spirit of marine waters. Delta and seagoing vessels are in his charge. Therefore, offerings are made to him whenever a boat is launched. Some fishermen use whale jaws as ornaments on their boat (Figure 44).

Fishermen and local people regard dolphins as life guards and believe they will save humans in trouble at sea. A fisherman at Dawei said that dolphins were "*Nat nga*" or celestial fish because they were created by celestials. He also said that celestials created dolphins with flukes in a transverse position to distinguish them from other fish. Some fishermen said that they would save the life of an entangled dolphin if the animal was found still alive.

Figure 44. A whale jaw ornamented on top of the wheel house of a trawler.

Dolphins reportedly scared some nearshore fishermen with their respirations and splashes when they swam in a big group near their fishing boat at night. Some fishermen from Thabauseik and Dawei said they sometimes banged two iron bars together in the water to scare the dolphin from stealing their fish and interfering with their operations.

6 Discussion

Cetacean bycatch is a serious problem for marine mammal populations and mitigation measures have been sought. A global bycatch initiative was launched in early 2002 by World Wildlife Fund-US and their strategy calls on governmental and non-governmental bodies to move quickly, cooperatively, and thoughtfully to achieve bycatch reduction (Reeves *et al.* 2004).

In Sri Lanka small cetaceans continue to be killed both directly using hand harpoons and indirectly through entrapment in gill nets. Small cetaceans are sold to consumers at inland markets away from the coast under the false pretext of being dugong flesh (Ilangakoon, 2002).

Deliberate and accidental catches of cetaceans appear to be particularly common in Dawei. Indo-Pacific bottlenose dolphins and spinner dolphins were the most frequent species observed at the Maungmagan market. Cetacean catches (including bycatch and directed catch) are estimated to be at least a few hundreds in waters near Dawai and at least in the low tens in waters near Myeik.

Except for some apparent marks, such as the thread-like pattern on the neck made by a net, or single or multiple piercing wounds made by hand harpoons, it was difficult to determine the cause of death for most carcasses observed at fish markets. In other areas of the world, cetacean bycatch occurs in almost all major gear types, including drift nets/gill nets, bottom trawls, pots, long lines, tangle/trammel nets, fish traps, purse seine and other sound nets, pelagic trawls, set nets, etc. (Northridge 1991; National Research Council 1992). Though

cetacean bycatch was not reported from bottom trawlers from Myeik, they are the most numerous offshore fishing vessels in the Taninthayi Division. Their landings should be taken into account for monitoring cetacean bycatch. Some fishermen from Kyaikkhami Town in the Mon State are also reported to practice killing of dolphins with hand harpoons.

Generally, people in Myanmar abstain from eating the meat of big fishes and animals. Consumption of whale, dolphin and porpoise meat appears to be localized and almost all demand and supplies are at village or suburban levels. There are plans to upgrade Maungmagan as a port and resort. Dolphin meat could become a local favorite at the resort unless measures are taken to eliminate the sale of these products.

Most local people do not know that Irrawaddy dolphins and dugongs are protected by law. They do not know even which is the Irrawaddy dolphin and, therefore, information given during this study may improve their knowledge. The participation of local people is a vital component for mitigating cetacean bycatch.

Indo-Pacific bottlenose and spinner dolphins were the most common species observed being sold at the Maungmagan fish market. Cetacean species with high bycatch rates in other areas of the Indian Ocean include spinner dolphins off Sri Lanka, common dolphins (*Delphinus delphis*) in the Southwest Indian Ocean Basin and Tasman Sea, and pan-tropical spotted dolphins (*Stenella attenuata*) in the North Indian Ocean (Alverson, *et al.* 1994).

According to a Department of Fisheries officer, many hundreds of dolphins were previously observed in waters nearby Maungmagan. This information is supported by reports of fishermen from Sakhinthit village who stated that they could previously catch as many as 20 dolphins in a single fishing trip. However, the absence of dolphin bycatch in Sakhinthit during the last few years may indicate a decline in the numbers of dolphins and porpoises in the area.

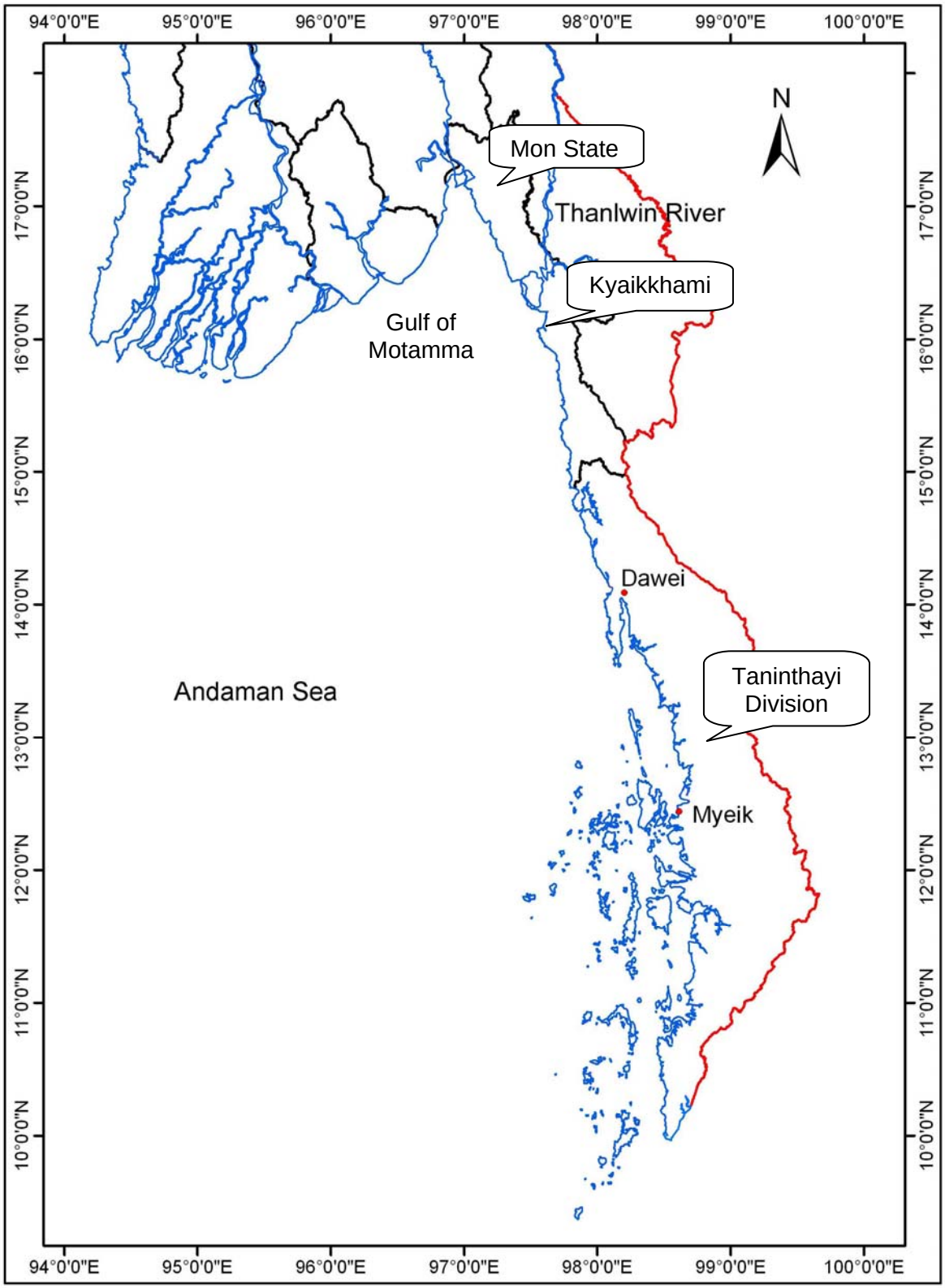


Figure 45. Map showing the Myeik, Dawei, Kyaikkhami and Thanlwin River.

7 Conclusions and recommendation

Provisional conclusions and recommendations based on the two assessment trips are that:

(a) Seine nets and gill nets represent the main threats to small cetaceans in the waters near Myeik and Dawei, with directed catches from hand harpoons presenting an additional threat that applies mostly to Dawei.

(b) Exploitation of dolphins for consumption by local people is common but apparently localized to Maungmagan and nearby villages.

(c) Mortality from dolphin catches (including bycatch and direct catch) probably numbers in the low hundreds per year in the waters near Maungmagan and in the low tens per year in the waters near Myeik.

(d) Public education and conservation awareness about cetaceans is urgently needed in the coastal area of Dawei district.

(e) A cetacean survey should be carried out between the Thanlwin River Mouth and Myeik in the Mon and Taninthayi Divisions of Myanmar (Figure 44).

8 Acknowledgements

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- A study on sex ratio and sex change of the pearl oyster, *Pinctada fucata* (Gould), at Pearl Island.
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- A review of "South Sea Pearl" culture.
- Studies on spatfall prediction and spat collection in *Saccostrea cucullata* and *Crassostrea belcheri* at Setse, Mon State.
- A study on rock oyster spat settlement on asbestos collectors at Setse.
- Growth of rock oyster spats fed with two microalgae.
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- Cruise reports of "Annawatheikpan" Training and Research vessel.
- A study on population dynamics of croakers at Thanlwin River mouth.
- A brief account of Myanmar's pearl culture industry.
- A view on seeding.
- Myanmar pearling: Past, Present and Future.
- A review on the mass mortalities in pearl oysters.
- A preliminary observation on coral reefs in Kawthoung township.
- Current status of Ayeyawady (Irrawaddy) dolphin in the Ayeyawady River, Myanmar.
- A report on Irrawaddy dolphin (Ayeyawady dolphin) Survey between Bhamo and Mandalay segment of the Ayeyawady River, Myanmar.
- Irrawaddy dolphins in Hsithe-Mandalay segment of the Ayeyawady River and Cooperative fishing between Irrawaddy dolphin, *Orcaella brevirostris*, and Cast-net fishermen in Myanmar.
- Castnet fisheries in cooperation with Irrawaddy dolphins (Ayeyawady dolphins at Hsithe, Myitkangyi and Myayzun villages, Mandalay Division, in Myanmar.
- Current status and threats of Irrawaddy dolphin in Irrawaddy River in Myanmar.
- Capacity building and preliminary assessment on dugong (*Dugong dugon*) occurrence off the Rakhine Coast of Myanmar.

CAPACITY BUILDING AND PRELIMINARY ASSESSMENT ON DUGONG (*Dugong dugon*) OCCURRENCE OFF THE RAKHINE COAST OF MYANMAR

Tint Tun and A. D. Ilangakoon

Report to
The Society for Marine Mammalogy

February 2006

CAPACITY BUILDING AND PRELIMINARY ASSESSMENT ON DUGONG (*Dugong dugon*) OCCURRENCE OFF THE RAKHINE COAST OF MYANMAR

Report to

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1. Introduction

The dugong (*Dugong dugon*) is presently the only extant species in the Family Dugongidae of the Order Sirenia. The documented geographical range of the species extends over the coastal waters of some 37 countries ranging from east Africa, through south and south-east Asia to Australia (Marsh *et.al.*, 2002). This herbivorous mammal, inhabiting the marine environment was once abundant in many parts of its range but numbers have declined and its area of occupancy has decreased in recent times due to exploitation and loss of habitat.

The dugong is therefore, currently listed in the IUCN (World Conservation Union) Red List of Threatened Species as being vulnerable to extinction throughout its global range. It is also listed in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which prohibits all trade in this species or any products derived from it.

Documenting the continued presence of the dugong in Myanmar waters was considered important at this stage because recent global assessments and action plans have not listed Myanmar as a country that still supports a population of this species in her waters (Marsh *et. al.*, 2002). Historically however the presence of the dugong in Myanmar waters has been known locally within the country and has been documented as far back as the 1850's by Rev. S Benjamin (Mason, 1882). Unfortunately there has been a large gap in the knowledge base about this species in the country of recent times, with the last documented report of dugong occurrence in Myanmar being in 1966 (Guardian, 1966; Yin, 1967). This lack of recent information is possibly the reason for the neglect of Myanmar in more recent global assessments of the species.

After a gap of almost four decades the present project initiated gathering of recent information on the dugong along the Rakhine coastline of western Myanmar. This coastline became the focus of the initial survey as the last documented report from 1966

also originated from this area. Although the occurrence of the dugong in Myanmar waters has been known locally and accidental bycatch of dugongs has been reported from Rakhine and Taninthayi no systematic studies on the species have ever been carried out.

The present project was undertaken to initiate preliminary investigations into the continued presence of the dugong in the waters off the Rakhine coast of western Myanmar. Simultaneously the project proposed to build local human resource capacity for future assessments on the dugong in other parts of the Myanmar coastline through collaboration with researchers from other Asian countries such as Sri Lanka where similar assessments have been undertaken recently (Ilangakoon *et.al.*, 2004). The results of this collaborative capacity building exercise and preliminary field survey are detailed in the following sections of this report.

2. Methodology

A semi-structured interview survey technique was developed for this initial survey based on a questionnaire already used in the Gulf of Mannar Sri Lanka and India by Ilangakoon *et. al.* in 2004. Both individual interviews and group discussions were carried out at the field sites visited along the Rakhine coastline. The questionnaire was translated into the local language and all interviews and discussions were conducted in the local language by researchers from Myanmar. The collaborating researcher from Sri Lanka participated only as an observer.

2.1 Survey Area

The Rakhine coastal zone is bounded by the Bay of Bengal in the west and it stretches 740 km from the Naff River in the north to Mawdin point in the south. The survey was conducted along an 82 km. stretch of coastline from Magyi zin village in the south to

Thegoni village a few kilometers north of Kyein ta li along the Rakhine coast (Figure 1). The fishing villages of Magyi zin, Gwa, Magyi ngu, Tain gyo, Kan tha yar, Satthwar, Long gyo and Thegone, Gwa and Kyein ta li towns were included within this survey area.

2.2 Survey Respondents

The majority of respondents to the questionnaire and participants at group discussions (Figure 2 & 3) at all sites were members of the fishing communities. Additionally in-depth discussions were also held with regional fisheries officials of the area (Figure 4) and other influential and knowledgeable persons within these communities (Figure 5).

2.3 Survey Team

The survey team (Table 1) consisted of local researchers who already had experience working on other marine mammals such as Cetaceans in the country (Figure 6). Within Myanmar the members of the survey team are affiliated to the Wildlife Conservation Society (WCS), the Department of Fisheries (DoF) and the University of Myeik. The collaborating researcher from Sri Lanka is a member of the Cetacean Specialist Group of IUCN and is affiliated to the Indian Ocean Marine Affairs Co-operation (IOMAC) through its Center for Research on Indian Ocean Marine Mammals (CRIOMM).

Table 1. The Survey Team

Name	Designation/Affiliation
Mr. Tin Tun	Associate Marine Biologist, Wildlife Conservation Society
Mr. Mya Than Tun	Staff Officer, Department of Fisheries, Myanmar
Mrs. Nang Mya Han	Professor, Dept. of Marine Science, University of Myeik
Ms. Thidar Moe	Deputy Staff Officer, Department of Fisheries, Myanmar
Ms. Anouk Ilangakoon	Member, Cetacean Specialist Group of IUCN

3. Results

Discussions on survey methodology, adapting and translating the questionnaire, survey participants and logistical arrangements between collaborators from Myanmar and Sri Lanka began in October/November 2005. The initial field survey along the Rakhine coastline was conducted in December 2005.

3.1 Local knowledge on the biology and ecology of the dugong

The majority of respondents at all sites were aware that the dugong is a mammal and they were all aware that dugongs inhabit sea-grass habitats. One respondent at Kan tha yar reported opening the stomach of an accidentally caught dugong and finding the undigested remains of crustaceans such as small crabs and echinoderms. At a group discussion with fishermen at Long gyo village, south of Kan tha yar, several members of the fishing community reported seeing dugongs accidentally pick up holothurians (sea cucumber) while feeding in sea-grass beds and subsequently spitting them out again without ingesting them. Some also reported that dugongs inhabited deeper waters (of about 45 feet depth) during day time but came closer to shore at night to forage on sea-grass and bivalves. Therefore in contrast to current scientific knowledge on dugong feeding habits, there is an opinion among these fishermen that dugongs are not strictly vegetarian although they eat plant matter most of the time.

At all sites visited fishermen reported frequent sightings of small groups of dugongs, usually 2, but sometimes numbering upto 5-6 individuals, including calves. It was reported that dugongs are more frequently sighted during the transitional months between winter and summer along this coast. The respondents also observed however, that larger numbers and more frequent sightings of dugongs can be made around Man aung Island (Cheduba Island) situated to the north of the present study area. This information was

further substantiated by fisheries officers at Gwa who observed that they receive frequent reports of dugong occurrence and bycatch from the Island of Cheduba.

3.2 Stories, beliefs and myths in relation to the dugong

In contrast to neighbouring countries of the region like Thailand there were no specific superstitions, myths or religious beliefs in relation to the dugong among the fishing communities along the Rakhine coast of Myanmar. However several stories connected to dugongs interacting with fishermen engaged in their day-to-day activities were reported.

At a group discussion at Long gyo village, south of Kan tha yar, several fishermen explained that dugongs often come and bump their heads against the wooden rudder of artisanal fishing craft at Hmawyone which is located between Kyein ta li and Thandwe near Andrew Bay. At times they head so violently that the rudder is damaged and therefore the fishermen carry long bamboo poles to push the dugongs away from their boats in such instances.

At Gwa a fisherman who used to dive for sea cucumbers in the past reported that dugongs often display curiosity and follow divers up and down between the surface and the substrate. This behaviour makes the divers a little nervous because dugongs are large heavy creatures even though they display no aggression and never try to harm the divers.

A fisherman at Kan tha yar who had some old dugong bones (Figure 7) in his possession and some fishermen at Long gyo village reported that they had heard dugong bones can be used as a remedy for diarrhea in the form of powder or ground to a paste with water on a stone slab. However, the fisherman who had the bones added that although he had kept some bones from an accidentally caught animal he had never tried this remedy and therefore did not know if it was true.

3.3 Recent evidence of dugong occurrence

Frequent dugong sightings and some accidental bycatch was reported from all sites visited. At Gwa it was reported that dugongs are frequently seen throughout the fishing season but the fishermen were not aware if they are present during the monsoon (May to October) as they do not go out fishing during that time of the year. At Kan tha yar and Kyein te li dugong sightings were reported all year round with more frequent sightings during the winter season, especially in December and January. Fishermen at all sites were in agreement that dugong sightings are more frequent and larger numbers are present around Cheduba Island throughout the year. It was reported that spending one week at Cheduba Island would guarantee at least one dugong sighting and possibly more. The respondents explained that they can be seen even from land as there are extensive shallow sea-grass beds around this island which is inhabited by people engaged in fisheries activities.

The most recent dugong bycatch was reported at Kan tha yar where a large animal had been accidentally killed in a net laid for skates as recently as August 2005. Fisheries officers at Gwa were able to provide photographs (Figure 8) of a young dugong that had been accidentally killed at Kan tha yar in 2004. Bycatch of at least a few animals was reported from all sites within the past five years.

3.4 Possible range of distribution along the Rakhine coastline

Based on the information obtained through this initial survey it appears that the dugong still has a continuous range of distribution from around Magyi zin, Bwa mi and Nga yoke kaung in the southern part of the study area, to Kyein ta li in the north. This stretch of coastline along Myanmar's Rakhine coast is approximately 80 km. in extent (Figure 9). Although this was the area actually covered by the present survey the data gathered indicates that dugong distribution along this coastline extends much further north, at least as far as Cheduba Island, where dugong sightings and bycatch is reported to be common.

Therefore it is now of importance to extend the survey north of Kyein ta li, at least to Cheduba Island and further north if possible, to ascertain the northern extremity of the dugongs range in Myanmar coastal waters.

The present information indicates that dugongs are not rare anywhere along the coastal belt that was surveyed and larger concentrations of the species are to be found further north around Cheduba island. All fishermen interviewed reported seeing dugongs in groups of 5-6 animals and also reported the presence of calves indicating that there is a viable breeding population of the species along this segment of coastline in Myanmar. These positive results from the present survey not only makes it possible to authenticate the fact that the Rakhine coastal waters off western Myanmar still supports a dugong population but also that it appears to be a healthy breeding population of the species. Further investigations will possibly indicate that the range of the species extends both north and south of the present study area and more extended surveys should therefore be considered a priority.

3.5 Threats and use

In contrast to most countries in Asia where the dugong still occurs, direct threats to the dugong along the Rakhine coast of Myanmar appear to be minimal. It is reported that about a decade ago some dugongs were accidentally caught in beach seine fisheries. Usually only young dugongs were caught in these nets as the nets are manufactured with locally available fibre threads and larger dugongs can tear these nets apart and escape. Presently however fishermen engage in deep sea fishing and beach seine fishing has not been practiced in the area for many years. Accidental bycatch in set nets used mainly for skates and rays does however still occur sometimes along this coastline. Opportunistic killing of dugongs with hand harpoons was reported only from the Taungup area.

Animals that are accidentally killed are used for local consumption here but the flesh of the dugong is not considered to be of any special significance or importance unlike in

other Asian countries such as Sri Lanka and India where direct hunting occurs because it is considered a delicacy (Ilangakoon, *et. al.*, 2004). At the same time unlike in neighbouring countries such as Thailand (Hines *et. al.*, 2005) there is no prevalence of strong superstitious or medicinal values in relation to dugong body parts, teeth or tears in Myanmar. All these factors contribute to the absence of demand driven direct hunting of dugongs along the Rakhine coastline of western Myanmar.

Likewise the sea-grass beds along this coastline are still in pristine condition (Soe-Tun *et.al.*, 2001) and they are not under any undue stress due to human induced factors such as destructive practices or pollution as in many parts of the world-wide range of the dugong today. The sea-grass habitat off the Rakhine coastline is therefore well preserved and faces no immediate threats.

3.6 Legislation in relation to the dugong

The State Law and Order Restoration Council of the Union of Myanmar enacted The State Law and Order Restoration Council Law No. 6/94, titled "The Protection of Wildlife and Protected Areas Law" on 8th June, 1994. The objectives of this Law are as follows:

a) to implement the policy of protecting wildlife of the State;
b) to implement the policy of conserving the protected areas of the State;
c) to carry out in accordance with International Conventions agreed by the State in respect of the protection of wild species of both flora and fauna and representative ecosystems occurring in the country;
d) to protect endangered species of wild flora and fauna and their habitats;
e) to contribute for the development of research on natural resources;
f) to establish zoological and botanical gardens for the protection of flora and fauna.

In accordance with Chapter V, Article 15(a) of the Protection of Wildlife and Protected Areas Law, the Forest Department of the Ministry of Forestry, Union of Myanmar issued

Notification No.583/94, dated 26 October 1994 under which, the Dugong was listed in the "Completely Protected Animals" category. Therefore, since 1994 the dugong is a species that is totally protected by law in Myanmar.

3.7 Secondary information on other marine mammals

In the course of this survey on the dugong it was also possible to obtain information on the occurrence of other marine mammals of the Order Cetacea along the Rakhine coastline. All the skeletal parts of a 45-50 foot whale that had stranded approximately five kilometers north of Kyein ta li in July 2005 were discovered during the survey (Figure 10). Given the size of the skeleton and the shape of the skull it appeared to be of a fin whale (*Balaenoptera physalus*). Presently this skeleton is displayed for the public at the Fish Garden in Kandawgyi Park in Yangon (Figure 11). Fishermen at all sites also described encountering large whales exceeding 60 feet in length in deeper waters near the edge of the continental shelf. These are also possibly fin whales as the species seems to be common in the area. This is further substantiated by the fact that the skeleton of a 72 foot fin whale that stranded on the Rakhine coast in 1987 is presently displayed in the Natural History Display of the Yangon Zoological Gardens (Figure 12).

Additionally fishermen taking part in the dugong questionnaire survey when shown photographs of whales and dolphins in a guide book (Reeves *et. al.*, 2002) identified several species as ones they see often in the area. At Kan tha yar and Gwa fishermen identified the species *Sousa chinensis, Stenella attenuate* and *Tursiops spp.* as those that they are familiar with. At Kan tha yar several fishermen at a group discussion described a small whale not much bigger than their boats that is encountered in shallow waters and when shown pictures identified it to be *Balaenoptera acutorostrata*. At Kyein ta li one fisherman identified *Globicephala macrorhynchus* as a species he has seen in the area in addition to *S. chinensis, S. attenuate* and *Tursiops spp*. This is of interest as *G. macrorhynchus* is listed as one of three species of small cetaceans to occur in Myanmar

waters in a book titled "Wild Mammals of Myanmar" published in the 1960's (Yin, 1967), although more recent surveys have not recorded the species.

4. Discussion

Although no systematic surveys have been carried out on the dugong in Myanmar and its occurrence has not been documented during the past four decades, the species appears not only to exist in these waters but to be quite common unlike in many other parts of its earlier range in south and south-east Asia. From all information gathered through the survey, the dugongs here seem to be a part of a healthy breeding population. Likewise, the Rakhine coastline within the present survey area and northwards to the islands off the coast still support good sea-grass habitat that is under no stress from human induced factors.

Some studies have been done on these sea-grass habitats that are essential for the survival of the dugong along the Myanmar coastline (Soe-Tun *et.al.*, 2001). A total of nine species have been recorded with eight of them occurring on the Rakhine coastline. The species include *Cymodocea rotundata, C. serrulata, Halodule pinifolia, H. uninervis, Syringodium isotoefolium, Enhalus acoroides, Halophila beccarii, H. decipiens* and *H. ovalis*. Meanwhile, the family Hydrocharitaceae represents the most dominant genera in both Rakhine and Taninthayi coasts and the family Cymodoceaceae occurs mainly on the Rakhine coastline. Presently, these sea-grass meadows along the coastal areas of Myanmar are in pristine, climax condition. Of the species found in the area *Halophila ovalis* is known to be a species preferred by dugongs (www.hans-rothauscher.de/dugong/sasia_e.htm).

It is also apparent that off Myanmar's Rakhine coastline the dugong is not faced with serious direct hunting pressures or habitat fragmentation, degradation and destruction. This is in sharp contrast to many parts of the dugong's worldwide range, especially in

Asia, where they are generally hunted as food or for their body parts, bones and teeth which are used for medicinal purposes and are valued on the basis of superstitious beliefs. The two factors of deliberate hunting and habitat destruction have played a major role in the vulnerable status of the dugong in many countries of the region. The absence of both these adverse factors in Myanmar makes the future survival prospects of the dugong population here much brighter than in many parts of its Asian range. The fact that the dugong and its habitat are still safe in Myanmar waters indicates that the dugong population here is probably healthier and more likely to survive in the long-term than in neighbouring parts of its range. In the light of these positive factors it can be speculated that Myanmar is possibly one of the very few countries in south and south-east Asia that not only supports a healthy dugong population but also one that faces no direct threats in the form of hunting, pollution, destructive fishing practices that destroy habitat or any other human induced factors that could adversely affect its long-term survival.

Although these preliminary results based on surveying a small section of Myanmar's western coastline appear very positive and confirm the continued presence of the species in these waters they also lead to a host of other questions. At present no information or data is available on the total extent of the dugong's range of occurrence and distribution, the extent of available habitat, size of the population, seasonal movement patterns and extent as well as effects of accidental bycatch in Myanmar waters. Therefore this preliminary survey has only been able to show that Myanmar waters still have dugongs in them and that more research on the species is both urgent and important. The study should now be extended northwards of the present study area along the Rakhine coast. Likewise it is important to do a similar study on the south-west coast adjacent to the Mergui Archipelago off Myanmar as old documented records of dugongs occurring in that area already exist (Rev. S. Benjamin, 1853). More recently dugong bycatch has been reported on islands in close proximity to the city of Myeik (pers. comm. Nang Mya Han) on this south-west coast.

Meanwhile secondary information on the occurrence of other marine mammals obtained during the course of this survey indicates that the waters off the Rakhine coastline have

an abundance of cetaceans both large and small and the area may support high species diversity. Compared to other areas off Myanmar, the continental shelf off the Rakhine coast is narrow, having an average width of approximately 30-40 nm. and widening to about 60 nm. off the northern part. Hydrographic conditions along this coastline are influenced by the monsoons that prevail between May and October. The fact that the area is adjacent to the narrowest part of Myanmar's continental shelf also supports the possibility of high species richness. Likewise, many large whale strandings have also been reported along the Rakhine coastline both in the past and in recent times. The narrow continental shelf also ensures that even near-shore fishermen report encountering large whales during fishing activities. These factors warrant further investigation of the area in relation to all marine mammals including the dugong and cetaceans.

5. Conclusions and Recommendations

Based on the results of the present survey it can be concluded without any doubt that dugongs still inhabit the waters off the Rakhine coastline of western Myanmar. The coast also supports good sea-grass habitat that is under no stress from human induced factors. It can also be concluded that the status of the dugong on the Rakhine coast is presently secure due to minimal direct hunting pressures, low rates of accidental bycatch and no habitat degradation or fragmentation. As a result of these factors the dugongs along the Rakhine coastline still appear to be a part of a healthy breeding population. Therefore, the future survival prospects of the dugong population in Myanmar waters looks much brighter than in many parts of the species remaining range in Asia.

The results of this preliminary investigation, which was limited in its scope, are extremely positive for the dugong and its conservation in Myanmar. Based on these results several important future research and conservation needs have become apparent. Therefore future directions for work on the dugong in Myanmar are outlined through the following recommendations:

- It is recommended that dugong surveys should be extended to the north of the present study area along the Rakhine coastline with special attention to the area around Cheduba Island as a matter of priority.
- It is also strongly recommended that a training programme is organized for officers of the Department of Fisheries stationed along Myanmar's Rakhine and Tanintharyi coastlines in order to familiarize them with information collection on dugong occurrence and bycatch and to better equip them to collect data in a systematic and effective manner.
- After fisheries officers have received the necessary training it is suggested that a dugong bycatch monitoring and information network is initiated along the coastline in order to assess the extent of the accidental bycatch. This information will also assist in determining the range of occurrence and distribution of the species in Myanmar waters.
- Based on the discovery of old records and recent information on the occurrence of the dugong in the Mergui area off south-west Myanmar it is recommended that dugong surveys are initiated in this area as well.
- Once further baseline information is available it is strongly recommended that aerial surveys are conducted off the Rakhine coast to obtain direct, quantifiable data on dugong occurrence, distribution and population parameters in this area in the future.
- A public awareness and education programme is recommended along the Rakhine coastal belt, in order to sensitize the public and get public participation in future dugong conservation plans.
- Development of an overall action plan for conservation of the dugong in Myanmar is recommended.

6. Acknowledgements

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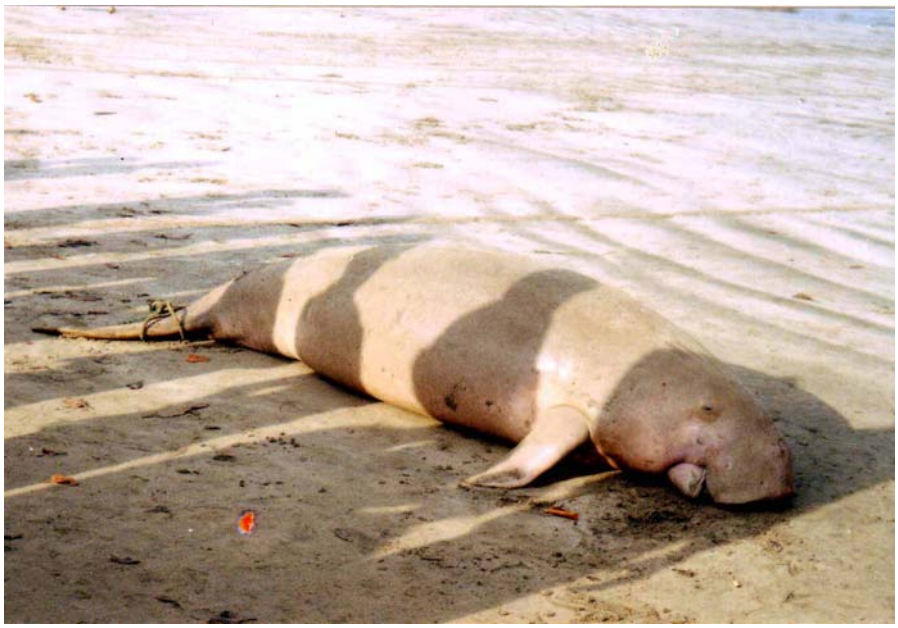

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ASSESSMENT OF DUGONG (*Dugong dugon*) OCCURRENCE AND DISTRIBUTION IN AN EXTENDED AREA OFF THE RAKHINE COAST OF WESTERN MYANAMAR

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1. Introduction

Dugong (*Dugong dugon*) is known as “Ye-wet” (water pig) or “Ye-thu-ma” (mermaid) or “Lin-shu” in Myanmar. Dugong has been a protected animal by law since 1994 and it is listed in the “Completely Protected Animals” category in Myanmar.

The presence of dugong in Myanmar waters was documented as far back as the 1850’s by Rev. S. Benjamin (Mason, 1882) from Tanintharyi coast (formerly known as Tenasserim coast) of southern Myanmar and one was captured alive in 1966 from Rakhine coast (formerly known as Arakan coast) in western Myanmar (Guardian, 1966; Yin, 1967). The 740 km long Rakhine coastal zone, stretching from Naff river in the north to Mordin point in the south, is situated in western Myanmar and it is bounded by the Bay of Bengal in the west (Figure 1).

Since 1966 there was a large gap in information about the dugong in Myanmar which is possibly the reason for the neglect of Myanmar in recent global assessments and action plans in which Myanmar was not listed (Marsh et al., 2002) as part of the dugongs range. After this gap of about four decades from 1966, Tun and Ilagakoon (2006) initiated a dugong survey in 2005. Rakhine coast became the focus of their initial survey as the last occurrence was documented from the Rakhine coast. Their preliminary survey succeeded in documenting the continued presence of the dugong in Myanmar (Ilagakoon and Tun, 2007).

Following their preliminary survey in 2005/2006, Tun and Ilagankoon conducted another extended survey along the Rakhine coast from Ngwe Saung resort town in Ayeyawady

Division to Hmawyone village in Rakhine State during the 2006/2007 field season (Figure 1). This report presents the results of this second phase of their survey.

2. Method

Based on a questionnaire already used in the Gulf of Mannar Sri Lanka and India by Ilangakoon *et. al.* in 2004, Tun and Ilangakoon (2006) developed a semi-structured interview survey technique for their preliminary dugong survey in Rakhine coast in western Myanmar. The technique was also used in the present extended survey. Both individual interviews and group discussions were carried out at the field sites visited along the Rakhine coastline.

2.1 Survey Area

The survey was conducted along a 160km stretch of coastline from Ngwe saung town to Hmawyone village during February to May 2007 (Figure 1). According to the administration, Ngwe saung is situated in Ayeyawady Division and Hmawyone is situated in Rakine State although they are all located along the Rakhine coast (Figure 1). Minlan, Thazin, Phone maung kyain, Gyine le, Ka nyin kwin, Ye thoe, Pho kalar kyun, Chaung tha, Magyi, Tha baw kan, Shwe ya gyaing and Hmawyone villages were visited. Ngwe saung, Shwe thoung yan, Gwa and Kyein ta li towns were also visited during the survey (Figure 2).

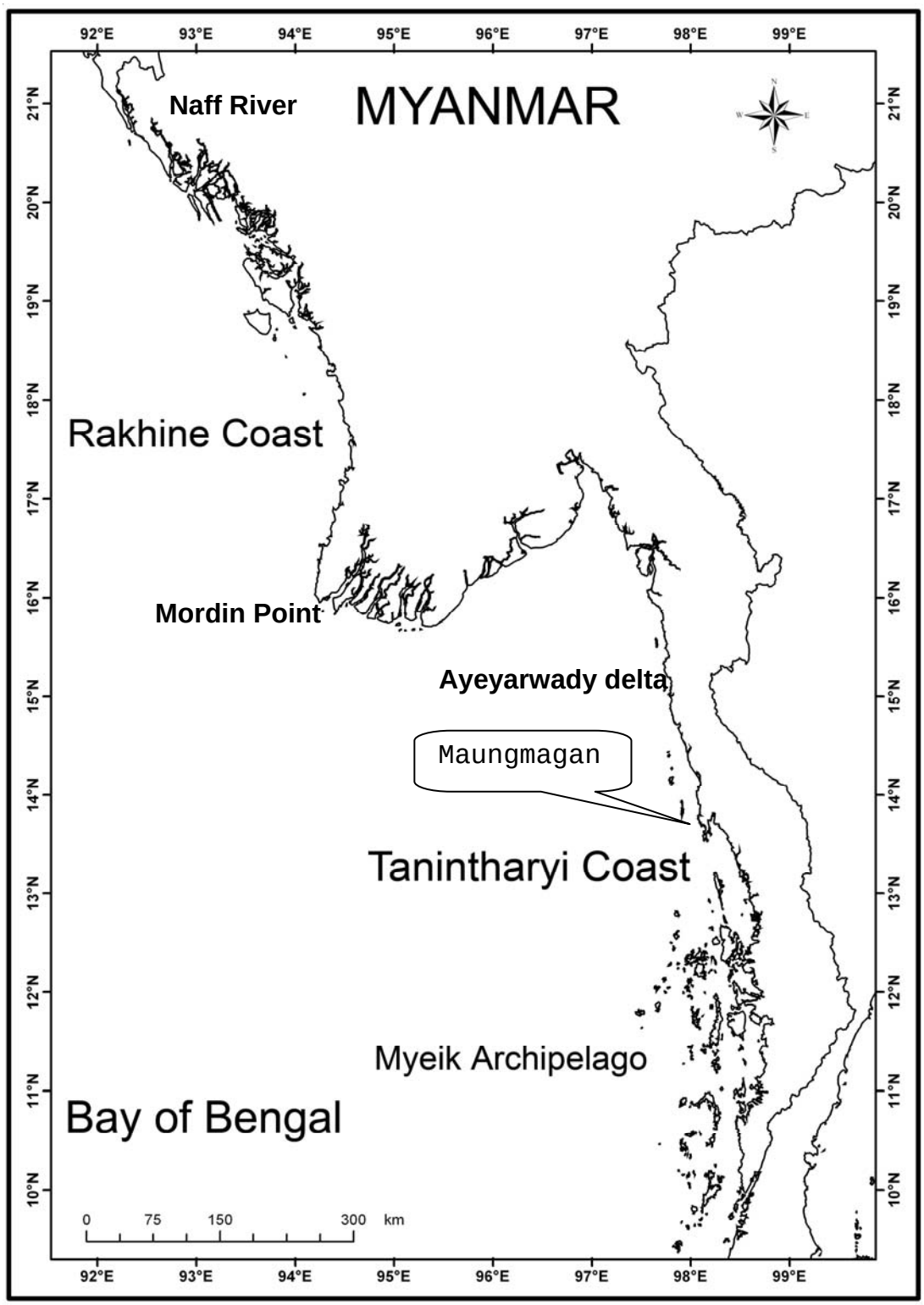

Figure 1. Map showing the Myanmar coastal area.

Figure 2. Map showing the study area.

2.2 Survey Respondents

The majority of respondents to the questionnaire and participants at group discussions at all sites were members of the fishing communities. Additionally discussions were also held with fisheries officials and other influential and knowledgeable persons within these communities (Figure 3 - 8). A total of 79 persons were interviewed during the survey.

Figure 3. An interview with a fisherman.

Figure 4. An interview with a fisherman.

Figure 5. An interview with villagers.

Figure 6. An interview with fishermen.

Figure 7. An interview with fishermen.

Figure 8. An interview with knowlegeable persons.

3. Results

3.1 Dugong

3.1.1 Stranding

Strandings of dugong were reported at Thazin and Phone maung kyaing villages. A dugong was stranded at Thazin in 2004 and another dugong was stranded about four years ago at Phone Maung Kyine village. Causes of death could not be identified by the villagers.

Dugong stranding was also reported by a fisherman at Hmawyone village, who reported that two dugongs with wounds and scratches were found stranded. Fishermen thought that they fought with each other and stranded with many wounds. One was dead and the other one was still alive when they were found but it was subsequently killed.

3.1.2 Sightings

Based on the information obtained during the survey, dugongs are sighted along the coast of the survey area. Dugongs were sighted by most of the respondent fishermen and some villagers. In the past, fishermen sighted dugongs occasionally at Hgnet taung kyun (also known as Hgnet kyun) which is located between Ngwe saung and Thazin. However, at present, dugong is rarely sighted in that area. A fisherman from Gyaing le village had sighted a dugong about two years ago.

At Hmawyone, dugongs can be found throughout the year but more frequently in the rainy season, from May to October. Almost all villagers at Hmawyone have seen the dugong. Fishermen said that the presence of a dugong can be noticed easily by its movement, ripples in the wake of its movement and surfacing to respire. They explained that it looks like a hull of a boat in upside down position. A dugongs head can also be seen when they are surfacing. Sometimes dugongs come close to the shore even just beyond a fishing rod and then it can be seen easily (Figure 9).

Figure 9. Hmawyone water where dugongs can be sighted just beyound the fishing rod.

Dugongs have not been found in big groups. Two to three dugongs were the biggest group size found in Hmawyone water. Two dugongs, one small and one big (possibly a mother-calf pair), were sighted in Hmawyone waters and weights were estimated to be 20-25 viss (33–41kg) and around 150 viss (app. 245kg) respectively. Big dugongs

were common in Hmawyone waters and the biggest ever seen was estimated to be about 300viss (490kg) in weight.

Dugong sightings are also common in Shwe ya gyaing and neighbouring villages. At Shwe ya gyaing, dugongs are sighted frequently almost throughout the whole rainy season. They are apparently so visible that villagers can see the animal even from the land. Shwe ya gyaing is also a good place with some rocks and seagrass and, therefore villagers assumed that it can provide not only sheltered areas but also an area for dugongs to forage in the monsoon season. The biggest dugong ever sighted in Shwe ya gyaing was estimated to be more than 200 viss (ca. 327kg) in weight and about 3m in length and animals of approximately more than 100 viss (163kg) are common. A dugong was found in Gwa kyun waters at about 3m depth. Dugongs were sighted frequently every monsoon season in Shwe ya gyaing but they are rarely sighted in summer. Fishermen think that Shwe ya gyaing and its neighbouring waters are a good habitat for dugongs as sightings and accidental catch of dugongs have been reported every year.

3.1.3 Bycatch

Dugong bycatches were also reported from the survey area. Various sizes of dugongs were killed accidentally in fishing nets. Many years ago, a dugong was even caught alive by a fisherman with a castnet on a beach in the Gwa area.

A dugong was accidentally caught in a beach seine net at Ngwe saung in October 2004 (Figure 10 & 11). It was about

3m in length and estimated to be about 50-60 viss (82–98kg) in weight.

Figure 10. A dugong accidentally killed at Ngwe saung in 2004.

Figure 11. A dugong accidentally killed at Ngwe saung in 2004.

Accidental killings of dugong were also reported at Shwe ya gyaing and its neighbouring villages. Two years ago, a dugong was accidentally caught in a beach seine and a

small dugong of about 25viss (41kg) was accidentally caught in a fishing net a few years ago at Shwe ya gyaing. Another dugong was killed accidentally in a gillnet nearby a few years ago.

Recent dugong bycatches in 2006 were also reported from the survey area. In 2006, a dugong weighing 40-50viss (ca. 65–82kg) was caught accidentally in a fishing net at Shwe ya gyaing. At the end of 2006, a dugong weighing more than 100 viss (163kg) was accidentally caught while beach seine fishing at Magyi. A small dugong was also caught accidentally in a gillnet at Hmawyone in 2006 wighing 20 viss (33kg).

Very recently in 2007, two dugongs, one was about 70 viss (114kg), were accidentally caught in seine nets in Shwe ya gyaing area within a few months of each other. Another dugong was also killed accidentally in a fishing net weighing 80 viss (ca. 131kg) at Hmawyone in April 2007. The fishermen did not allow the dugong to be photographed but they allowed collection of its flipper as a specimen (Figure 12).

Figure 12. A flipper of an accidentally killed dugong at Hmawyone in April, 2007.

Generally, fishermen have no intention to hunt and kill dugongs but when one is sighted in the process of normal

fishing operations they try to kill it, most often using a harpoon. Sometimes, fishermen try to use their nets to catch a dugong but they are reluctant to use fishing nets because they know that dugongs are very strong animals and they can destroy their fishing nets.

Sometimes, dugongs are still alive when fishermen find them accidentally caught in fishing nets. However, they killed the dugong instead of releasing it as they can earn a good income even just from one dugong.

3.1.4 Local knowledge on dugong

The majority of respondents at all sites were aware that the dugong is a mammal. People in the survey area are very familiar with the dugong but almost all respondents did not know either the local or international legal status of the dugong. There is no superstition attached to the sighting of dugongs during their fishing. Fishermen are aware of dugongs and they do not fear them in any way. They are also aware that dugongs are clever because they manage to escape even when they are encircled with fishing nets. A fisherman observed a foraging dugong in Shwe ya gyaing water. The animal swam away when the fishermen try to go closer to the animal. They said that a dugong cannot swim away very swiftly as some fishes do because of its massive bulk but it builds up its momentum quickly after two or three strokes.

Fishermen have the belief that a dugong or dolphin can be killed accidentally in fisheries due to fate, when the animal’s life span has ended and it is the due time for the animal to die. Tusks or teeth of dugongs are

collected as souvenirs by some villagers. Three teeth collected from a dugong stranded at Hmawyone were round in shape and about the size of a human thumb. Fishermen know that dugongs are mammals and the sex of dugongs can be distinguished by presence or absence of breasts.

Dugong rind (skin) is used as a traditional medicine for diarrhoea in Rakhine coast (Figure 13). It is obtained from dugongs and kept in dried form. Villagers usually keep the rind above a stove in the kitchen. A user grinds the rind with a little water on a stone slab and then drinks ground rind mixture as a traditional medicine. It was reported that it smells bad when it is soaked in water. However, some people do not think that it can cure severe diarrhoea. But some have used it as a traditional medicine and sometimes they need to look for the rind at nearby villages if they cannot find one in their village.


Figure 13.Fresh dugong rinds at Hmawyone.

Some people in the survey area have tried to eat dugong meat but said it is soft and not palatable. Dugong meat does not need to be boiled with water to make curry.

Dugongs living in Hmawyone water destroy rudders of the fishing boats which anchor in the bay. Some rudders make a noise due to movement of the shaft in wave action. Dugongs are said to selectively attack those rudders which make a noise but they do not attack a rudder which does not make a noise. The dugong apparently dives straight down under the boat, then it swims upwards forcefully and destroys the rudder with its head. Fishermen can see the attack from the boat very clearly and they think that the rudder is destroyed by smashing the rudder with its tusks. Dugongs usually attack rudders at night time and, sometimes, they continue to attack all night. This behaviour has also been found to occur in other nearby waters. Nowadays, most of the boats in the area are fixed with iron rudder to avoid dugong attack.

Figure 14. Boats anchored in Hmawyone water where dugong destroys the rudder with its head.

Dugongs can be seen during day or night, full moon or new moon, but they noticed that dugongs consume not only seagrass but also bivalves. Hmawyone and Shwe ya gyaing waters are abundant not only in seagrass but also in

bivalves. According to the descriptions and some broken samples shown by a fisherman, the bivalve looks like *Pinna* species (Figure 15). Hmawyone small bay is also known as a bay of bivalves among the villagers. These bivalves are also collected and eaten by the villagers.

Figure 15. A broken bivalve molluscs which is abundant in Hmawyone bay.

Sometimes, fishermen from Shwe ya gyaing hear some noises while they are diving in the water. They believe that the noise comes from foraging dugongs as they have sighted dugongs in the water. They also found some toppled corals and stone slabs on the sea bottom. Fishermen believe that it does not look like it happened by wave action or other natural events because it looks selective. Fishermen think that if they are toppled by a natural event, all stones and/or corals must be in disorder. They can also distinguish between places which are altered by sharks, rays, groupers or dugongs.

Fishermen said that dugongs forage on the bottom and they also look for food under the stone or corals by removing them. Foraging tracks made by dugongs can also be seen while they are diving. Based on their experience, fishermen from Shwe ya gyaing had an opinion that the dugong prefers to live in rocky habitat rather than coral habitat.

Figure 16. A seagrass measow at Pho ka lar kyun.

3.2 Seagrass

According to the respondents, many seagrass meadows are patchily distributed along the coast of the survey area and they are in pristine condition (Figure 16). They can be found at places with little silt. Stranded seagrasses were observed at all sites during the survey (Figure 17). Large seagrass meadows can be seen in almost all small bays in Gwa and Shwe ya gyaing areas. A good seagrass meadow was observed at Pho ka lar kyun at low water and *Cymodocea serrulata*, *Cymodocea rotundata*, *Halodule pinifolia*, *Halophila ovalis*

Figure 17. Stranded seagrass at Hmawyone.

and *Syringodium isotoefolium* species were observed (Fighre 18 & 19). Hmawyone area also has many seagrass meadows and they are also in pristine condition.

Figure18. Seagrass at Pho ka lar kyun.

Figure 19. Seagrass at Pho ka lar kyun.

3.3 Other Marine Mammals

Dolphins are abundant in Rakhine coast and they can be sighted in various group sizes even in hundreds throughout the year. According to the fishermen from Shwe ya gyaing, they divide dolphins into two kinds – black and white. Because of the colour, white dolphins are called "*Ah nu*" at Myaybon area in northern Rakhine coast (Associate Professor San Tha Tun, pers. com). "*Ah nu*" means leprosy or leprosy patient and people are scared to be stained with some waters which were spewed during the dolphin surfacing.

Some fishermen have sighted whales during their fishing operations. They sighted the body and blow (water spout) of whales from a distance. They estimated the water spout was about four meters high. They are not superstitious about sighting a whale in the sea. Sometimes, dolphins are accidentally caught in fishing nets and fishing

lines. They are usually entangled by their flukes when they are accidentally caught in longline fishing.


Figure 20. A dolphin head observed at Thazin.

Very recent accidental dolphin bycatches in fishing gear were reported from Thazin and Chaung tha. A dolphin was accidentally killed in purse seine fishing off Thazin in January 2007. The dolphin's head was kept by the fishermen and they handed it over to the survey team (Figure 20). They do not collect oil from the dolphin but its meat was eaten by fishermen and villagers.


Figure 21. A dolphin carcass observed at Chaungtha.

Two dolphin carcasses were also observed at Chaung tha. They were accidentally killed in two separate fishing nets in 2007. Both dolphins were being sunned out by hanging from bamboo poles and oil from the dolphins was being collected by using a plastic bag and some enamel coated bowls when they were observed (Figure 21 & 22). Some villagers and visitors bought the oil to use as a lotion for muscles and tendons.

Figure 22. A dolphin parts observed at Chaungtha.

Sometimes, dolphins strand alive on the shore. A fisherman from Shwe ya gyaing found a dolphin stranded alive in the early morning about three months ago. It was lying on its side when it was found. The dolphin was killed and its flesh was sold. The fishermen kept the skin of the dolphin in dried form, hoping that someone would buy the skin at a good price (Figure 23).


Figure 23 A dried dolphin skin at Shwe ya gyaing.

Fishermen from Shwe ya gyaing said that many dolphins with human-like heads were observed at Ma gyi ngu in the past. They were told by their ancestors that such kinds of dolphins were called "*labine*" in Myanmar language. A villager from Ma gyi ngu was given a nick name as "*labine gaung*" (dolphin head) because his head looked like a dolphin head. They call dolphins with a beak (elongated rostrum) as "*Lin shu*" and dolphins without a beak as "*La bine*".

3.4 Threats to Marine Mammals

Fishermen have no intention of deliberately killing dugongs in general but when they sight a dugong during their fishing trips, they take the opportunity and, usually, try to kill the dugong. Their greed is the main reason because of the animal's massive body which can yield much flesh and a single dugong can provide a good income. They usually use harpoons to kill the animal because the harpoon is a tool generally carried in their boat besides fishing nets. Fishing nets are also a threat

to the dugongs. Seine nets are the main threat in this area as the animals live in shallow water and near the shore.

New and disturbing information derived from this survey was that some shark fishermen look for dolphins and kill them to use as bait for their shark fishing. Fishermen from Shwe ya gyaing explained that they had no special purpose or specific interest in killing marine mammals but, as they were fishermen and they were living on their catch, they try to kill the marine mammals just as another aquatic animal in the sea when they are sighted.

However, it appears that marine mammals in the survey area are relatively safe because neither dugong nor dolphin meat was observed at markets in the survey area like Maungmagan market in Tanintharyi Division (Tun, 2006) (Figure 1).

4. Discussion

Although no systematic surveys have been carried out on the dugong in Myanmar and its occurrence had not been documented during the past four decades, Tun and Ilangakoon (2006) successfully proved the continued occurrence of a dugong population in Myanmar with their preliminary survey in Gwa area in the Rakhine coastal region.

Substantiating further their previous positive results, the present survey could verify the existence of a healthy and viable dugong population in the extended Rakhine coastal region stretching over a distance of

approximately 160km from Ngwe saung in Ayeyarwady division and Hmawyone in Rakhine state.

Having an average width of approximately 30-40 nm., the continental shelf off the Rakhine coast is narrow (People's Pearl and Fisheries Corporation, Rangoon, and Institute of Marine Research, Bergen, 1981), and, therefore, bathymetric conditions create opportunities for even near shore fishermen to encounter large whales during their fishing operations. Dugong and dolphin sightings are common in Rakhine coastal waters. It indicates that the waters off the Rakhine coastline have an abundance of cetaceans (both large and small) and dugong and the area may support high species diversity. Inclusion of some dugong juveniles in sightings and bycatch indicates that the dugong population in that area is still productive.

The accidental catch in fishing gear is the single major threat to dugongs on the Rakhine coast. Opportunistic killing by fishermen should also be considered as a potential anthropogenic threat to the dugong population in the area in future. So far, dugong meat is eaten locally by the people in that area although it is not considered to be particularly palatable. At the same time direct catch and bycatch is also a major threat to dolphin populations.

Fishermen releasing a marine mammal that is still alive in accidental bycatch or stranding is questionable and difficult to believe even if they sometimes state that they do so. In the light of information obtained through surveys along the Rakhine coast so far, a marine mammal captured accidentally whether dead or alive will not be

freed but, instead, it will certainly be killed for local sale and consumption just to provide some variety in relation to local food. It is normal practice for the people in the survey area to consume marine mammal meat whenever it is landed. However, it has not been landed on demand as yet.

Though dugong rind is kept and used as a traditional medicine, people have no other superstitious beliefs concerning the dugong. This is in sharp contrast to many parts of the dugong's worldwide range, especially in Asia, where they are generally hunted as food or for their body parts, bones and teeth which are used for medicinal purposes and are valued on the basis of superstitious beliefs. It is apparent that the dugongs off Myanmar's Rakhine coastline are not yet faced with serious direct hunting pressures or habitat fragmentation, degradation and destruction.

However, due to geographical advantages, the hotel and tourism trade is booming in the survey area. Chaung tha and Ngwe saung are, in fact, new resorts on the coast whereas Nga pa li beach which is situated a few kilometres north of Hmawyone has been a very famous tourist area in Myanmar for many decades. Another well known beach, Kan tha yar, is situated in Gwa township. Even at Gwa itself, an assessment and feasibility study has been done recently for hotel construction at the old Gwa airport.

According to the statistics, Chaung tha received more than seven times more visitors than Ngwe saung and Ngapali. Around, 165 thousand visitors went to Chaung tha in 2005-2006 tourist season, whereas Ngwe saung and

Ngapali received around nine thousand and 14 thousand visitors respectively (Living Colour, 2007).

Figure 24. A menu of a restaurant at Chaung tha.

In line with this booming hotel and tourism business, exploitation of marine living resources has also risen (Figure 24). However, dugong and dolphins have not been put on the menu so far. It is however necessary to take advantage of the enforcement of law and order in the hotel and tourism development area, and to launch an extensive public education program in a timely manner to assure conservation and sustainable use of the living marine resources.

Rakhine coastal area between Than dwe and Gwa is an ideal place for both terrestrial and marine environmental conservation because, parallel to the survey area in Rakhine division, a 678 sq. mile Rakhine Yoma Elephant Range is situated along the Rakhine Mountain Range. The Kyein ta li based local NGO, Rakhine Coastal Region Conservation Association (RCA) is also very interested in conservation and sustainable use of the natural resources in this region and it has already started its activities within its present capacity. In cooperation and collaboration with the RCA, awareness of conservation and sustainable use of their marine and coastal environment can be raised among the local people and authorities. Due to the strong base built by the RCA as an on-the-ground active NGO in the area, a marine

mammal network can be developed between Gwa and Than dwe areas.

Rakhine coastal region is the most tropical cyclone prone area of Myanmar and hydrographic conditions are influenced by the monsoons that prevail between May and October. Based on the information obtained during the survey, it can be assumed that seasonal occurrence of dugong at Hmawyone and Shwe ya gyaing depends mainly on geographic conditions and food supply.

Soe-Tun et. al. (2001) studied seagrass off the Myanmar coastline. Seagrass meadows are patchily distributed along the Rakhine coastal region and they are in very good, pristine condition (Soe Tun, Professor, Marine Science Dept., Mawlamyine University, pers. com.). Family Hydrocharitaceae represents the most dominant genera in both Rakhine and Taninthayi coasts and the family Cymodoceaceae occurs mainly on the Rakhine coastline. Meanwhile, the species *Halophila ovalis* found in the area is known to be a species preferred by dugongs (www.hans-rothauscher.de/dugong/sasia_e.htm).

Occurrence of dugong in Tanintharyi division in southern Myanmar was also documented by Rev. S. Benjamin (1983) and some recent dugong bycatch information were also reported from that division (Tint Tun, unpublished; Nang Mya Han, pers. comm.).

5. Conclusion

Occurrence of a healthy and viable dugong population in Rakhine coastal region of Myanmar has been verified by

the present extended survey. Seagrass beds are scattered and patchily distributed along the survey area and they are in undisturbed and pristine condition. The status of the dugong in the survey area on the Rakhine coast is also presently secure due to minimal direct hunting pressures, low rates of accidental bycatch and no habitat degradation or fragmentation. Therefore, in the light of these positive factors, it can be speculated that Myanmar is possibly one area remaining in south and south-east Asia where future survival prospects of the dugong are bright.

At present no information or data is available on the total extent of the dugong's range of occurrence and distribution, the extent of available habitat, size of the population, seasonal movement patterns and extent as well as effects of accidental and opportunistic kiling in Myanmar waters. Therefore, more research on the species off Rakhine coastal area is both urgent and important. This also applies to small cetaceans.

6. Recommendation

6.1 Development and dissemination of public awareness materials.

There are no publications or any other awareness creating materials concerning the dugong in Myanmar so far. Production of printed bilingual (Rakhine and Myanmar), educational material is essential in order to initiate the public awareness programme in Rakhine State. These materials would be distributed to the local schools, NGOs, for display in public places and offices concerned,

through public awareness creation trips to the Rakhine coastal areas.

6.2 Launching of public awareness programm on conservation and sustainable use of marine living resources in Gwa amd Thandwe area in Rakhine coastal area.

A program for public awareness and education should also be done in order to give accurate information to the local people on status, conservation and bycatch reporting in order to make them aware of the important role they need to play in marine mammal research and conservation in the future. Gwa and Kyein ta li have the most convenient access at present and they are the nearest towns in Rakhine State to Yangon. Due to the willingness of the already existing Kyein ta li based local NGO to participate in the conservation of the coastal area between Gwa and Than dwe in Rakhine State, this should be designated as a base area for further development and extension of conservation and sustainable use of natural resources activities in the Rakhine coastal region.

6.3 A Short course on marine mammals to the fisheries officers.

Information on marine mammal strandings, sightings and bycatch have been reported from the coastal region of Myanmar every year. However, a standardized format to collect this information is an urgent need for local fisheries officers and people concerned. Capacity

building through conducting a short introductory course on marine mammals, targeting the fisheries officers would become a basis for setting up the necessary infrastructure for the development of a marine mammal information network. Illustrated handout material, digital cameras and computers should be made available at the fisheries training centre.

6.4 Occurrence and status of dugong off the whole Rakhine coast.

Building on baseline data already available through interview surveys along the Ngwe saung and Hmaw yone segment of the Rakhine coast (Ilangakoon and Tun, 2007, present survey), qualitative cost-effective interview surveys on the occurrence of dugong off the remaining segments of the Rakhine coast should be conducted. The same research protocol should be used as in the previous surveys.

It is also recommended that aerial surveys should be conducted along the Mynamar coastline as a matter of priority to collect quantitative data on dugong occurrence and distribution. This should also lead to the identification of areas where concentrations of dugongs occur, and as a result, efforts to minimizing threats, such as the use of gillnets, in such areas can be better focused.

6.5 Dugong habitat assessments in Rakhine Coast.

An assessment of the dugong habitats mainly on the abundance, quality and distribution of seagrass along the Rakhine coastline should be undertaken. Preferably, this should also be done using satellite images and aerial photographs, combined with local knowledge through consultation with fishermen in the area. This information should lead to development of a seagrass habitat map in Myanmar waters. The survey should be first conducted at some prioritized places as an initial phase of the study.

At present there is no data to show that there are any adverse anthropogenic impacts on seagrass habitats in Myanmar waters. However it is recommended that a specific assessment of human impacts on seagrass beds is carried out in order to detect any such yet unknown threats that may exist and may become a problem in the future.

6.6 Bycatch monitoring and fisheries interaction assessment.

Interview surveys in 2005, 2006 and 2007 (Tun and Ilangakoon, 2006, present survey) have shown that there is accidental bycatch and some level of interaction between dugongs and fisheries in Myanmar waters. Therefore it is important to systematically monitor this bycatch in order to assess its extent and determine the level of threat it poses to the long term survival of the dugong in Myanmar.

At present bycatch is not always reported to authorities and therefore much of it may go undocumented. Therefore

it is necessary to develop a system of reporting and documenting the bycatch in all coastal areas of the country.

In order to collect such quantitative data on bycatch it is essential to provide basic training to local fisheries and social sector officials. This data will also become vital in the future to minimise conflicts between the fishery and dugong conservation efforts.

6.7 Regional collaboration and cooperation with neighbouring countries.

Regional collaboration and co-operation with neighbouring countries, Thailand to the south and Bangladesh to the north, in terms of dugong research could be advantageous to all countries concerned. This is of importance in assessing if any cross border dugong migrations occur. At the same time Thailand already has a history of dugong research (Hines 2001, 2005) and therefore also has the necessary expertise and experience which is presently lacking in Myanmar. Collaboration and consultation with Thailand could help to build local capacity for research and conservation of the dugong.

Establishment of a dugong and marine mammal regional network is an option to be pursued, so as to share information and to take timely conservation action based on regionally significant information.

7. Acknowledgement

The authors are grateful to the Society for Marine Mammalogy for funding this work. The authors also wish to thank Mr. U Uga, President of Biodiversity and Nature Conservation Association for his encouragement and suggestions.

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The authors are greatly indebted to Mr. Thein Pe, Dr. Maung Maung Kyi, Mr. Tin Tun of Rakhine Coastal Region Conservation Association (RCA), for their invaluable help in collection of a dugong flipper from Hmawyone and their logistical arrangements and participation in Gwa and Hmawyone field trips.

The authors also wish to thank Mr. Tint Wai, Deputy staff officer of the Marine Resources Unit of the Department of

Fisheries at Yangon for his suggestions and Mr. Zaw Tun, Deputy staff officer of the Department of Fisheries at Gwa, for his participation in the Shwe ya gyaing trips.

Respondent fishermen and villagers are greatly acknowledged for so willingly sharing their knowledge and experience.

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Dugong (*Dugong dugon*) and Seagrass in Thailand:
Present Status and Future Challenges

Kanjana Adulyanukosol
Sombat Poovachiranon
Mickmin Charuchida

Phuket Marine Biological Center (PMBC)
Department of Marine and Coastal Resources (DMCR)

Background

- Main objectives of Phuket Marine Biological Center (PMBC), DMCR are marine and coastal researches
- Dugong information in 1979
- Seagrass in 1988
- More concern on these 2 topics are in this decade

Topics for the presentation

1. **Status of Seagrass**
2. **Status of Dugong**
3. **Cooperation project in Thailand**
4. **International cooperation**
5. **Education**
6. **Conservation and management**
7. **Future challenges**

3 types of Seagrass beds

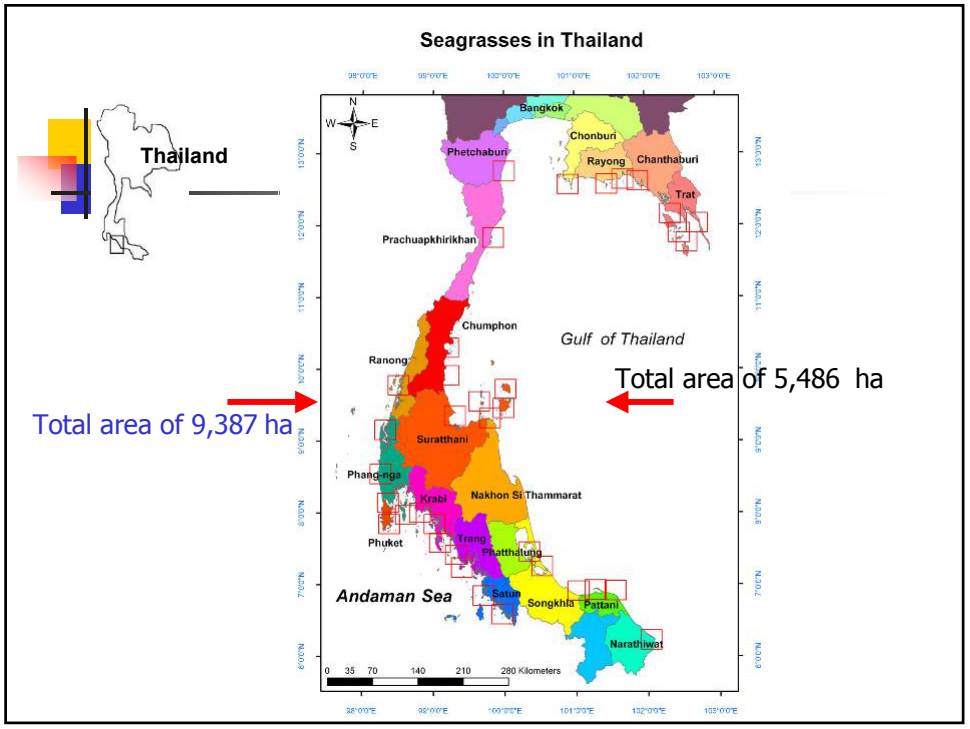
- Coral reef associated grass bed

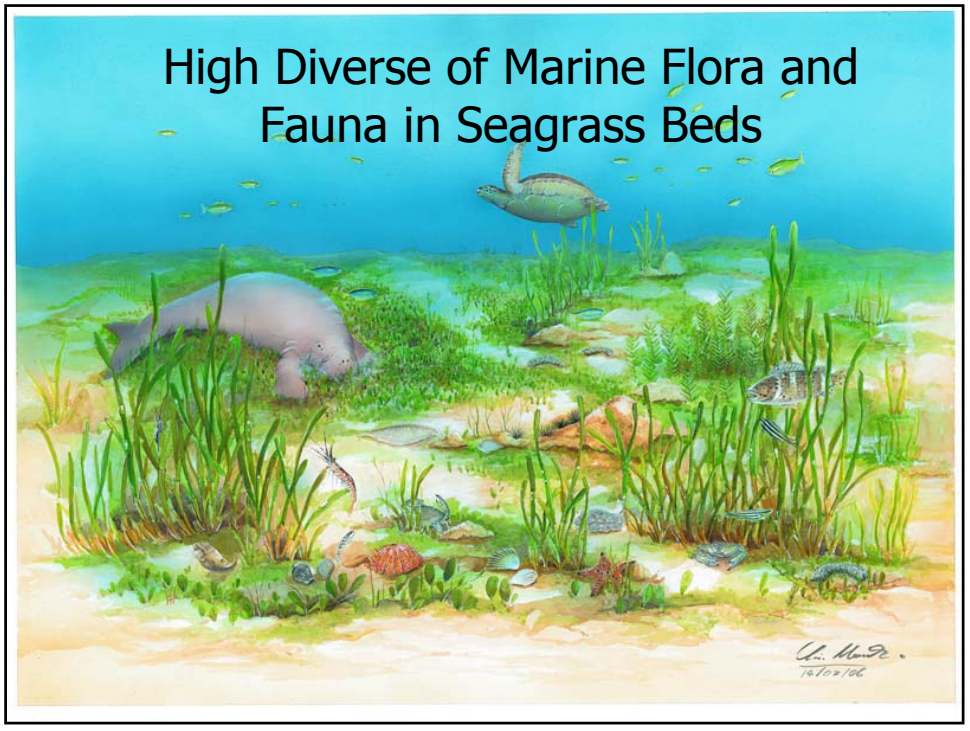
- Mangrove associated grass bed

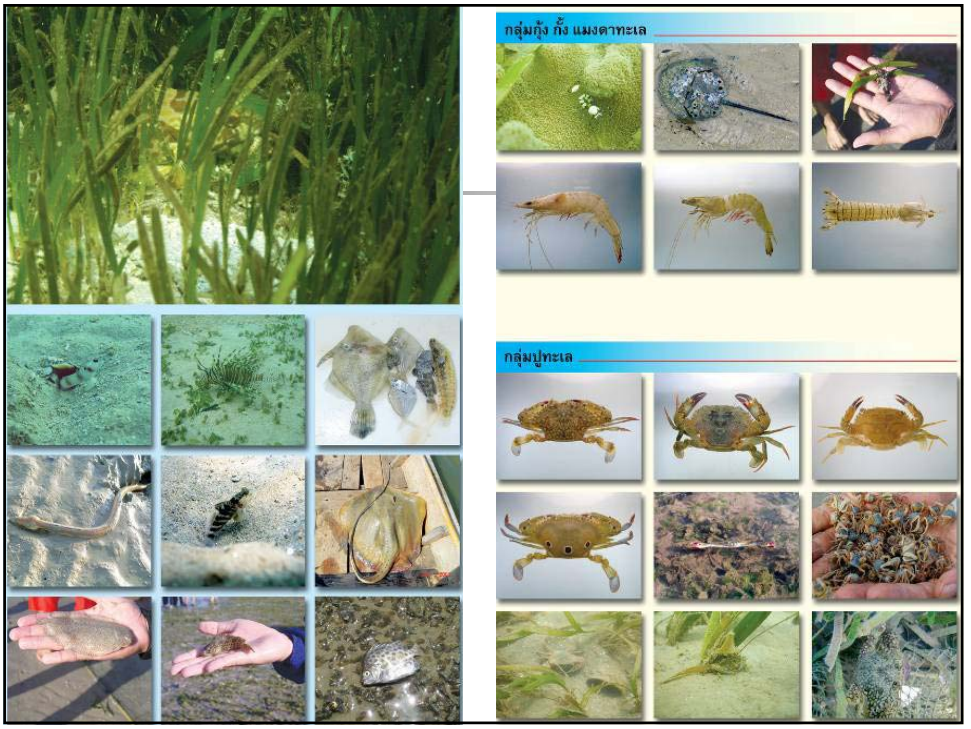
- Shallow sandy bottom grass bed

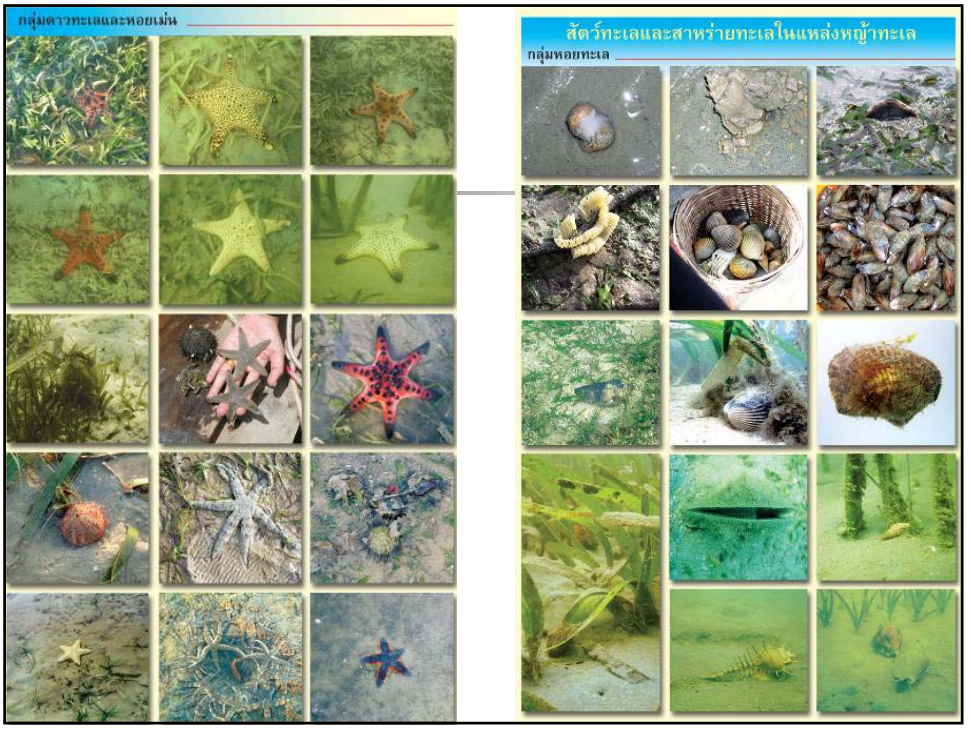
12 seagrass species

- *Enhalus acoroides*
- *Halophila* group (*H. ovalis*, *H. monor*, *H. decipiens*, *H. beccarii*)
- *Halodule* group (*H. uninervis*, *H. pinifolia*)
- *Cymodocea rotundata, C. serrulata*
- *Thalassia hemprichii*
- *Syringodium isoetifolium*
- *Ruppia maritima*


Seagrasses in Thailand
Thailand
Bangkok
Chonburi
Phetchaburi
Rayong
Chanthaburi
Trat
Prachuapkhirikhan
Chumphon
Gulf of Thailand
Ranong
Total area of 5,486 ha
Total area of 9,387 ha
Suratthani
Phang-nga
Krabi
Nakhon Si Thammarat
Trang
Phuket
Phatthalung
Andaman Sea
Satun
Songkhla
Pattani
Narathiwat
0 35 70 140 210 280 Kilometers


High Diverse of Marine Flora and Fauna in Seagrass Beds


กลุ่มกุ้ง กั้ง แมงดาทะเล
กลุ่มปูทะเล


กลุ่มดาวทะเลและหอยเม่น
สัตว์ทะเลและสาหร่ายทะเลในแหล่งหญ้าทะเล
กลุ่มหอยทะเล

Small scale Fisheries in Seagrass Beds

Stake trap

Crab trap

Destruction of SB

- Man made impact
  - tin dredging near shore and sediment from land-based mining
  - coastal development (sedimentation, pollution…)
  - fisheries (push net, long line, crab trap)
- Nature (Monsoon, Tsunami…)

2. Status of Dugong

Biological aspects

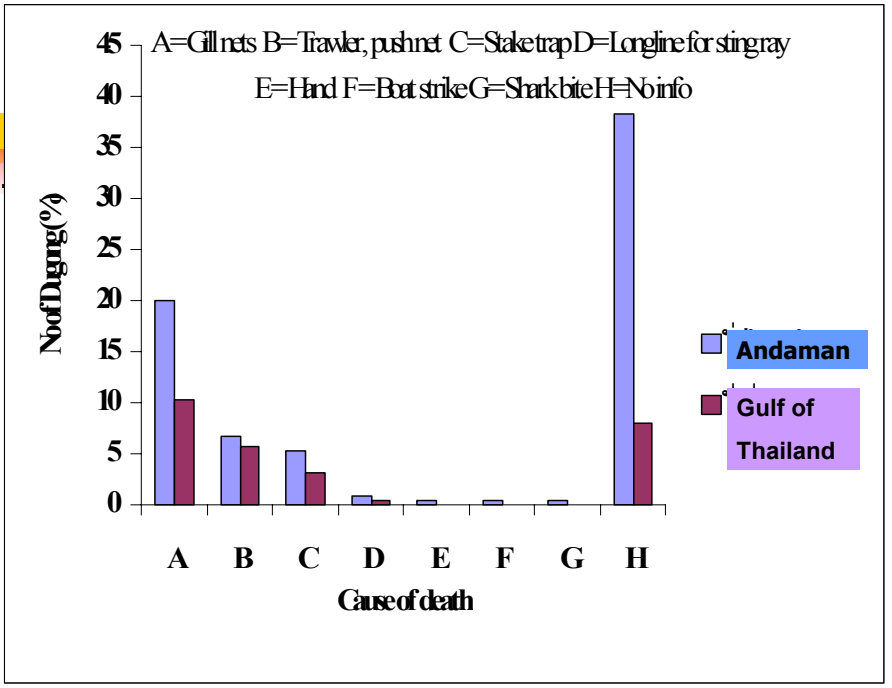
PMBC:

- Stranding record
- Stomach content
- Tissue collecting
  -DNA & heavy metal analysis
- Bone-age determination
- Behavior (captive animal & aerial survey)
- To educate people and transfer information

Belief on dugong of local people; meat, tusk, bone, oil

Cause of stranding/dead animal

Fishing gears;
gill nets, long line,
stake trap

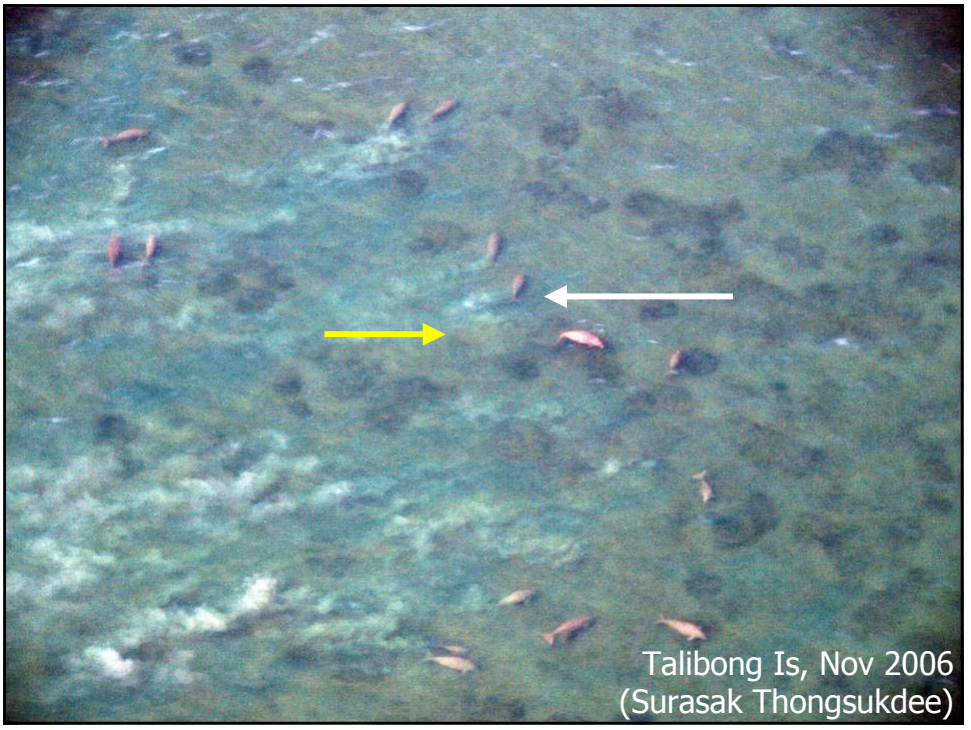


DMCR has conducted the aerial survey since 1997

Distribution of dugong in Thai waters

200-250 dugongs


Talibong Is, Nov 2006
(Surasak Thongsukdee)


Talibong Is, Nov 2006
(Surasak Thongsukdee)

Solitary / group feeding

Muk-Talibong Is, Nov 2006
(Surasak Thongsukdee)

3.Cooperation project in Thailand

With Dr.Suwanna Panutrakul, Burapha Univ ---analysis of heavy metal in marine mammals tissue and sea turtles

- With Dr.Chittima Arytthaka, Kasetsart univ --- mieofauna in seagrass bed at Phuket is

4.International cooperation

Seagrass

- ASEAN-Australia: LCR phage I; 1990-1995 (Australian side & Chulalongkorn Univ & PMBC)

  --- survey and monitoring seagrass in the Andaman Sea

- Japan & Kasetsart Univ (1998-1999 & 2001-2003) at Trang province

  ---- the effects of grazing and disturbance by dugong and turtle on seagrass eco & functional of seagrass on the coastal eco.

Dugong

- Kyoto Univ & JFRCA (Japan Fisheries Research Conservation Association) & DMCR

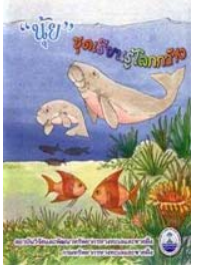
  --- **Dugong Biological Survey** since 2002

  (acoustic survey, feeding pattern, behavior)

- Japan--- Organotin on dugong tissue

5. Education

- Educational materials
- Exhibition



6. Conservation and management

- UNEP GEF Project in 2005 (Reversing Environmental Degradation Trends in the South China Sea and Gulf of Thailand : China, Cambodia, Vietnam, Philippines, Malaysia, Indonesia and Thailand) –Action Plan of SG in the Gulf of Thailand
- Thailand Seagrass Action Plan under cooperation of Mahidol Univ & DMCR) hopefully completed in early 2007
- Dugong Action Plan in 2004 (WCS & DMCR) and get the draft of the Action Plan of Seagrass and Dugong in Sept 2007
- Dugong Conservation and Management in the Indian Ocean South-east Asian Region in 2005-6 (Australia Gov & DMCR)- final draft of Dugong MoU

7.Future Challenges: Du & SG

- Implementation of AP- Du & SG
- MoU Dugong- progressing and implementation
- **Research; Seagrass** - monitoring survey

  - survey in deeper area in Andaman Sea coast (spot check or video transect)

  - Ecosystem SG-biodiversity

  - Valuation of existence value of SG bed

Future Challenges: Du & SG

- **Research;**

  Seagrass - monitoring survey

  - survey in deeper area in Andaman Sea coast (spot check or video transect)
  - Ecosystem SG-biodiversity
  - Valuation of existence value of SG bed

Future Challenges: Du & SG

Research; Dugong

- monitor for dugong in an area where is dangerous for aerial surveys (observe during low tide, manta tow survey in the submerge area)

Future Challenges: Du & SG

- data base
- tagging (PTT, GPS) in order to know the migration and habitat use of dugong

Future Challenges

- To reduce the stranding dugong via the developing technique from the outcome of acoustic survey and sonar experiment ….?
- To rescue the alive stranding by technique transfer (be trained dugong nursery in Indonesia or Japan
- Community Based Coastal Zone Management
  - Net-working (Gov, NGOs, private sectors, communities) strengthens & expanding inside and among regions


Thank you
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UNEP/ CMS supported traveling and accommodation of Thai participants

SPREP Dugong Action Plan 2008-2012 Pacific Islands Region

Presentation by Anne Trevor for the Technical Workshop for the Conservation and Management of Dugongs and Their Habitats: Eastern Indian Ocean and Pacific Sub-region

Abu Dhabi, United Arab Emirates

28 - 29 October 2007

Secretariat of the Pacific Regional Environment Programme

SPREP Marine Species Programme 2008 – 2012

- Focuses on 3 groups of marine animals; Dugongs, Marine Turtles and Cetaceans
- Outlines a strategy for the cooperative conservation management of shared dugong, marine turtle and cetaceans resources in the Pacific region.

Secretariat of the Pacific Regional Environment Programme

Background

March 2007 – Apia, Samoa

- DAP 2003 –2007 reviewed by SPREP members and collaborating partners
- Draft DAP 2008 – 2007 developed

September 2007 – Apia, Samoa

- DAP 2008 – 2012 considered and endorsed at the 16th SPREP meeting
- Supportive of the 6 members joining the CMS MoU for Dugongs and encourage them

Secretariat of the Pacific Regional Environment Programme

Implementation and Partnership

- The implementation of the DAP 2008 – 2012 is the collective responsibility of SPREP member states, the SPREP Secretariat, partner non-governmental and intergovernmental organizations, and private sector organizations.
- The DAP 2008 – 2017 was developed so that it complements any existing mechanisms that address issues relating to the conservation of dugong and their habitat
- SPREP/CMS Memorandum of Cooperation

Secretariat of the Pacific Regional Environment Programme

Dugong Action Plan 2008-2012 Pacific Islands Region

- To maintain and improve dugong populations and their habitats, while keeping in line with the traditions of the people of the Pacific Islands Range States
- Occurs in 6 countries and territories of the SPREP region: Australia, Papua New Guinea, Palau, Solomon Islands, Vanuatu and New Caledonia

Secretariat of the Pacific Regional Environment Programme

Threats to dugongs in the Pacific region

Direct threats

- Harvesting for food, medicine and artifacts
- Incidental by-catch, destructive fishing methods and boat strikes

In-direct threats

- Coastal development
- Agricultural pollution
- Nutrient run-off

Secretariat of the Pacific Regional Environment Programme

Conservation Challenges

- Lack of data and information including basic population, parameters and long-term data sets;
- Absence and lack of on-going and long-term research, survey and monitoring programmes;
- Limited public awareness and education programmes;
- Limited in-country skills/capacity to provide leadership in marine species conservation management;
- Limited national management mechanisms to protect these marine animals and their habitat
- Lack of resources including accessing sustained funding;
- Limited of information exchange, linkages and collaboration.

Themes

1. Education and Awareness
2. Habitat Protection
3. Management
4. Traditional Knowledge, Customary Marine Tenure and Traditional Resource Management
5. Capacity building
6. Threat – Key Dugong Conservation Issues
7. Research and Monitoring – Information/Databases
8. National, Regional, and International Collaboration
9. Human and Financial Resources

MARINE SPECIES PROGRAMME 2008-2012

PACIFIC ISLANDS REGION

LIST OF ABBREVIATIONS AND ACRONYMS

ABS	Access and Benefit Sharing
CBD	Convention on Biological Diversity
CITES	Convention on International Trade of Endangered Species of Wild Animals and Plants
CMS	Conservation on the Conservation of Migratory Species of Wild Animals
CMT	Customary Marine Tenure
COP	Conference of Parties
CROP	Council of Regional Organisations in the Pacific
DAP	Dugong Action Plan
DWFN	Distant Water Fishing Nation
EEZ	Exclusive Economic Zone
FAO	Food and Agriculture Organization
FFA	Forum Fisheries Agency
FFEM	Fonds Français pour l'Environnement Mondiale (French Global Environment Facility)
IAC	Inter-American Convention for the Protection and Conservation of Sea Turtles
IFAW	International Fund for Animal Welfare
IFREMER	Institut Français de Recherche pour l'Exploitation de la Mer (French Research Institute for Exploitation of the Sea)
IGO	Inter-Governmental Organization
IOSEA	Indian Ocean-South-East Asia Marine Turtle Memorandum of Understanding
IPR	Intellectual Property Rights
IUCN	The World Conservation Union (International Union for the Conservation of Nature)
IUU	Illegal, unreported and unregulated fishing
IWC	International Whaling Commission
MoU	Memorandum of Understanding
MPA	Marine Protected Area
MSO	Marine Species Officer
MSPF	Marine Species Programme Framework
MTAP	Marine Turtle Action Plan
NBSAP	National Biodiversity Strategic Action Plan
NCSA	National Capacity Self Assessment
NGO	Non-Government Organisation
NMFS	National Marine Fisheries Service
NSDS	National Strategies for the Development of Statistics
NZ	New Zealand
PICT	Pacific Island Countries and Territories
PIR	Pacific Islands Region
RFMO	Regional Fisheries Management Organisations
RMTCP	Regional Marine Turtle Conservation Programme
SPC	Secretariat of the Pacific Community
SPREP	Secretariat of the Pacific Regional Environment Programme
SPTO	South Pacific Tourism Organization
SPWRC	South Pacific Whale Research Consortium
TK	Traditional Knowledge
TRM	Traditional Resource Management
UK	United Kingdom
UNCCD	United Nations Convention to Combat Desertification
UNFCCC	United Nations Framework Convention on Climate Change
USP	University of the South Pacific, Fiji
WCPFC	Western and Central Pacific Fishery Commission
WDAP	Whale and Dolphin Action Plan
WDCS	Whale and Dolphin Conservation Society
WPRFMC	Western Pacific Regional Fishery Management Council

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OVERALL VISION

The SPREP[1] Marine Species Programme for the Pacific Islands Region outlines a strategy for the cooperative conservation management of shared dugong, marine turtle, whale and dolphin resources which will be implemented through Action Plans for 2008-2012. This strategy will enable the peoples of the Pacific Islands to take a primary role in achieving the following vision:

A healthy Pacific Ocean which sustains populations of whales, dolphins, dugongs and marine turtles and meets the aspirations of Pacific Island peoples and protects their natural and cultural heritage.

INTRODUCTION

The Pacific Islands region served by SPREP covers 32 million sq km and is situated in the middle of the largest continuous marine habitat on the planet, the Pacific Ocean. This region is home to a diverse range of large marine fauna including cetaceans, sirenians and marine turtles. Over half of the world's known species of cetaceans are found in the region. The area also supports the world's largest remaining populations of dugongs, green, hawksbill, and loggerhead turtles.

The diversity of these marine creatures is recognized as a fundamental element of Pacific Islands' culture and heritage, and maintenance of healthy populations is essential to maintaining a healthy Pacific Ocean.

Dugongs, turtles whales and dolphins play a significant ecological role in the functioning of coastal and oceanic habitats. They are widely regarded as flagship species for Pacific marine ecosystems and often feature prominently in promotional tourist material for many Pacific Island states.

Many Pacific island cultures have legends, stories and traditional uses of marine mammals and turtles, indicating the importance of these creatures in the identities of people, their way of life and their heritage.

Most of these species are long-lived and have low reproductive rates, making them vulnerable to over-harvesting. Dugongs and turtles have been hunted extensively in the region both for traditional and subsistence purposes and more recently for commercial gain. They are now considered endangered throughout their range and many small and /or isolated populations are vulnerable to extinction. Dolphins have also been used as source of food and resources, often through local drive hunts. These species remain a highly valued food (meat and oil), medicine (oil) source and the shells, skin and bones are often used for jewelry and ornaments. Dugong bone and the teeth of small cetaceans have been important in certain ceremonies e.g., in marriages and funerals in New Caledonia, Manus Province (PNG), and Malaita (Solomon Islands). In Fiji, *tabua* (sperm whales teeth) are a highly valued commodadity in cultural ceremony and exchanges.

While subsistence hunting of dugongs and turtles may have been sustainable in the past, the combination of increasing human populations and the introduction of new technologies (e.g. outboard motors and gill nets) has impacted severely on several species resulting in fragmentation of populations and even local extinction.

For many species of large whales, the impacts of commercial whaling during the nineteenth and twentieth centuries, largely by countries from outside the region have reduced the breeding

[1] SPREP Members: American Samoa, Australia, Cook Islands, Federated States of Micronesia, Fiji, France, French Polynesia, Guam, Kiribati, Marshall Islands, Nauru, New Caledonia, New Zealand, Niue, Northern Mariana Islands, Palau, Papua New Guinea, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, United States of America, Vanuatu, Wallis and Futuna

populations of South Pacific whales to extremely low levels, possibly to local extinction for some species.
For all of these species, there is a growing awareness of their non-consumptive values for social, economic and cultural benefit of local communities, e.g. boat or shore-based watching of whales, dolphins, turtles and dugongs as tourism activities.

Most of these species have distribution and migratory pathways that extend across and beyond several jurisdictions. Thus Pacific Islands have a shared responsibility to ensure the recovery and maintenance of viable populations of these species, including under the provisions of various international agreements such as Convention on Biological Diversity (CBD), Conventional on the Conservation on the Conservation of Migratory Species of Wild Animals (CMS) and the Convention on International Trade of Endangered Species of Wild Animals and Plants (CITES).

In our lifetime, there has been a growing awareness of the increasingly threatened status of many of these iconic species and of the need for a concerted and coordinated approach amongst Pacific Island nations to arrest and reverse declining population trends.

CONSERVATION CHALLENGES

In addition to threats facing these species, the overarching problems and challenges surrounding conservation effort in the Pacific Islands Region include:

- Lack of data and information including basic population parameters and long-term data sets;
- Absence and lack of on-going and long-term research, survey and monitoring programmes;
- Limited public awareness and education programmes:
- Limited in-country skills/capacity to provide leadership in marine species conservation management;
- Limited national management mechanisms to protect these marine animals and their habitats;
- Lack of resources including accessing sustained funding;
- Limited of information exchange, linkages and collaboration.

The implementation and coordination of the 2003-2007 Regional Marine Species Programme Action Plans was significantly constrained by the lack of consistent funding for the SPREP Marine Species Officer (MSO) position to facilitate sourcing of funding for implementation. This will be addressed in the 2008-2012 Action Plans by the development of a resourcing strategy. Despite this situation, substantial progress has been achieved.

STRATEGIC APPROACH

Pacific Island peoples are stewards of their marine environment and depend on these resources for their way of life. The Marine Species Programme 2008-2012 supports their role by:

- **Identifying and mitigating threats;**
- **Promoting customary management practices and traditional stewardship;**
- **Improving the status of these species and their habitats;**
- **Ensuring these species populations recover and continue to fulfill their ecological roles;**
- **Fostering sustainable use, including non-consumptive uses such as tourism;**
- **Building capacity and securing human and financial resources;**
- **Enhancing cooperation and coordinated action at national, regional and international levels; and by**
- **Increasing knowledge, awareness and understanding of these species and their habitats, and their ecological and cultural values.**

ROLES AND RESPONSIBILITIES

These Action Plans and their implementation are the collective responsibility of SPREP member states, the SPREP Secretariat, partner non-governmental and intergovernmental organizations, and private sector organizations.

COMMITMENT, FUNDING AND HUMAN RESOURCES

The SPREP Secretariat will continue to play an important role in facilitating information exchange, coordination, capacity building, securing resources and in regular monitoring and reporting on the implementation of the Action Plans.

It is recognized that, beyond existing in-country capacity, significant additional resources will be needed to achieve the aims and objectives of these Action Plans. We call upon all donor partners and supporters of SPREP's Regional Marine Species Programme to assist in providing the necessary resources to implement the Action Plans at regional and national levels.

NETWORKING, REPORTING AND INFORMATION MANAGEMENT

The SPREP Secretariat will take the primary responsibility for networking, information management, archiving and regional reporting. It will continue to rely on reporting and information from members and partners to achieve this.

IMPLEMENTATION AND COORDINATION

OBJECTIVE: ***To ensure successful Marine Species Programme implementation through effective and sustained management, coordination and communication.***		
Actions:	**Lead**	**Priority**
1 Provide sustained regional and national facilitation and coordination:		High
• Ensure continuation of MSO position within SPREP;	SPREP	
• Facilitate the establishment of an additional SPREP dedicated officer to be recruited at the Associate project level or through other partnership arrangements;	SPREP	
• Nominate appropriate national officers for implementation and reporting of the Marine Species Programme Action Plans at the national level.	Members	

2	Build and strengthen the Dugong, Marine Turtle, and Whale & Dolphin Networks consisting of SPREP members and partners including IGOs, NGOs, donors, technical experts and other interested parties:		High
	• Establish list servers;	SPREP	
	• Maintain contacts database;	SPREP	
	• Disseminate the Action Plans network list of contacts on a regular basis;	SPREP	
	• Ensure SPREP has updated information;	Members	
	• Encourage in-country networks;	Members	
	• Facilitate access to information and resources including scientific and technical reports.	SPREP/ Partners	
3	Develop and implement a Resourcing Strategy (including financial and human resources and associated capacity building required) for the Action Plans:		High
	• Identify and secure the human and financial resources and partnerships required for the management and coordination of the Action Plans;	SPREP	
	• Develop proposals and secure resources for the implementation of Action Plan priorities;	SPREP/ Members/ Partners	
	• Encourage interested parties, individuals and agencies to develop and implement project proposals consistent with Action Plan and national priorities of target countries.	Partners SPREP/ Members/ Partners	
4	Develop and implement a Communication Strategy that ensures effective outreach and buy-in at the national, regional and international levels:		High
	• Develop a communication outreach package in consultation with Members and partners;	SPREP/ Members	
	• Provide training for national coordinators to effectively utilize and communicate information, including support for language translation;	SPREP/ Partners/ Members	
	• Ensure target audiences include politicians, local communities, donor agencies, IGOs, NGOs, technical experts;	Members	
	• Promote understanding and support buy-in from communities and decision-makers.	Members	
5	Develop and implement Monitoring, Evaluation and Reporting mechanisms:		High
	• Develop a streamlined and simple reporting format for Members and partners, drawing from lessons learnt from other reporting requirements. Further develop this as an on-line reporting mechanism;	SPREP	
	• Incorporate information from Action Plan reports into other national reporting mechanisms where possible and appropriate (e.g. CBD, CMS, UNFCCC, CITES and UNCCD);	Members/ SPREP/ Partners	
	• Prepare annual report on Action Plans implementation for SPREP meeting with a focus on in-country progress, including successes and constraints, and also implementation of arrangements under CMS;	SPREP	
	• Undertake mid-term and final review of Action Plans implementation, including lessons learnt, and provide status report to Members and partners.	SPREP/ Members	

6	Develop and maintain an Information Management System that includes databases covering lessons learnt, achievements and investments that is accessible and promotes information sharing: • Maximize on-line access to Action Plans information and databases; • Secure archiving of reports and information through the SPREP Library and Information Center; • Ensure information system is readily available and easily accessible; • Ensure that any restrictions on source information should be respected.	SPREP SPREP/ Members SPREP SPREP SPREP	High
7	Promote the integration of Marine Species Programme and Action Plan priorities into national strategies, plans and projects as appropriate and relevant to national needs.	Members	High
8	Promote the integration of Marine Species Programme and Action Plan priorities into regional and international strategies, plans and projects as appropriate and relevant to regional and international needs.	Members/ SPREP/ Partners	High
9	Facilitate an informal and open-ended technical Working Group, comprising scientists, policy developers, managers, etc to provide technical advice on Action Plan implementation as required. As part of this technical working group, promote linkages with the relevant groups of the IUCN Species Survival Commission.	SPREP	High
10	Continue to foster collaboration with the CMS.	SPREP	High
11	Further national, regional and international collaboration and cooperation by: • Initiating dialogue and collaboration with the fisheries, tourism and transport sectors at the regional and national levels in relation to information, awareness raising and management actions to address impacts • Fostering interagency collaboration at national level and engagement with private sector • Fostering NGO partnerships at the national, regional and international levels	Members Members Members/ SPREP/ Partners	High
12	Identify and develop appropriate responses for the conservation needs of other marine species for SPREP Members consideration		

Indicators:

- ⊙ Dugong, Marine Turtle and Whale & Dolphin Networks established/strengthened and fully operational.
- ⊙ Resource Strategy in place and implemented.
- ⊙ Communication Strategy in place and implemented.
- ⊙ Monitoring, Evaluation and Reporting mechanisms in place and implemented.
- ⊙ Information Management System in place and operational.
- ⊙ Marine Species Programme priority actions integrated into national, regional and international plans and projects.

1. DUGONG ACTION PLAN 2008-2012
PACIFIC ISLANDS REGION

GOAL

To maintain and improve the status of dugong populations and their habitats, in keeping with the traditions of the people of the Pacific Islands Range States.

INTRODUCTION

The dugong *(Dugong dugon)* has high biodiversity value as the only member of the family Dugongidae and the only strictly marine herbivorous mammal. Dugongs are long-lived and slow breeders. Dugongs first breed at age 6 to 17 years and suckle their young for up to 18 months. Females produce only one calf every 2.5 to 7 years depending on food supply. They are thought to live for more than 70 years. For dugongs, adult survival is the most critical life history parameter and populations can only be sustained through low levels of human-induced mortality.

Dugongs spend most of their time feeding in shallow waters less than 10m deep where their critical habitats of sea-grass beds occur. Being sea-grass specialists, dugongs play an important ecological role in structuring the sea-grass ecosystem. If sea-grass habitat loss occurs, dugongs may postpone their breeding and move to other areas. Dugongs are capable of undertaking long-distance movements of up to several hundred kilometers over 2 to 3 days.

Given the above life history characteristics, populations of dugongs are slow to recover if they are lost from a particular area. In addition, without the influence of their grazing activities, the sea-grass communities in the area may change to less favourable species for dugongs, discouraging their return.

Dugongs are also highly significant as a subsistence food source, for the maintenance of cultural traditions and for their iconic status and high biodiversity value to the human populations of the Pacific Island States where they occur.

SPECIES DISTRIBUTION

Dugongs have a large range that spans 140,000 km of coastline across 48 countries and territories and includes tropical and subtropical coastal and island waters from east Africa to Vanuatu.

It is generally believed that throughout much of its range, the dugong is represented by relict populations separated by large areas where its numbers have been greatly reduced or already extirpated. The only large remaining populations of dugongs are those in northern Australia and south-western Papua New Guinea as well as the Arabian Gulf.

Dugong occurs in six countries and territories in the SPREP region: Australia, Papua New Guinea, Solomon Islands, Palau, Vanuatu and New Caledonia. The dugong population in Palau is believed to be the most isolated in the world and unlikely to be supplemented by recruitment from any other area. “The Vanuatu Archipelago is the eastern limit of the dugong’s rage. Sea-grass beds become less frequent and less diverse progressing eastwards across the Pacific, placing a natural barrier to the eastward extension of the dugong’s range”[1].

[1] Dugong Status Report and Action Plans for Countries and Territories. UNEP/DEWA/RS.02-1. ISBN 92-807-2130-5. Compiled by Helene Marsh, Helen Penrose, Carole Eros and Joanna Hugues.

Being highly mobile, dugongs are capable of moving across the Exclusive Economic Zones of different countries.

SPECIES STATUS

The 2006 IUCN Red List classifies dugong as vulnerable to extinction at the global scale. All populations of the dugong are also listed on Appendix 1 of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) which prohibits commercial international trade of the species. Dugong is listed in Appendix II of CMS, which means they are considered to have an unfavourable conservation status and require international agreements for their conservation and management.

In the Pacific Islands Region, with the exception of the Torres Strait, the status of dugong populations are generally unknown but of concern, particularly in Palau waters where the population is likely to be facing extinction.

TRADITIONAL KNOWLEDGE AND CUSTOM

The dugong plays a significant part in the culture of communities in the Pacific Islands where they occur. In some societies, the dugong is considered an important totem because of its large size and strength, and it also features prominently in the stories and legends. The activities associated with the hunting of dugongs and preparing the meat also have great significance and are an expression of the continuance of long cultural traditions.

Specific parts of the dugong are used in customary events (such as weddings, funerals and other traditional feasts) as well as for making traditional equipment including drums, spoons, scrapers, hooks, laces, and necklaces. While dugong meat is a traditional, and sometimes highly prized, meat in some societies, others have traditional taboos against killing them.

INCOME GENERATING OPPORTUNITIES THROUGH ECO-TOURISM

Similar to other eco-tourism activities based on marine animals such as whales and dolphins, dugong watching/cruise and “swim with” operations have been established in several countries including Australia and the Philippines. Swimming with dugongs is a tourism activity in Vanuatu.

THREATS

Threats to dugong have been broadly categorised into two areas, those that cause direct mortality to the animals and those that cause their habitat loss or degradation.

Threats that cause direct dugong mortality include:

- Harvesting for food, medicine and artefacts: This is perhaps the greatest threat in the Pacific Islands Region given the low numbers or unknown status of populations in some areas. For most countries, it is unknown whether the level of harvest is sustainable. However, there is concern that the use of modern equipment for hunting is a major threat.
- Incidental by-catch, destructive fishing methods and vessel strikes: The incidental drowning of dugongs caught in fisheries gear, such as nets, is believed to have contributed to the decline of dugongs in some areas of the Pacific Range States. The increase in vessel traffic also increases the likelihood of dugongs being impacted by vessel strikes.

Because of their dependence on seagrasses, dugongs are very vulnerable to habitat loss/disturbance. Threats to their habitat include:

- Coastal development including human settlement: These activities increase sedimentation and turbidity in the coastal waters where sea-grass is found. Sedimentation and turbidity not only smother sea-grasses but also reduce light reaching the seagrasses, resulting in degradation of seagrass extent, density and productivity.
- Agricultural pollution: herbicide runoff from agricultural lands also presents a potential risk to the functioning of sea-grass habitats.

- Nutrient run-off from land: This causes nutrient enrichment that leads to increases in epiphytic growth in the water column with the result being reduced light levels for the sea-grass. Nutrient enrichment may also change the community structure of sea-grass habitats.

THEMES AND OBJECTIVES

THEMES	OBJECTIVE
1. EDUCATION AND AWARENESS	• Raise awareness about the importance of dugongs and their habitats
2. HABITAT PROTECTION	• Enhance protection of dugong foraging and breeding habitats
3. MANAGEMENT	• Improve protection mechanisms for dugongs and their habitats
4. TRADITIONAL KNOWLEDGE, CUSTOMARY MARINE TENURE & TRADITIONAL RESOURCE MANAGEMENT	• To recognize the value of preserving and protecting the integrity of traditional knowledge, TRM and CMT and incorporating into management practices
5. CAPACITY BUILDING	• Build in-country capacity to enhance dugong management
6. THREATS - KEY DUGONG CONSERVATION ISSUES	• Reduce direct and indirect causes of dugong injury and mortality
7. RESEARCH AND MONITORING – INFORMATION/DATABASES	• Improve our understanding of dugong population status through research and monitoring
8. NATIONAL, REGIONAL, AND INTERNATIONAL COLLABORATION	• Enhance national, regional and international cooperation
9. HUMAN AND FINANCIAL RESOURCES	• To ensure on-going and efficient facilitation of implementation, management and coordination of the Dugong Action Plan

THEMES AND PRIORITY ACTIONS

THEME 1: EDUCATION AND AWARENESS

OBJECTIVE: ***Raise awareness about the importance of dugongs and their habitats***

Actions:		Lead	Priority
1.1	Provide assistance to the Pacific Islands range states to enable them to deliver an effective and appropriate education programme to their peoples.	SPREP/ Partners	High
1.2	Increase community awareness of threats and the need for conservation of dugongs and their habitats.	Range Members/ Partners	High
1.3	Encourage and support the incorporation of dugong life history information and conservation issues into school and other awareness programmes.	Range Members/ Partners	Medium
1.4	Facilitate and encourage networking and linkages to community monitoring groups, such as Seagrass Watch (http://www.seagrasswatch.org) and other NGOs in information exchange.	SPREP/ Range Members	Medium
1.5	Create a dugong web page on the SPREP website and to include inter alia links, with content guidance, on SPREP website for educational materials on dugongs.	SPREP	High
1.6	Declare 2010 as the Pacific Year of the Dugong and support the planning, development and implementation of in-country and regional range states conservation campaigns.	SPREP/ Range Members/ Partners	Medium
1.7	Encourage the use of informal/traditional methods of education within villages utilising appropriate local knowledge custodians/competent village authorities, as resource people.	Range Members /Partners	High
1.8	Work with watercraft users to raise awareness on the importance of dugongs and their habitats in order to encourage responsible boating behaviour (such as slower speeds, anchoring in seagrass etc).	Range Members/ Partners	High
1.9	Develop a code of practice for responsible watercraft operation to avoid adverse effects on dugong.	SPREP/ Partners/ Range Members	High

Indicators:

- Appropriate education programme delivered to Pacific Island dugong range states.
- Information sheets on threats produced, translated where necessary, and distributed to communities and all relevant stakeholders.
- Dugong conservation issues and information included in school programmes in 3 Pacific range states.
- Dugong web-page established on SPREP website by 2010 for the Year of Dugong campaign
- Watercraft code of practice developed and implemented.
- Year of the dugong campaign celebrated in 2010

THEME 2: HABITAT PROTECTION

OBJECTIVE: ***Enhance protection of dugong foraging and breeding habitats***

Actions:		Lead	Priority
2.1	Facilitate and support review of all levels of relevant legislation to incorporate habitat protection for dugongs.	Range Members	High
2.2	Identify and map areas of dugong habitat particularly sea-grass beds, taking note of their condition, e.g. intact, partially disturbed degraded	Range Members/ Partners	High

2.3	Encourage and support the establishment of measures, including customary measures, to protect and conserve dugong habitats.	Range Members/ Partners	High
2.4	Assess the risk of, and develop measures to mitigate against, the degradation of dugong habitats.	Range Members/ Partners	High
2.5	Where appropriate, rehabilitate degraded dugong habitats.	Range Members/ Partners	Medium
2.6	Promote protection of water quality and where possible undertake monitoring from impacts of land-based and maritime pollution, including but not limited to, marine debris, sedimentation etc, which may adversely affect dugongs and their habitats.	Range Members/ Partners	Medium
2.7	Seek opportunities to strengthen the enforcement and awareness of existing laws against the use of poisonous chemicals, explosives etc in the marine environment.	Range Members/ Partners	Medium

Indicators:

- ⊙ Legislation review completed and other measures for dugong habitat protection incorporated.
- ⊙ Important dugong habitat, particularly sea-grass beds, mapped in at least 2 Pacific Island Range States.
- ⊙ Risk of degradation assessed in at least 2 Pacific Island Range States.
- ⊙ A 5-year monitoring programme of dugong habitat initiated in one Pacific Island Range State

THEME 3: MANAGEMENT

Objective: ***Improve protection mechanisms for dugongs and their habitats***

Actions:		**Lead**	**Priority**
3.1	Encourage the establishment of legislation to protect dugongs and their habitats while recognizing and promoting existing traditional management systems.	Range Members	High
3.2	Review and strengthen, where necessary, domestic policies and laws to improve dugong conservation e.g. EIA processes for coastal development.	Range Members/ Partners	High
3.3	Seek opportunities to strengthen protection mechanisms for dugongs and their habitats e.g. MPA development, traditional closures, boat speed restrictions etc.	Range Members	High
3.4	Strengthen enforcement and engage local communities in monitoring, surveillance and reporting of illegal activities.	Range Members	High

Indicators:

- ⊙ Legislation and policies that recognize appropriate traditional management systems to protect dugongs and their habitats in place in all Pacific Island Range States.
- ⊙ Mechanisms, such as MPA and EIA processes in place, to strengthen protection of dugongs, including enforcement of laws relating to dugongs.

THEME 4: TRADITIONAL KNOWLEDGE, CUSTOMARY MARINE TENURE & TRADITIONAL RESOURCE MANAGEMENT

OBJECTIVE: ***To recognize the value of preserving and protecting the integrity of traditional knowledge, TRM and CMT and incorporating into management practices***

Actions:		**Lead**	**Priority**
4.1	Support the documentation of TK, practices and values based on agreements that respect and protect the rights of knowledge holders.	Range Members/ Partners	High/Med
4.2	Ensure that information collected be held and maintained by	Range Members	High/Med

	appropriate in-country authority and the use of traditional knowledge is protected (IPR).		
4.3	Incorporate relevant traditional knowledge and TRM, CMT into dugong and habitat management.	Range Members	High
4.4	Promote and support appropriate community-based management and conservation.	Range Members/ SPREP/ Partners	High
4.5	Provide feedback to local communities on dugong management particularly if the local people are involved in surveys, monitoring and/or enforcement.	Range Members	High
4.6	Where appropriate, promote awareness regarding the value of traditional knowledge and practices in the management of dugongs and habitats.	Range Members/ SPREP Partners	High/Med

Indicators:

- Traditional knowledge in all dugong Pacific Island Range States documented, maintained and where appropriate, incorporated into management.
- Community-based management supported.
- Information and survey results etc disseminated to communities.

THEME 5: CAPACITY BUILDING

OBJECTIVE: ***Build in-country capacity to enhance dugong management***

Actions:		**Lead**	**Priority**
5.1	Identify skills required by relevant government authorities and local communities to improve capacity for dugong management.	*Range Members*	High
5.2	Build national capacity to participate in dugong management, research and monitoring. (access to expertise/ resources).	*SPREP/Partners*	High
5.3	Build the capacity of communities to participate in dugong management, research and monitoring including the ability of authorities involved in dugong management to work with local communities (e.g. cultural awareness training).	*Range Members*	High
5.4	Secure student scholarships for developing dugong and related marine science expertise in the region.	*Partners/ Range Members/ SPREP*	High
5.5	Encourage Australia to strengthen its partnership with Pacific Island range states to increase provision of technical advice and support for effective dugong conservation management e.g. internships in Australian dugong projects.	Australia/SPREP/ Partners	High

Indicators:

- At least two scholarship students from the Pacific Island Range States enrolled in post graduate studies on dugong.
- Training to build national and community capacity in dugong management conducted.
- Internships from Range Island States completed.

THEME 6: THREATS - KEY DUGONG CONSERVATION ISSUES

OBJECTIVE: ***Reduce direct and indirect causes of dugong injury and mortality***

Actions:		**Lead**	**Priority**
6.1	Identify, assess and evaluate threats and potential threats to dugong populations.	Range Members with access to expertise/resources if required	High

6.2	Develop appropriate management measures to address identified threats.	Range Members	High
6.3	Reduce to the greatest extent practicable the incidental injury and mortality of dugongs.	Range Members	High
6.4	Reduce to the greatest extent practicable the illegal take of dugong.	Range Members	High
6.5	Ensure that subsistence and customary use of dugong is sustainable in areas where it is permitted.	Range Members	High

Indicators:

- ⊙ Assessment and report on threats (identification and evaluation) completed in at least three Pacific Island Range States.
- ⊙ Measures to address identified threats to dugongs developed and implemented in at least three Pacific Island Range States

THEME 7: RESEARCH AND MONITORING – INFORMATION/DATABASES

OBJECTIVE: ***Improve our understanding of dugong population status through research and monitoring***

Actions:		Lead	Priority
7.1	Determine the distribution, abundance and trends of dugong populations to provide a base for conservation efforts and actions using traditional knowledge and/or scientific methodologies.	Range Members with access to expertise as required	High
7.2	Collect genetic samples through non-lethal means and including from strandings in accordance with procedures (such as the Great Barrier Reef Marine Parks Authority necropsy manual) and undertake genetic analysis to determine the distinctness/connectivity of Pacific Island dugong populations.	Range Members with regional compilation by SPREP supported by Australia	Medium
7.3	Where appropriate, undertake satellite tagging to assist in understanding migratory patterns in the region.	Range Members with regional compilation by SPREP supported by Australia	Medium
7.4	Distribute book, *Sirenian Conservation: Issues and Strategies in Developing Countries*, edited by Ellen Hines *et al*, when published.	SPREP	High
7.5	Develop appropriate rescue/stranding protocols for dugong range states.	SPREP/Partners	Medium

Indicators:

- ⊙ Updated baseline surveys completed for distribution and abundance for all Pacific range states by 2012.
- ⊙ Relevant information on dugong population status distributed.
- ⊙ Genetic sampling initiated in all Range States and satellite tagging conducted in at least one.
- ⊙ Rescue/stranding protocol developed.

THEME 8: NATIONAL, REGIONAL, AND INTERNATIONAL COLLABORATION

OBJECTIVE: ***Enhance national, regional and international cooperation***

Actions:		Lead	Priority
8.1	Collaborate with Range States to combat illegal trade, and to cooperate in enforcement activities relating to dugong products.	PNG, Australia, and others as appropriate	High
8.2	Encourage Pacific Range States to sign the CMS MOU for the Conservation and Management of Dugongs and their Habitats.	SPREP/Partners/ Range Members	High

8.3	Develop and implement national databases of relevant information in relation to dugong conservation and management and ensure data is accessible to Range Members.	Range Members as needed	Medium
8.4	Encourage and strengthen partnerships amongst governments and all other existing and new stakeholders in research, conservation and management efforts.	Range Members/ Partners	Medium

Indicators:

- ⊙ CMS MoU for the Conservation of Dugongs signed by all Pacific Island Range States.
- ⊙ Collaboration and partnership formalized to eliminate illegal trade of dugong products.
- ⊙ Partnerships developed for research and conservation effort amongst most Range States and stakeholders.

THEME 9: HUMAN AND FINANCIAL RESOURCES

OBJECTIVE: ***To ensure on-going and efficient facilitation of implementation, management and coordination of the Dugong Action Plan***

Actions:		**Lead**	**Priority**
9.1	Encourage Member Range States to incorporate dugong actions for implementation as part of other national projects and/or programmes (such as NBSAP)	Range Members	High
9.2	Identify and seek opportunities to secure funding through bodies such as universities, NGOs, etc	Range Members	Medium
9.3	Encourage Range State Members to develop and prepare funding proposals specifically to address dugong issues	SPREP/Range Members	Medium
9.4	Encourage "Developed" Range States to collaborate with other Range States in dugong work e.g. Australia/PNG partnership, Vanuatu/New Caledonia.	Range Members, particularly Australia	High
9.5	Request the Government of Australia to provide a technical adviser(s) to the Dugong Action Plan (Dr Donna Kwan and/or Prof Helene Marsh)	SPREP	Medium

Indicators:

- ⊙ Actions incorporated and carried out through national projects/programmes.
- ⊙ Funding proposals submitted and work carried out.
- ⊙ Partnership developed for all Pacific Island Range States.
- ⊙ Technical adviser available.

2. MARINE TURTLE ACTION PLAN 2008-2012 PACIFIC ISLANDS REGION

GOAL

To conserve marine turtles and their habitats, in keeping with the traditions of the people of the Pacific Islands Region.

INTRODUCTION

Marine turtles have lived in the world's oceans for over 100 million years. Of the world's seven marine turtle species, six occur in the waters of the Pacific as follows:

- Flat back turtle (*Natator depressus*)
- Green turtle (*Chelonia mydas*)
- Hawksbill turtle (*Eretmochelys imbricata*)
- Leatherback turtle (*Dermochelys coriacea*)
- Loggerhead turtle (*Caretta caretta*)
- Olive Ridley turtle (*Lepidochelys olivacea*)

Turtles play an integral ecological role in the functioning of marine habitats throughout the Pacific region. They are very much a part of the traditions of Pacific island people, featuring in legends and traditional uses. Turtles are highly migratory and use a range of habitats at different stages of their life cycle. As a result, they readily cross jurisdictional boundaries and face a range of threats. They are long-lived and slow to mature facing a range of threats over their lifetime. This migratory nature means that their survival and conservation requires a rigorous coordinated regional effort amongst range states and territories. Information exchanges, linkages and collaboration are needed at the national, regional and international levels in order for conservation and management efforts for marine turtles to be effective.

SPECIES DISTRIBUTION

Of the six marine turtle species that occur in the Pacific region, the green and hawksbill turtles are the most widely recorded species with confirmed records in almost all countries and territories, whilst the flatback turtle is known to occur only in Australia and southern Papua New Guinea. The green and hawksbill turtles also nest in most Pacific countries and territories, whilst the flatback turtle is only known to nest in Australia.

Table 1: Marine Turtle Species Occurrence in the Pacific Islands Region

Species	AMS	AUS	COK	FSM	FIJ	FRP	GUA	KIR	RMI	NAU	NEC	NEZ	NIU	NMI	PAL	PNG	SAM	SOL	TTK	TON	TUV	VAN	W&F
Leatherback		√			√	√	√[1] ?		√		√	√			√	√	√[2]	√		√ ?	√	√	
Green	√	√	√	√	√	√	√	√	√		√	√	√	√	√	√	√	√	√	√	√	√	√
Hawksbill	√	√	√	√	√	√	√	√	√		√	√	√	√	√	√	√	√	√	√	√	√	
Loggerhead		√	√[3] ?		√			√ ?			√	√			√	√		√	√			√	
Olive Ridley		√			√	√[4]		√ ?	√			√			√			√		√ ?		√	
Flatback		√														√						√[5] ?	

SPECIES STATUS

Marine turtles are recognised internationally as species of conservation concern. The 2006 IUCN Red List of Threatened Animals lists marine turtle species found in the Pacific as follows:

- Leatherback Turtle - CRITICALLY ENDANGERED
- Hawksbill Turtle - CRITICALLY ENDANGERED
- Olive Ridley Turtle - ENDANGERED
- Loggerhead Turtle - ENDANGERED
- Green Turtle - ENDANGERED
- Flatback Turtle - Data deficient.

All species of sea turtles are listed in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). This means all sea turtle species are listed as threatened with extinction under this convention and CITES generally prohibits commercial international trade in specimens of these species. Under the Convention on the Conservation of Migratory Species of Wild Animals (CMS), sea turtle species are listed in Appendix I (migratory species that have been categorized as being in danger of extinction throughout all or a significant proportion of their range) and Appendix II (migratory species that have an unfavourable conservation status or would benefit significantly from international co-operation organised by tailored agreements).

The status of marine turtles in the Pacific region is generally unknown. In response to growing concern in the last 10 years on the need for conservation and sustainable use in the region, an increasing number of initiatives are being undertaken at local and regional levels.

TRADITIONAL KNOWLEDGE AND CUSTOMS

Marine turtles have long held economic, cultural and spiritual value to the Pacific Island peoples. The spiritual and cultural importance of marine turtles to Pacific peoples is illustrated through their stories, traditions and customs including contemporary ceremonies.

Marine turtles have been an important source of food for many coastal people for hundred of years. Many communities continue to utilise marine turtles for protein on the subsistence level as well as their shell for traditional crafts. In many places in the Pacific, local people are extremely knowledgeable about marine turtles and are able to provide information of the biology of the species in the local areas, for example, where they occur what time of year, their habitat preferences etc. Such information is often lacking within local government wildlife authorities, yet traditional knowledge is often overlooked.

Sometimes local communities are the best conservationists. Traditionally, people would not take more than what was needed for their community and would only take animals at particular times of the year or from particular areas, thus ensuring that this resource was available to them in the future.

Unfortunately, in many places this traditional knowledge and sustainability of resources has been lost or is often ignored. This Action Plan recognises the fundamental role that traditional knowledge and customs play in turtle conservation and aims to address the issue of community based and driven management.

TOURISM INCOME GENERATING OPPORTUNITIES

In some places, marine turtles are fast becoming an eco-tourism attraction whether it is watching nesters on the beach or experiencing their grace whilst on a dive. Responsible eco-tourism with turtles can generate income for local communities in a positive way whilst conserving turtles and their habitats, potentially offsetting the black market trade and overfishing.

Local fishermen are often best placed to provide information on the local marine environment and make skilled and knowledgeable guides. There is potential for local fishermen to earn enough as guides to offset the money that they may otherwise make on the black market or from fishing.

Eco-tourism provides direct employment as well as a trickle-down effect to jobs in other businesses such as hotels, restaurants, and taxis. In this way, it can become an incentive for entire communities to safeguard their natural environment, thus creating an economy where turtles are worth more alive than dead.

THREATS

The IUCN Marine Turtle Specialist Group (http://www.iucn-mtsg.org/hazards) has identified five major threats to sea turtles as follows:

- Fisheries Impacts
- Direct Take
- Coastal Development
- Pollution and Pathogens
- Global Warming

The above threats are considered to have the most significant impacts to sea turtles and without mitigation, will result in decline, local extinction and/or prevent recovery of sea turtles.

Within the Pacific Region the main threats for marine turtle include:

- Unsustainable harvesting (direct take for meat and handicraft and egg harvesting);
- Feral animal predation on turtle nests (eggs);
- Incidental capture in commercial fishing;
- Degradation of habitat including through coastal development and natural disaster;
- Pollution and marine debris (e.g. plastic bags and fishing gear) and pathogens;
- Boat strikes;
- Climate change.

The main challenges for effective conservation of marine turtles in the region include the lack of information and data on populations, harvesting and interactions with fishing activities due to limited research and monitoring. A major constraint is the limited resources, both financially and in terms of manpower (including skills) that are available for implementing management actions in the region.

THEMES AND OBJECTIVES

THEMES	OBJECTIVES
1. COLLABORATION AND PARTNERSHIP	• To increase regional collaboration and partnerships for turtle conservation and management.
2. THREATS	• To improve the management and protection of marine turtles and their habitats by reducing threats to marine turtles in the Pacific Islands region.
3. CAPACITY BUILDING	• Improve capacity within each participating country and territory for marine turtle protection, management, and population research and monitoring.
4. EDUCATION AND AWARENESS	• To provide assistance to the participating member agencies to enable them to deliver effective and accurate education and awareness programs to the people of the Pacific Islands region.
5. POLICY AND LEGISLATION	• To ensure a more cohesive approach in policy and legislation in

	SPREP member countries and territories to support the Regional Marine Turtle Conservation Programme [RMTCP] that incorporates traditional knowledge and CMT.
6. TRADITIONAL KNOWLEDGE AND CUSTOMARY PRACTICES	• To encourage a more cohesive approach in policy and legislation in SPREP member countries and territories which supports, promotes and formally protects traditional knowledge, practices and resource management.
7. SUSTAINABLE DEVELOPMENT	• To promote the sustainable use of marine turtles.
8. TURTLE DATABASE	• Turtle Research and Monitoring Database System (TREDS) is implemented effectively in SPREP member countries and territories
9. RESEARCH AND MONITORING	• Identify all major Turtle Nesting Beaches in the Pacific Islands Region • Identify major turtle stocks in the Pacific • Identify major foraging grounds in the Pacific.

THEMES AND PRIORITY ACTIONS

THEME 1: COLLABORATION AND PARTNERSHIP

OBJECTIVE: ***To increase regional collaboration and partnerships for turtle conservation and management***

Actions:		Lead	Priority
1.1	SPREP members decide by 2008 on whether to participate in a CMS arrangement that expands on current SPREP region.	SPREP/CMS/ Members	High
1.2	Dr George Balazs (Marine Turtle Research Program, NOAA, Honolulu) and Dr Colin Limpus (Queensland Environment Protection Agency, Australia) to continue as Technical Advisers to SPREP and the RMTCP.		High
1.3	Establish direct contact and formal communication with various actors in turtle conservation (IAC, WCPFC, SPC, FFA, USP, IOSEA, NMFS, WPRFMC, IUCN Marine Turtle Specialist Group, collaborating universities, and laboratories (for genetic analysis), and relevant Australian Institutes & Departments).	SPREP	High
1.4	Foster partnerships to support MTAP implementation at national and regional levels (including governments, NGOs and the private sector).	Members/ SPREP	High
1.5	Develop regular communication with countries/ territories through media such as the Turtle Talk newsletter and MTAP list-server.	SPREP	Medium

Indicators:

- ⊙ MoU under CMS for the conservation of sea turtles in the Pacific finalized and signed by most members.
- ⊙ Communication with agencies working on turtle conservation established and active.
- ⊙ Partnership established for MTAP implementation.
- ⊙ More than 80% of Members participating and collaborating in the regional network.

THEME 2: THREATS

OBJECTIVE: ***To improve the management and protection of marine turtles and their habitats by reducing threats to marine turtles in the Pacific Islands region***

Actions:		Lead	Priority
2.1	Identify and prioritize the threats on turtles regionally including harvest of turtles and eggs, tourism, pollution and waste (plastic debris), fisheries by-catch, habitat destruction, and climate change.	SPREP/SPC	High
2.2	Quantify the impacts of threats identified for each PICT, on the national level.	All	High
2.3	Develop and implement management and mitigating actions for top 3 regional priority threats identified in 2.1.	All/SPC/FFA/ WCPFC/ WPRFMC	High
2.4	Reduce use of non-biodegradable materials (imported plastics) and encourage the development of alternative materials (e.g. cloth bags instead of plastic shopping bags).	All	High
2.5	Assess and document information on the level of turtle harvest including collection of turtle eggs on national level, where possible.	Members/ SPC/ SPREP	High
2.6	Strengthen EIA process for coastal development by furthering survey work to identify critical turtle habitat and by building the capacity of policy makers and legislators to understand implications of decisions for turtle conservation management.	Members	High
2.7	Work with the fishing industry, Fisheries authorities, RFMO's and other IGOs/NGOs to reduce turtle by-catch in coastal & oceanic fisheries.	SPC/FFA/ WCPFC/ WPRFMC	High

		WPRFMC	
2.8	Promote observer programs and improve documentation, identification, reporting, and observer coverage for information collection on turtle by-catch.	SPC/FFA/ WCPFC/ WPRFMC	Medium
2.9	Promote protection of nesting beaches and use mitigating measures for impacts to nesting beaches.	Members	High

Indicators:

- ⊙ All PICTs have identified, quantified and ranked threats.
- ⊙ Management actions and/or mitigation measures of at least 3 prioritized threats are developed and implemented.
- ⊙ At least 50% of PICTs introducing management measures to reduce the use of non-biodegradable materials.
- ⊙ Number of PICTs involved in the observer programme has increased by 25%.
- ⊙ Inventory, maps and protection plans of top 2 critical nesting beaches in each PICTs are produced and implemented.
- ⊙ Inventory, maps and protection plans of critical foraging areas are produced and implemented.
- ⊙ At least 50% of PICTs have started collection of baseline information on nesting populations.
- ⊙ AT least 50% of PICTs documenting information on turtle harvest and turtle egg collection increased.
- ⊙ EIA procedures including legislations have been improved and strengthened.

THEME 3: CAPACITY BUILDING

OBJECTIVE: ***Improve capacity within each participating country and territory for marine turtle protection, management, and population research and monitoring.***

Actions:		**Lead**	**Priority**
3.1	Identify skills required by relevant government agencies and local communities for turtle management and protection by utilizing mechanism such as NCSA.	Members	High
3.2	Facilitate the provision of appropriate training including attachments, tools, materials, technical assistance and expertise.	SPREP/USP/ Partners	High
3.3	Provide a regional workshop for policy and legislation drafters to build capacity in relation to turtle management.	SPREP/ Partners	Medium
3.4	Undertake a regional turtle nesting beach monitoring/survey training workshop, including survey methodologies, turtle tagging, best handling practices and genetic sampling.	SPREP/USP/ Partners/	High
3.5	Undertaken in-country turtle nesting beach monitoring/survey training workshops for local staff, including survey methodologies, turtle tagging, best handling practices and genetic sampling.	Members/ Partners	High
3.6	Provide training to Members in the use of TREDS and in data analysis.	SPREP/ Members	High
3.7	Encourage partnerships with tertiary institutions, researchers, government agencies, local communities, NGOs, IGOs etc.	SPREP/ Partners	Medium
3.8	Provide training to relevant personnel in relation to cultural awareness.	SPREP/ Partners	Medium

Indicators:

- ⊙ National reports by at least 50% of PICTs include documentation of required national skills for turtle conservation.
- ⊙ At least 1 regional and 10 in-country nesting beach monitoring/survey training workshops undertaken.
- ⊙ Policy and legislation workshop conducted.
- ⊙ Tools/materials made readily available to Members.
- ⊙ Partnerships developed with tertiary institutions, IGOs, NGOs to provide technical assistance and expertise.
- ⊙ All members with marine turtle programmes effectively using TREDS.

THEME 4: EDUCATION AND AWARENESS

OBJECTIVE: ***To provide assistance to the participating member agencies to enable them to deliver effective and accurate education and awareness programs to the people of the Pacific Islands region.***

Actions:		Lead	Priority
4.1	Collate and review existing available education materials on marine turtles, such as those available on Sea Turtle.org, to suit the needs of the region.	SPREP/ Members	High
4.2	Provide relevant education materials (e.g. turtle migration, turtle biology and ecology, tagging) to schools, universities, and local communities.	SPREP/ Partners	Medium
4.3	Investigate options for including turtle information in school curricula.	Members	Medium
4.4	Provide relevant education materials in local languages.	Members	High
4.5	Investigate options for providing scholarships in marine science for tertiary students.	Members/ Partners	Medium
4.6	Provide feedback to communities regarding the results of turtle research and monitoring and other activities including data sharing in accordance with adopted Policy and Protocols.	Members/ SPREP	High
4.7	Promote the tag recovery program and make material available in local languages.	SPREP/ Members	High
4.8	Continue the regional 'Turtle Talk' newsletter established under YOST for SPREP members. Include a column in the newsletter, "Notes from the field", to be coordinated by USP (Dr Kenneth MacKay).	SPREP/USP	Medium
4.9	Seek opportunities to raise public awareness on marine turtle issues through local media.	Members	High
4.10	Develop relevant regional promotional material (e.g. documentary) to be made available to SPREP members.	SPREP/ Partners	Medium
4.11	Document traditional knowledge and customs in relation to turtles and their management that can be used in education and awareness raising activities.	Members	High
4.12	Develop agreements with cultural groups/leaders/individual knowledge holders regarding intellectual property rights, appropriate use and dissemination of information.	Members	High
4.13	Ensure any traditional knowledge and customs documented are properly held and maintained by appropriate in-country authority.	Members	High
4.14	Include traditional knowledge in education and awareness programs.	Members	High
4.15	Promote the value of TRM, TK, CMT and community rights on IPR and ABS through education and awareness at the community level including the preparation and distribution of materials.	Members	High
4.16	Encourage the use of informal/traditional methods of education within villages utilising traditional elders as resource people where appropriate.	Members	High
4.17	Encourage community awareness using successful models such as Wan Smolbag's Vanua-tai Monitors network.	Members	Medium
4.18	Work closely with the organizing committee for the 2009 Sea Turtle Symposium in Australia to ensure significant Pacific Islands participation.	SPREP/USP	Medium

Indicators:

- ⊙ Educational materials collated, reviewed, translated and disseminated.
- ⊙ Tag recovery programme active in most Member countries and territories.
- ⊙ At least two issues of the Turtle Talk newsletter produced and distributed per year.
- ⊙ Educational material available in local languages in at least 50% of PICTs.
- ⊙ Traditional knowledge and customs documented appropriately and report produced and distributed.
- ⊙ Traditional knowledge and customary practices incorporated into information materials developed.
- ⊙ At least 2 students from Member countries and territories on scholarships doing research on turtles in the region.
- ⊙ At least 5 Pacific Island representatives participate in the 2009 Turtle Symposium.

THEME 5: POLICY AND LEGISLATION

OBJECTIVE: ***To ensure a more cohesive approach in policy and legislation in SPREP member countries and territories to support the Regional Marine Turtle Conservation Programme that incorporates traditional knowledge and CMT.***

Actions:		Lead	Priority
5.1	Review and identify gaps and conflicts in current policies and legislation in Member countries and territories that supports/limits the RMTCP including conventions, treaties, MoU's, agreements etc.	Members	High
5.2	Encourage the need to address gaps and conflicts found in the review of policies and legislation as described in action 5.1 where required.	Members	High
5.3	Encourage and support compliance mechanisms that are *more* effective at the community level, drawing upon and supporting existing laws and controls and conflict resolution systems and utilizing local community members.	Members	High
5.4	Amend relevant policies and legislation regarding size limits of turtles taken to better reflect the impact of removing mature females from populations and where possible, to ensure preference be given to utilizing smaller sized animals.	Members	High
5.5	Incorporate relevant traditional knowledge CMT, and practices into policy, legislation management plans where appropriate.	Members	Medium
5.6	Ensure adequate protection is provided for nesting beaches and other known critical habitats for turtles through policy and legislation.	Members	High

Indicators:

- ⊙ Review of current national policies/legislation completed and disseminated.
- ⊙ Policies and legislation in PICTs amended to address gaps for marine turtle conservation which also include the protection of critical habitats and application of minimum size limits that reflect the impact of removing mature female turtles.
- ⊙ Traditional knowledge and management practices incorporated into legislation, policies and plans.
- ⊙ Appropriate compliance mechanisms are put in place.

THEME 6: TRADITIONAL KNOWLEDGE AND CUSTOMARY PRACTICES

OBJECTIVE: ***To encourage a more cohesive approach in policy and legislation in SPREP member countries and territories which supports, promotes and formally protects traditional knowledge, practices and resource management***

Actions:		Lead	Priority
6.1	Review and identify gaps and conflicts in relevant policies and legislation that supports/limits the protection and promotion of TRM, TK, IPR, ABS and CMT.	Members	High

6.2	Encourage the need to address gaps and conflicts found in the review of policies and legislation as described in action 6.1 where required.	Members /SPREP	High
6.3	Promote integration of TRM, TK, CMT into national, provincial and community management plans, including NSDP, NBSAP and other development plans.	Members	High
6.4	Promote **awareness** on the **value** of TRM, TK, CMT and **community rights** on IPR and ABS through education and awareness at the community level including the preparation and distribution of awareness materials.	Members	High

Indicators:

- ⊙ Review of policies/legislation in relation to TK and other customary management and practices completed.
- ⊙ Traditional knowledge, tenure and management practices integrated into development plans.
- ⊙ Education and awareness of TK and other customary practices material delivered to local communities in each PICT.

THEME 7: SUSTAINABLE DEVELOPMENT

OBJECTIVE: ***To promote the sustainable use of marine turtles***

Actions:		**Lead**	**Priority**
7.1	Develop regional guidelines for responsible and sustainable eco-tourism in the wild.	SPREP/ Partners	High
7.2	Promote best practice eco-tourism in accordance with guidelines.	Members/ SPREP/ Partners	High
7.3	Identify and encourage/facilitate alternative livelihoods (including income generating activities) that are not detrimental to marine turtles and their habitats, in consultation with local communities and other stakeholders.	Members/ SPREP/ Partners	High
7.4	Prohibit the commercial[1] harvest of marine turtles, parts thereof and their derivatives.	Members	High
7.5	Apply sustainable management principles to permitted traditional/subsistence use of turtles for food.	Members	High
7.6	Discourage the keeping of marine turtle in captivity (except for rehabilitation purposes).	Members	High
7.7	Develop best practice guidelines for turtles permitted to be kept in captivity and make available to SPREP members.	SPREP/ Partners	High
7.8	Identify and remove situations where turtles in captivity are not kept in accordance with best practice guidelines.	Members	High
7.9	Document the extent of marine turtle eco-tourism and turtle related activities.	Members	Medium

Indicators:

- ⊙ Guidelines developed and distributed to members on best practice for responsible and sustainable marine turtle eco-tourism and husbandry.
- ⊙ Promotion of responsible eco-tourism ventures for turtles in the wild.
- ⊙ All PICTs have identified, prioritized and implemented some form of alternative livelihoods initiatives.
- ⊙ Policy and legislative frameworks to prohibit commercial use of turtles and products derived from turtles strengthened.
- ⊙ Management principles applied to turtle use permitted for traditional and subsistence use.
- ⊙ The number of marine turtles kept in captivity decreased by 50% with no new undertaking of this nature.

[1] The exchange of turtles and turtle parts for money

THEME 8: TURTLE DATABASE

OBJECTIVE: ***Turtle Research and Monitoring Database System (TREDS) is implemented effectively in SPREP member countries and territories***

Actions:		Lead	Priority
8.1	Develop Information and Data Sharing Policy and Protocol for TREDS: • In place and used effectively by 2008; • Policy and Protocol to include restrictions to access to data and sharing data with communities; • Members to adopt agreed Policy and Protocol at SPREP Meeting in 2008; • Distribute adopted Policy and Protocol to members.	SPREP/ Members	High
8.2	TREDS is distributed to all members by early 2008 with in-country training and follow-up for use and report generation.	SPREP	High
8.3	All Members are encouraged to use TREDS in accordance with the adopted Policy and Protocols.	SPREP/ Members	Medium
8.4	Members to submit data annually to TREDS Database Officer.	Members	High
8.5	Reporting:		
	• Members report to SPREP at least annually on tagging records and activities, noting that re-issue of tag will be dependent on reporting;	Members	High
	• Report recovered tags immediately to SPREP using appropriate form where available or providing standard information. Provide reward (such a t-shirt, poster etc) for recovered tags;	Members/ SPREP	High
	• SPREP to report annually to Members on tags distributed and recovered, results of mapping, and other significant data.	SPREP	High
8.6	Institutional Commitment:		
	• SPREP commits to long-term maintenance of the TREDS programme;	SPREP	High
	• Seek long-term funding from Members and partners (including NGOs, IGOs and the private sector) to maintain TREDS Officer and programme.	SPREP	High
8.7	Distribute tags and applicators to Members undertaking tagging activities and engaged in SPREP approved tagging program.	SPREP	High
8.8	Link to other databases where sea turtle data are collected.	SPREP/ SPC	Medium

Indicators:

- ⊙ All members effectively using TREDS and reporting annually to SPREP.
- ⊙ SPREP produce five (5) Annual reports of summary data.
- ⊙ Increased return of tags and reporting of tagging information.
- ⊙ Information from TREDS used to provide a picture of turtle distribution and migration at the regional level.
- ⊙ TREDS programme including responsible officer secured for long-term.
- ⊙ Link to other relevant turtle databases completed.

THEME 9: RESEARCH AND MONITORING

OBJECTIVE: ***Identify all major turtle nesting beaches in the Pacific Islands Region***

Actions:		Lead	Priority
9.1	Undertake literature search of available information regarding turtle nesting sites in the Pacific Islands region including previous flipper and satellite tagging activities.	USP/SPREP/ WWF/ Members	High
9.2	Identify and report known information including TK provided by communities	Members	High

	regarding turtle nesting sites.		
9.3	Undertake regional aerial rapid assessment of turtle nesting beaches where feasible.	Multi-agency collaboration	Medium
9.4	Identify and map turtle nesting beaches and prioritise index sites for long term monitoring.	SPREP/ Members	High
9.5	Undertake turtle nesting beaches surveys (by relevant trained personnel): • Initial baseline data collection for at least a 5-year period; • Relevant information is distributed to members via list server and uploaded to SPREP website of relevant information.	USP/SPREP/ NMFS Members/ SPREP	High
9.6	Initiate long term monitoring at index nesting beaches, to include beach temperature data for climate change baseline information, and beach morphology.	Countries with support of USP/ NMFS/SPREP & other experts	High
9.7	Enter beach turtle monitoring data into TREDS.	SPREP	High

Indicators:

- ⊙ Literature search on turtle nesting completed and reported.
- ⊙ Known information and TK identified and reported by all Members.
- ⊙ Key index nesting beaches in all PICTs identified and prioritised.
- ⊙ Long term monitoring initiated at 5 index nesting beaches i the Pacific Region.
- ⊙ Estimates obtained of current nesting beach populations for Pacific.
- ⊙ Baseline data collected & inputted into TREDS including beach temperatures.
- ⊙ Key turtle nesting sites across the Pacific mapped.

OBJECTIVE: ***Identify major turtle stocks in the Pacific***

Actions:		**Lead**	**Priority**
9.8	Develop & distribute Regional Procedures & Protocol for genetic sampling that includes using non-lethal techniques and addresses ownership of genetic information and material collected.	USP/SPREP	High
9.9	Develop partnerships to undertake genetic sampling and analysis with Members and relevant genetic researchers/laboratories such as N. Fitz Simmons (Aus), IFREMER (Indian Ocean), & P. Dutton (NOAA) to analyse and share data, and to publish & report results.	SPREP/ Members/ NOAA/SPC/AU	Medium
9.10	Report to Members results of genetic sampling and identification of major turtle stocks in the region.	USP/SPREP/ NOAA with collaborators	

Indicators:

- ⊙ Regional procedures and protocols for genetic sampling developed, distributed and implemented by participating PICTs.
- ⊙ Work towards identifying Pacific stocks of Marine Turtles progressed and results reported and published.
- ⊙ Map of Pacific stock developed and distributed to Members.

OBJECTIVE: ***Identify major foraging grounds***

Actions:		**Lead**	**Priority**
9.11	Collate known and published information on foraging grounds in the region.	Members/SPREP/ collaborators	Medium
9.12	Distribute collated information on foraging grounds to Members.	Members/SPREP/ collaborators	Medium
9.13	Identify and map major/critical in-water sites and prioritise foraging habitats for long-term monitoring.	Members/SPREP/ collaborators	High

9.14	Undertake long-term foraging surveys at 5 major sites.	Members/SPREP/ collaborators	Medium
9.15	Undertake sea grass mapping and monitoring where possible.	Members/SPREP/ collaborators	Medium
9.16	Undertake aerial surveys of foraging grounds (eg ultra light) where possible.	Members/SPREP/ collaborators	Medium
9.17	Undertake satellite tagging to fill information gaps where it is needed, cost effective and feasible.	SPREP/ NOAA/ Members	Medium

Indicators:

- ⊙ Known and published information of marine turtle foraging grounds in the region collated and distributed to Members.
- ⊙ Major marine turtle foraging sites identified, mapped and prioritised for monitoring.
- ⊙ Long term foraging ground surveys initiated on 5 major sites.
- ⊙ Sea grass mapping and monitoring undertaen in at least 5 sites across the region.
- ⊙ Results of turtle tracking distributed to PICTs through the SPREP website and the Marine Turtle network.

3. WHALE AND DOLPHIN ACTION PLAN 2008-2012 PACIFIC ISLANDS REGION

GOAL

To conserve whales and dolphins and their habitats] for the peoples of the Pacific Islands Region

INTRODUCTION

Whales and dolphins are an important component of the marine biological diversity of the Pacific Islands Region. Over half the world's known species of whales and dolphins are found in the region, and for some species such as the humpback whale, the Pacific Islands Region is a vital breeding area. Whales and dolphins are widely regarded as flagship species for Pacific marine ecosystems and feature prominently in promotional tourist material. Many Pacific island cultures have legends, stories and traditional uses and values of marine mammals. These species are generally long-lived and have low reproductive rates.

For many species of large whales, the impacts of commercial whaling during the nineteenth and twentieth centuries, largely by countries from outside the region, have reduced the breeding populations of South Pacific whales to extremely low levels, possibly to local extinction for some species

In recent time, many Pacific Island countries and territories have declared whale sanctuaries or marine sanctuaries for marine animals including whales and dolphins.

SPECIES DISTRIBUTION

Based on largely opportunistic and anecdotal records, Miller[1] (2007) reported that at least 30 different whale and dolphin species occur within the Pacific Islands, although this number increases to more than 40 species when Hawaii, New Zealand and Australia are also considered. The checklist of country-specific whale and dolphin species records, classified according to the "reliability" of the record, for the 22 Pacific Island countries and territories is given in Table 3.1 attached. The limited research efforts in the region, coupled with the very large expanse of marine area, makes it plausible that there may be still unreported species that inhabit these waters.

Our current understanding of whale and dolphin diversity and distribution in the Pacific Islands Region is considered incomplete as there are many locations that have not been surveyed. For example, only 5 whale and dolphin species have been reported to occur in Tuvalu waters, however records for additional species have been reported in EEZs of adjacent countries, which suggests that these species may also be part of the Tuvalu whale and dolphin fauna. In addition, as capacity and research within the region is strengthened, data and information that is gathered will produce increasingly accurate records for the Pacific Islands Region.

Sperm whales are the most widely reported cetacean species in the Pacific Islands Region with all 22 PICTs having records of this species. Rare species for the region include the Southern bottlenose whale and the Indo-Pacific humpback dolphin. A relatively high number of records were reported for both Papua New Guinea and Solomon Islands, while very few records were available for the Pitcairn Islands and Wallis and Futuna.

[1] Current State of Knowledge of Cetaceans Threat, Diversity and Habitats in the Pacific Islands Region. A report by the Whale and Dolphin Conservation Society for the First Meeting of the Signatories to the Memorandum of Understanding for the Conservation of Cetaceans and their Habitats in the pacific Islands Region.

SPECIES STATUS

Population status of virtually all species of whales and dolphins in the Pacific Islands Region is basically unknown. The exception to this is for the South Pacific humpback whale and local population estimates for certain species e.g. spinner dolphins in Moorea, French Polynesia. Widely distributed and were heavily exploited in the 20th Century.

The total takes on the humpback whale in the Southern Ocean IWC Management Areas IV, V and VI were approximately 80,000. Recent work by the SPWRC has shown that there are likely to be at least three genetically distinct populations of humpback whales in Eastern Australia, and east Polynesia and two distinct populations in central and west Polynesia. Based on closed population models, Baker *et al* (2006), in a paper submitted for consideration by the Inter-Sessional Workshop for the Comprehensive Assessment of Southern Hemisphere Humpback Whales (Hobart, Tasmania, 3-7 April 2006), estimated regional abundance of humpback whales in Oceania as 472 for the New Caledonia stock, 2311 for the Tonga stock and 1057 for the French Polynesia stock. However, the open-population models yield 15-25% lower estimates. In comparison, the Eastern Australia humpback abundance has been estimated to be approximately 8,000 and this population is increasing by about 10% per annum [re-word to give proper reference]. This difference in abundance could be because the South Pacific populations have been so depleted or were always smaller and/or because some South Pacific whales have shifted migration routes to Australia.

Several whale and dolphin species are listed on Appendix I[2] of the CITES, and the remaining species are listed in Appendix II[3]. The CMS also lists whale and dolphin species needing protection on its Appendices I[4] and II[5]. The IUCN Red List of Threatened Species 2006 lists several whale and dolphin species as endangered and vulnerable with a lot of species having deficient data for categorizing.

TRADITIONAL KNOWLEDGE AND CUSTOMS

Whales and dolphins are important in the cultures, legends, traditions and heritage of many Pacific Island peoples. In Fiji, sperm whales teeth have particular cultural significance. Whales and dolphins are associated with identity, lifestyle and well-being. Migrations of whales are used as an environmental cue on some islands and ceremonies and ritual surround cetaceans across the region. In some traditions, they are viewed as incarnations of humans.

TOURISM INCOME GENERATING OPPORTUNITIES

A recent review of the status of marine mammal tourism activities in the Pacific Islands region, commissioned by IFAW in collaboration with SPREP, SPWRC and the SPTO, showed that the industry experienced strong annual growth for the period 1998 – 2005. The study indicates that between 1998 and 2005, both the number of whales watchers and the number of countries offering whale watching significantly increased (Table 3.2). Whale watching is becoming an important component of tourism development in the region with a total estimated direct economic value of $US 7.5 million and $US 21 million in total value in 2005.

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[2] Appendix I lists species that are the most endangered among CITES-listed animals and plant, which are threatened with extinction and CITES prohibits international trade in specimens of these species except when the purpose of the import is not commercial, for instance for scientific research. In these exceptional cases, trade may take place provided it is authorized.

[3] Appendix II lists species that are not necessarily now threatened with extinction but that may become so unless trade is closely controlled. International trade in specimens of Appendix-II species may be authorized by the granting of an export permit or re-export certificate.

[4] Migratory species that have been categorized as being in danger of extinction throughout all or a significant proportion of their range are listed on Appendix I of the Convention. States strive towards strictly protecting these animals, conserving or restoring the habitats in which they live, mitigating obstacles to migration and controlling other factors that might endanger them

[5] Migratory species that have an unfavourable conservation status or would benefit significantly from international co-operation organised by tailored agreements are listed in Appendix II to the Convention. For this reason, the Convention encourages the Range States to conclude global or regional Agreements for the conservation and management of individual species or, more often, of a group of species listed on Appendix II

Table 3.2: Growth of whale and dolphin watching in the Pacific Islands Region (EcoLarge, 2006)

Pacific Region Findings	Numbers of Whale Watchers	Countries with whale watch operations	Average annual growth in whale watchers (1998 – 2005)	Estimated Direct Value of whale watching industry	Estimated Total Value of the industry
1998	10,308	9			USD 1,185,000
2005	110,746	14	45%	USD 7,525,500	USD 21,012,000

THREATS

Whales and dolphins in the Pacific Islands region face various threats and there are important issues arising for their effective conservation and management.

Fishery Interactions: Depredation and incidental by-catch in long-line fisheries is categorized as a high threat for small and medium toothed whales, and may be a serious concern for small localized populations. Depredation is also recognized as a significant economic threat to long-line fishermen due to loss of catch or bait.

Directed take: Directed take is categorized as a high threat. Scientific whaling on minke, fin, and humpback whales is of specific concern, particularly the take of humpbacks that could directly impact on the recovery of the small vulnerable humpback populations in the waters of SPREP members. An additional issue is the recovery of other large whale species from previous unsustainable commercial harvest.

The drive hunt in the Solomon Islands is categorized as a high threat, as the three species taken may be highly localized and the impacts to these populations are unknown. Capture of animals for public display has also recently occurred and any resumption would be of concern.

Climate Change: Climate change is potentially a high threat to whales and dolphins and their habitats in the region through potential disruption of ocean circulation, changes in the amount and distribution of prey, changes in salinity, temperature and acidity and other parameters. Current climate change models include a wide range of potential scenarios.

Tourism/human interaction**:** Whales and dolphin watching is an important economic opportunity for many countries and territories in the Pacific Islands. If managed according to responsible wildlife viewing practices it should pose only a low threat to whale and dolphin populations. However, if not managed properly this form of tourism could pose a medium threat to the fitness of animals, and potentially a high threat for specific, localized populations that may be vulnerable to disturbance in certain areas such as resting bays. Recent studies show that in some circumstances whale and dolphin watching can cause impacts upon the individuals and populations being watched.

Habitat Degradation: Habitat degradation includes coastal development, sedimentation, aquaculture, nutrients, and other habitat impacts. Of most significance could be localized point source activities. This threat is categorized overall as medium.

Pollution: Plastics are categorized as a medium threat to whales and dolphins in the region. Species that prey on soft-bodied prey such as squid may be susceptible to plastic ingestion, and this has been shown in necropsy results of stranded animals. Toxic chemicals are considered a largely unknown but low threat, but may be of higher concern in specific areas due to impacts from mining operations, port and urban development and ship groundings.

Ship strikes, acoustics, disease: Ship strikes, acoustics, and disease are considered largely unknown but low threats to whales and dolphin in the region. Ship strikes may be a potential for concern in areas with fast vessels and high whale and dolphin concentrations.

THEMES AND OBJECTIVES

Theme	Objectives
1. NATIONAL, REGIONAL AND INTERNATIONAL COLLABORATION AND COOPERATION	• Promote and enhance national, regional and international coordination, collaboration and partnership for whale and dolphin conservation in the Pacific Islands region
2. THREAT REDUCTION	• To develop, test and disseminate effective mitigation techniques that reduce depredation and incidental by-catch, and to document the impact of Illegal, Unreported and Unregulated fishing on whales and dolphins in the Pacific Islands Region • Limit direct take to sustain populations • Improve our understanding on impacts of climate change on whales and dolphins • Minimize impacts of pollution on whales and dolphins • Support the development of sustainable eco-tourism practices in the region • Ensure coastal developments take account of potential impacts on whale and dolphin populations • Improve information on ship strikes, acoustics, disease (Low but Unknown)
3. ECOSYSTEM/HABITAT PROTECTION	• Support the designation and management of national whale/marine sanctuaries in the EEZs of SPREP members • Identify key critical habitat, hotspots, and migratory pathways that are candidates for improved conservation.
4. CAPACITY BUILDING	• Increase in-country expertise, field capacity and regional cooperation
5. EDUCATION AND AWARENESS	• Develop communication strategies, training programs and protocols for key issues within the Whale and Dolphin Action Plan • Increase awareness and understanding of whales and dolphins in the Pacific Islands Region • Promote awareness regarding the value of traditional knowledge and practices in the management of whales and dolphins
6. CULTURAL SIGNIFICANCE AND VALUE	• To document the range of cultural practices, values and knowledge associated with whales and dolphins and encourage a more cohesive approach in policies and legislation • Preserve and protect the traditional knowledge and values associated with whales & dolphins • Ensure appropriate cultural knowledge, practices, and values inform and underpin management measures
7. LEGISLATION AND POLICY	• Develop country level legal, policy and institutional framework to support the effective implementation of the Whale and Dolphin Action Plan
8. RESEARCH AND MONITORING	• Improve information received on stranding events in the Pacific Islands Region • Identify key species and areas for baseline surveys • Identify significance of and priority for toxicological research
9. WHALE AND DOLPHIN-BASED TOURISM	• Foster sharing of lessons learnt and undertake regular assessment of the industry • Ensure the best practice management of the whale and dolphin watching industry in the Pacific Islands Region • Maximize educational and economic values of whale and dolphin watching

THEMES AND PRIORITY ACTIONS

THEME 1: NATIONAL, REGIONAL AND INTERNATIONAL COLLABORATION AND COOPERATION

OBJECTIVE: ***Promote and enhance national, regional and international coordination, collaboration and partnership for whale and dolphin conservation in the Pacific Islands region.***

Actions:		Lead	Priority
1.1	Promote understanding by facilitating effective information sharing mechanisms to assist in addressing cross-sectoral issues and migratory species conservation.	SPREP	High
1.2	Encourage and support PICTs to remove internal cross-sectoral barriers to effectively implement the WDAP at the local, island, government level.	Members	High
1.3	Facilitate PICTs involvement and participation in relevant international meetings and initiatives for whales and dolphins conservation.	SPREP/ Partners	High
1.4	Promote cooperation and highlight achievements and lessons learnt in whale and dolphin conservation at regional and international conferences and fora.	SPREP	High
1.5	Ensure whales and dolphins conservation needs are integrated into the development and implementation of the SPREP Environment Ministers Regional MPA framework.	SPREP	High
1.6	Develop linkages with relevant regional organizations and processes (such as RFMOs), eg. MoUs information exchange and cross-sectoral integration.	SPREP/ Members	Medium
1.7	Develop linkages with relevant private sector organizations to reduce threats to whales and dolphins such as by-catch, depredation and marine debris (such as fishing and tourism industries, NGOs).	Members/ SPREP/ Partners	High
1.8	Effect improved integration of whale and dolphin conservation into national, regional and international initiatives including: national - NBSAP, NSDS; regional - Pacific Islands Regional Oceans Policy, Action Strategy for Nature Conservation, CROP Marine Sector Working Group, RFMOs, NBSAP Working Group).	Members/ SPREP/ Partners	High

Indicators:

- Number of national, regional and international organizations, processes and frameworks incorporating PIR whale and dolphin conservation needs.
- Number of national, regional and international partnerships created to support WDAP implementation.

THEME 2: THREAT REDUCTION

OBJECTIVE (i): FISHERIES INTERACTION

- ***To develop, test and disseminate effective mitigation techniques that reduce depredation and incidental by-catch;***
- ***To document the impact of Illegal, Unreported and Unregulated fishing on whales and dolphins in the Pacific Islands Region.***

Actions:		Lead	Priority
Depredation/fishery interactions			
2.1	Collaborate with RFMOs and share information on fisheries, marine mammals interactions and successful and unsuccessful tactics for mitigation.	Members, SPREP, RFMO, WCPFC, SPC, FFA, FAO, CBD, DWFNs, Partners	High

2.2 Encourage distant water fishing nations to support PIR in ensuring sustainable and responsible fishing practices and to maintain the health of the ocean and PIR economies.	Members, RFMO, WCPFC, SPC, FFA, FAO, DWFNs, SPREP, Partners	Medium
2.3 Foster industry/research institutions/governments partnerships to develop and test mitigation techniques to reduce by-catch and depredation.	Members, DWFNs, RFMOs	High
2.4 Examine information on IUU to better understand potential impacts on marine mammals including by-catch and depredation.	SPREP, SPC, FFA, FAO, Research Institutions, Partners	High
2.5 Collect and disseminate information on the scale of depredation and by-catch from fishing operations, to better assess level of priority and possible mitigation actions.	FFA, SPC, RFMO, SPREP, Members	High
Fishery Ecological Interactions **(Low but regional concern on this issue is High).**		
2.6 Support outreach and education programmes that provide understanding of the scientific principles of the low level of competition between whales/dolphins and fisheries in this region.	Partners	Low/High

Indicators:

- Properly tested mitigation technique.
- Acceptance and use of a successful technique by long-line fisheries in the region.
- System of collecting data from fishing operations on by-catch and depredation developed and used.

OBJECTIVE (ii): *Limit direct take to sustain populations*

Actions:	**Lead**	**Priority**
Direct take: Whaling		
2.7 Support non-lethal research on abundance, structure, trends, and assessments of impacts – particularly on humpback, minke and fin whales.	SPREP/Partners/ Members	High
Direct take: Drive hunts and live capture		
2.8 Support research on abundance, structure, distribution, trends, and assessments of harvest impacts on the whale and dolphin species targeted.	SPREP/Partners/ Members	High
2.9 Ensure the direct take of whales and dolphins does not affect viability of local populations.	Members	High
2.10 Ensure any live capture activities in the region comply with international regulations and agreements.	Members	High

Indicators:

- Non-lethal Research on abundance etc carried out concerning whale and dolphin species targeted in whaling, hunt and live capture.
- Sustainable principles applied to any direct take and international regulations/agreements applied to capture activities.

OBJECTIVE (iii): *Improve our understanding of climate change impacts on whales and dolphins*

Actions	**Lead**	**Priority**
2.11 Facilitate the collation and dissemination of current knowledge on the impacts of climate change on marine mammals and their habitats,	SPREP, scientific institutions, CBD Sec and UNFCCC Sec, partners	High

Indicators:

- Document/presentation on climate change impacts to whales and dolphins provided to SPREP members by 2009.

OBJECTIVE (iv): *Minimize impacts of pollution on whales and dolphins*

Actions:	Lead	Priority
Plastics and marine debris		
2.12 Encourage improved waste management at community and national levels to reduce plastics and other debris in the marine environment.	Members	Medium
2.13 Develop and promote the use guidelines for fishing operations related to discarding of waste.	SPREP/SPC	Medium
2.14 Collect information on the potential impact of plastics and fishing gear on whales and dolphins, including from stranding networks.	Members/ parnters	High
2.15 Where possible, request that necropsies include examination for plastic ingestion.	Members	High

Indicators:

- ⊙ Better information on the impacts of plastics and other debris to whales and dolphins.
- ⊙ Guidelines developed for proper waste management at all levels including from fishing boats.

OBJECTIVE (v): *Identify and mitigate any significant impact from marine whale and dolphin based tourism*

Actions:	Lead	Priority
2.16 Identify potential for significant impact/localised effects from tourism activities on whales and dolphins.	Partners/ SPREP/ Members	Medium
2.17 Develop management and mitigation strategies to reduce identified impact.		
2.18 Assess any potential impacts of whale and dolphin watching activities on the animals e.g. • Spinner dolphin watching • Swim-with programs • Vessel interactions.	Partners	High

Indicators:

- ⊙ Significant adverse effect from whale and dolphin watching tourism identified and threat mitigated and lessons learnt promoted and widely shared in the region.
- ⊙ Studies on impacts of whale/dolphin watching completed in New Caledonia, Tonga. Studies undertaken in Guam, French Polynesia, Hawaii.

OBJECTIVE (vi): *Ensure coastal development takes account of impacts on whale and dolphin populations*

Actions:	Lead	Priority
2.18 Encourage consultation/consideration of impacts on whales and dolphins in national legislative and EIA processes.	Members	High
2.19 Identify particular localized areas and populations – and then develop appropriate monitoring and mitigation of any significant impacts.	Members/ Partners	Medium
2.20 Provide information on potential impacts of coastal development to whales and dolphins to decision makers and public.	Members	Medium

Indicators:

- ⊙ Consideration of impacts on whales and dolphin incorporated in national legislation and other processes such as EIA and potential impact information made available.
- ⊙ Monitoring of identified localized populations initiated.

OBJECTIVE (vii): ***Improve understanding of unknown but potential threats to whales and dolphins, including ship strikes, entanglement, acoustics, disease***		
Actions:	**Lead**	**Priority**
2.21 Encourage anecdotal and opportunistic recording and documentation for ship strikes, entanglement and disease.	Members	Low but Unknown
2.22 Identify any significant source of acoustic noise pollution that could affect whales and dolphins in the region.	Members	Low
Indicators: ⊙ System in place and operational to collect anecdotal opportunistic data and to be able to respond if one of these becomes a significant threat at local, national or regional level.		

THEME 3: ECOSYSTEM/HABITAT PROTECTION[6]

Objectives:

- ***Support the designation and management of national whale/marine sanctuaries in the EEZs of SPREP members***
- ***Identify key critical habitat, hotspots, and migratory pathways that are candidates for improved conservation.***

Actions:	**Lead**	**Priority**
3.1 Support the declaration of EEZ wide whale sanctuaries by SPREP members and support these sanctuaries to develop and implement management plans and strategies.	SPREP/ Partners	High
3.2 Establish a working group on ecosystem/habitat protection that will identify critical habitats, hotspots and migratory pathways and environmental linkages (spatial and temporal).	SPREP/ Partners/ Members	Medium
3.3 Evaluate and support marine protected areas and networks where they are a suitable method and benefit to the protection of whales and dolphins and their habitats in the identified areas.	SPREP/ Partners	High
3.4 Integrate, where relevant and appropriate, whale and dolphin conservation into the development of MPAs/MMAs and in the region.	Members	High
Indicators: ⊙ Additional SPREP Member designate national EEZ whale sanctuaries. ⊙ Management strategies/plans developed, finalized and implemented for existing sanctuaries. ⊙ Working group identifies potential areas for marine protected area designation and management.		

[6] There are two general terms often used in regard to whales and dolphins ecosystem protection, these are "sanctuaries" and "marine protected areas". Typically in the Pacific Islands Region, and for the use in this Plan, "sanctuaries" refer to EEZ-wide whale sanctuary declarations with a principle objective of prohibiting commercial whaling. The other management tool, here referred to as "marine protected areas", may be smaller in scale and often refer to specific critical habitats, hotspots, or pathways.

THEME 4: CAPACITY BUILDING

OBJECTIVE: ***Increase in-country expertise and capacity***

Actions:		Lead	Priority
4.1	Identify training needs and support proposal writing to implement WDAP at the country and regional level, using existing processes such as NCSA.	Members/ SPREP	High
4.2	Develop training packages on common priorities (e.g. stranding, data recording, legislation, communication etc) based on regional priorities and convene workshops based on identified needs.	SPREP/ Partners	High
4.3	Support internship training on whales and dolphins in existing research centers.	Partners	High
4.4	Build in-country capacity to prepare relevant regulation, legislation and policy.	Members/ SPREP	High
4.5	Conduct local and/or regional training workshops on necropsy including collection and storage of tissues, skeletal remains and analysis.	SPREP/ Auckland Uni,	High
4.6	Conduct training and verification of whale and dolphin sightings and reporting, and develop database complementary to that under Marine Turtle Action Plan.	SPREP/ Partners	Medium
4.7	Conduct at least one specialist regional workshop in abundance estimation techniques (sighting surveys) followed by field training cruise.	SPREP/ CMS/ WDCS	High
4.8	Develop surveillance and enforcement capacity for implementation of national protection measures including whale and dolphin watching tourism operations.	Members	High
4.9	Conduct industry training and certification programs for whale/dolphin watching operators and guides, which should be required to attain a whale & dolphin watching permit/ license where applicable.	Partners	High

Indicators:

- Training needs identified and addressed.
- Training packages prepared and made available.
- Increased technical capacity to obtain information and assist in the conservation of whales and dolphins in the region.
- Improved capacity to develop and implement policies and legislation.
- Whale/dolphin operator training and certification programs are implemented in SPREP nations.

THEME 5: EDUCATION AND AWARENESS

OBJECTIVE (i): ***Develop communication strategies, training programs and protocols for key issues within the Whale and Dolphin Action Plan***

Actions:		Lead	Priority
5.1	Identify key issues for each Member and support development of appropriate education strategies and programs (e.g. known threats, species ID and status).	Members/ Partners	High
5.2	Develop appropriate educational and awareness tools for different target audiences at a regional and national level including producing a template to facilitate production in local dialect.	SPREP/ Members/ Partners	High
5.3	Up-skilling of government agencies and community trainers to facilitate stewardship, and to develop and deliver outreach programs.	Members	Medium

Indicators:

- Community and school education programs implemented.
- Regionally relevant facts sheets to inform governments and industry on key issues are produced (e.g. fisheries interactions, cultural practices, regulations, biology & natural history).
- Training programs carried out in-country for key government agencies and identified local community stewards.

OBJECTIVE (ii): ***Increase awareness and understanding of whales and dolphins in the Pacific Islands Region***

Actions:		**Lead**	**Priority**
5.4	Utilize existing community networks and venues to deliver public presentations.	Members	High
5.5	Provide materials and information to community media (TV and radio stations) in-country to inform public.	Members/SPREP/ Partners	High
5.6	Disseminate educational materials targeted at recreational/ private boaters to ensure minimum impact.	Members/SPREP/ Partners	Medium

Indicators:

- ⊙ Presentations on whales & dolphins are carried out in schools, village halls, and during annual festivities.
- ⊙ Whales & dolphins are profiled through documentaries, interviews and regular spots in local media.
- ⊙ ID guides, fact sheets and guidelines brochures are distributed to boaters, marinas, yacht clubs, through government agencies and NGO's.

OBJECTIVE (iii): ***Promote awareness regarding the value of traditional knowledge and practices in the management of whales and dolphins***

Actions:		**Lead**	**Priority**
5.7	Integrate traditional knowledge, stories and customs into education and awareness developed.	Members, SPREP	High
5.8	Encourage the use of informal/traditional methods of education within villages, e.g. utilizing elders as resource people.	Members, Partners, SPREP	Medium

Indicators:

- ⊙ Education programs implemented in schools, education centres and museums.
- ⊙ Informal/traditional methods of education are employed at community level.

THEME 6: CULTURAL SIGNIFICANCE AND VALUE

OBJECTIVE (i): ***To document the range of cultural practices, values and knowledge associated with whales and dolphins and encourage a more cohesive approach in policies and legislation.***

Actions:		**Lead**	**Priority**
6.1	Undertake a review of customary practice and knowledge related to the conservation and management of whales and dolphins.	SPREP/ Partners	High
6.2	Promote the adoption and integration of customary practices related to the conservation and management of whales and dolphins, where appropriate.	Members	High
6.3	Review and identify gaps and conflicts in relevant policies and legislation that supports/limits the protection and promotion of TRM, TK, IPR, ABS, and CMT.	Members	High
6.4	Encourage the need to address gaps and conflicts found in the review where required, in consultation with local communities and relevant stakeholders.	Members/ SPREP	High
6.5	Support and promote the introduction of appropriate formal protection of IPR, TK and ABS at a national, regional and international level.	Members/ SPREP	High
6.6	Support the documentation of traditional knowledge, practices, heritage and values, using existing networks.	Members/ SPREP	High

Indicators:

- ⊙ TK and other customary practices and values documented and incorporated where relevant.
- ⊙ Review on gaps carried out and report published and disseminated.
- ⊙ Artifacts and narratives (oral histories) documented and conserved in local museums.

OBJECTIVE (ii): ***Preserve and protect the traditional knowledge and values associated with whales and dolphins***

Actions:	**Lead**	**Priority**
6.7 Identify and empower appropriate in country authorities to hold, maintain and promote traditional knowledge.	Members	High
6.8 Establish documentation protocols and agreed partnerships with cultural groups/chiefly bodies and individual knowledge holders regarding appropriate use and dissemination of information.	Members	High

Indicators:

- ⊙ Each country has identified appropriate authority to house and promote cultural information.
- ⊙ On going promoting and support for TK, ABS in national, regional and international fora etc.

OBJECTIVE (iii): ***Ensure appropriate cultural knowledge, practices, and values inform and underpin management measures.***

Actions:	**Lead**	**Priority**
6.9 Assess the sustainability of cultural practices involving whales and dolphins that may represent a threat to whales and dolphins (e.g. Fijian *tabua*, Solomon Islands dolphin drive).	Members/ SPREP	High
6.10 Ensure biological survey designs respect and draw upon Traditional Knowledge.	Members	High
6.11 Ensure national and local policies and management respect and draw upon Traditional Knowledge.	Members	High

Indicators:

- ⊙ Case studies supported on sustainability of cultural practices in country's interested supporting sustainability assessments.
- ⊙ Relevant whale and dolphin TK and cultural values are utilized and acknowledged in scientific survey design and execution and formulation of national management policies.

THEME 7: LEGISLATION AND POLICY

OBJECTIVE: ***Develop country-level legal, policy and an institutional framework to support the effective implementation of the Whale and Dolphin Action Plan.***

Actions:		Lead	Priority
7.1	Complete legislative and policy review and disseminate the final report. Review to include: • Identifying legislative inconsistencies and gaps within PICTs; • Extending to cover US, UK, Pitcairn, France, Australia and NZ; • Assessment of country capacity to implement the WDAP, CMS Cetacean MoU, CITES and CBD where relevant; • Country capacity to implement CITES/CBD; • Habitat and species protection measures; • Sanctuary declaration; • Regulation of distant water and local fleets, including observer programme coverage to document commercial fishing impact on whales and dolphin.	IFAW/SPREP	High
7.2	Further develop policies, regulations and legislation for the effective conservation management of whales and dolphins, including measures to mitigate threat and ensure habitat protection.	Members/ SPREP/Partners	High
7.3	Identify and respond to country/territory legal and policy capacity needs.	Members/ SPREP/ Partners	Medium
7.4	Assess processes and outcomes used for NCSA and other related biodiversity mechanisms, to address legal and policy capacity needs for whale and dolphin conservation.	Members	Medium

Indicators:

- ⊙ Regional legislative/management review completed and widely disseminated.
- ⊙ Harmonization of in-country/territory policy and legal instruments.
- ⊙ Capacity strengthened to draft, manage and enforce legislation and policy in-country/territory.
- ⊙ Number of NBSAPs or equivalent strategies integrating WDAP actions.

THEME 8: RESEARCH AND MONITORING

This Action Plan promotes only non-lethal techniques for research

OBJECTIVE (i): ***Improve information received on stranding events in the Pacific Islands Region.***

Actions:		Lead	Priority
8.1	Develop a web-accessible regional stranding database, with verification process for species identification.	SPREP/ Te Papa/ Members	High
8.2	Collect community records and knowledge on whales and dolphins and incorporate into the regional stranding database.	Members	High
8.3	Produce a regional booklet/stranding manual with species identification, forms and instructions in English, Pidgin and French.	SPREP	High
8.4	Encourage an MoU between the University of Auckland and SPREP for processing and storage of tissue samples for genetic work.	SPREP/ CMS	High
8.5	Provide basic stranding kits (for genetic samples) to Members.	Auckland Uni/Donors	High

	Uni/Donors	
8.6 Assist in funding for experts to attend national workshops in regions.	SPREP	Medium

Indicators:

- Stranding Database and network established and operational.
- Stranding manual produced in three languages and distributed.
- Tissue archive and protocols for deposition and access established.
- Kits for genetic sampling distributed and used.
- Improved information on strandings events in all PICTs.

OBJECTIVE (ii): ***Identify key species and areas for baseline surveys***

Actions:	**Lead**	**Priority**
8.7 Establish web-accessible sighting database.	SPREP	Medium
8.8 Improve species inventories for all PICTs, prioritizing those recognised as data deficient.	Members/ Partners/ SPREP	High
8.9 Conduct dedicated surveys to estimate abundance and trends of whales and dolphins species.	SPWRC/ Partners/ Members	High
8.10 Provide adequate species identification and related information resources for all PICTs e.g. IFAW and SPC identification kit for observer programme.	SPREP/ SPC/ IFAW/ Partenrs	Medium
8.11 Increase use of platforms of opportunity (e.g. fisheries patrols and observers, aerial surveillance, naval and merchant shipping, other marine research programmes) for whale and dolphin sightings.	All	Medium
8.12 Increased use of remote sensing devices, especially acoustic.	SPWRC/ NOAA/Partners	Low

Indicators:

- Online regional sighting database established and operational.
- Species inventories for all data deficient SPREP members improved.
- Species inventories for at least 3 SPREP members improved by addition of further species.
- Cruises to estimate abundance of whales and dolphins species completed in at least 2 SPREP Members.
- Species information and id kit assembled and distributed.
- Incorporation of whale and dolphin expertise to conduct sightings and research activities in cruises dedicated to other purposes (e.g. Rapid Ecological Assessments).
- Increased reporting level for whales and dolphins sighted from fisheries enforcement patrols, fisheries observers, ferries, other commercial vessels and aerial surveillance flights conducted to combat IUU fishing.
- At least one remote sensing device deployed in the region for at least six months.

OBJECTIVE (iii): ***Identify significance of and priorities for toxicological research***

Actions:	**Lead**	**Priority**
8.13 Investigate need and opportunities for toxicological research.	SPREP	Low
8.14 Identify suitable laboratories for toxicological analysis.	SPREP	Low
8.15 Identify funding sources.	SPREP/ Partners	Low

Indicators:

- Regional expertise in, and laboratories for toxicological analysis identified.
- Areas in the region where toxicological analysis would be a high priority identified.

THEME 9: WHALE AND DOLPHIN-BASED TOURISM

To ensure that the development of whale and dolphin based tourism is sustainable and conducted responsibly throughout the Pacific Islands Region

OBJECTIVE (I): ***Foster sharing of lessons learnt and undertake regular assessment of the industry***

Actions:		**Lead**	**Priority**
9.1	Develop a framework to maintain effort to document industry growth (building on SPTO/SPREP/IFAW/SPWRC work).	Partners/SPREP	High
9.2	Promote understanding of the industry, the lessons learnt and their implications.	Partners/SPREP	High/ Medium
9.3	Foster communication between key in-country stakeholders, in particular industry and government, to promote understanding and assist in the management of the industry.	Members	High/ Medium
9.4	Monitor, document and support PICTs where whale watching activities occur as models in addressing licensing, regulation and management issues, ensuring that industry development draws on lessons learned.	SPREP/ Partners	High

Indicators:

- ⊙ Reporting system developed to gather information on growth of the industry.
- ⊙ Regional whale watching report updated and disseminated to relevant management bodies, industry, media and community.
- ⊙ Industry, Government and key stakeholders (NGO's, researchers, community groups) meet in-country as required to discuss issues and actions.
- ⊙ Key resources and technical support (reports, examples, templates) is available from SPREP.

OBJECTIVE (ii): ***Ensure the best practice management of whale and dolphin based tourism in the Pacific Islands Region***

Actions:		**Lead**	**Priority**
9.5	Develop region-wide whale and dolphin watching guidelines.	IFAW/ SPREP/Partners	High
9.6	Hold regional whale and dolphin watching workshop to promote best practice management and endorse regional guidelines.	Operation Cetaces/ IFAW/SPREP	High
9.7	Support collaborative and best practice management of whale and dolphin watching activities involving all stakeholders.	Members	High
9.8	Promote licensing/permitting of whale and dolphin watching tourism operations as a tool for management.	Members	High

Indicators:

- ⊙ Workshop held, well attended by SPREP members and industry.
- ⊙ Regional guidelines developed, accepted, published and utilized by SPREP members and industry.
- ⊙ Stakeholders are consulted in the development of management measures.
- ⊙ Licensing schemes are implemented in SPREP nations where whale and dolphin based watching tourism occurs.
- ⊙ Management agencies have on-water presence to monitor and enforce in-country licensing and permitting conditions.
- ⊙ Whale and dolphin tourism in the region operating according to responsible wildlife viewing practices

OBJECTIVE (iii): ***Maximize educational and economic values of whale and dolphin based tourism watching***		
Actions:	**Lead**	**Priority**
9.9 Develop programs for whale and dolphin watching operators to collect useful data.	Members/ SPREP	High
9.10 Support countries to develop an education kit for on-board operations.	SPREP/ Partners	High
9.11 Promote socio-economic benefits of whale and dolphin watching to local communities.	Members	High/ Medium
9.12 Assist countries to explore the potential for whale and dolphin watching through feasibility studies.	Partners/ SPREP	High/ Medium

Indicators:

- Data sheet developed and disseminated to operators and reported annually to SPWRC.
- Educational Kits developed and disseminated to SPREP nations.
- Community outreach program conducted in-country targeted at local media, villages, community groups.
- Feasibility studies conducted in relevant SPREP nations.

Table 3.1: Check-list of Country/Territory-Specific Whale and Dolphin Species Records in the Pacific Islands Region (Miller, 2007).

Cetacean Species	American Samoa	Cook Islands	Federated States of Micronesia	Fiji	French Polynesia	Guam	Kiribati	Marshall Islands	Nauru	New Caledonia	Niue	CNMI	Palau	PNG	Pitcairn Islands	Samoa	Solomon Islands	Tokelau	Tonga	Tuvalu	Vanuatu	Wallis and Futuna
Minke whales*	1	2		1	U			2		1	1		U		U	U			1			
Sei whale		U				U				2				1								
"Bryde's-like" whales*		U	1	1	U	U		U	2	1		U	2	U		2	U				U	
Blue whales*		2		U			U	2		1							2					
Fin whale				2	U			2														
Humpback whale	1	1		1	1	2		2		1	1	1		U	U	1	U		1		1	1
Common dolphins*		2		U				2		2		U					U					
Pygmy killer whale					1					1			U	U					1			
Short-finned pilot whale	1	1	1	1	1	2	2	2		1	2	2	U	1	2	1	1		1		2	
Risso's dolphin		U			1	2				1		1	U	1		2	1		1			
Fraser's dolphin		1	1	U	1		1		2				U	1		2	2					
Irrawaddy/snubfin dolphin														2			U					
Orca	2	1	U	U	1	U	2	2		1	1	U	2	2		1	1	U	1	2	2	
Melon-headed whale		1	1		1	U	U	2	2	1		1	U	1		2	2		1		2	
False killer whale	1	U		1	1		U			1	1	U	U	1		1	2		1			
Indo-Pacific humpback dolphin														2								
Pantropical spotted dolphin	2	1	U	1	1	U	2	2		1			U	1			1		1	U	1	
Striped dolphin		U	1			U	U	2				U	2			2	2				U	
Spinner dolphin	2	1	1	1	1	2	1	2		1	1	1	U	1		1	1		1	1	1	
Rough-toothed dolphin	2			U	1		2	U		1		1		U		1	1					
Bottlenose dolphins*	2	U	2	2	1	U	1	2		1		U	U	1		1	1		1	2	2	
Dwarf/pygmy sperm whale	U			U	1	2				1		2		1		1						
Sperm whale	1	1	2	1	1	U	1	U	2	1	2	2	U	1	U	1	1	1	1	2	1	U
Southern bottlenose whale							2															
Blainville's beaked whale		1		2	1		U			1				U			U					
Cuvier's beaked whale	2	1	U		1	U	U		U	1		2	U	1		1	U					

1=relatively recent field (or specimen record) confirmation of a given species within EEZ
2=potentially Class1 record that is either dated, or may be marginally outside of a given EEZ
U=unconfirmed-record that either was not definitely identified, has not been confirmed by field observations, is from an unobserved stranding event, or is an anecdotal report that for various reasons may be difficult to corroborate

ANNEX 5

THREATS TO DUGONGS IN EASTERN INDIAN OCEAN AND PACIFIC SUBREGION (CMP objectives 1 and 3)

	Thailand	Pakistan	Myanmar	New Caledonia	Australia	Other SPREP
Incidental capture in fishing gear						
• Gill nets	H	n.a.?	H	L?	H	H?
• Beach seine nets	n.a.	n.a.?	L	L?	n.a.	L?
• Purse seine nets	n.a.	n.a.	n.a.?	n.a.	n.a.	n.a.
• Stake traps	M	n.a.?	n.a.	n.a.	n.a.	n.a.
• Longlines for stingrays	L	n.a.	n.a.	n.a.	n.a.	n.a.
• Trawl nets	L	n.a.	L	n.a.	L	n.a.?
• Crab pot lines	n.a.	n.a.	n.a.	n.a.	L	n.a.
Marine debris						
• Fishing line and hooks	n.a.	n.a.	n.a.	L?	L	L?
• Ghost nets	n.a.	n.a.	n.a.	L	L	L?
Habitat destruction						
• Reclamation	n.a.	n.a.	n.a.	n.a.	L	M?
• Climate change	?	?	?	?	?	?
• Water quality (eg. agricultural, land & mining run-off)	n.a.	M?	n.a.?	M	M	M-H
• Coastal development	L-M	L	L	L	L	M
Boat strike	L	n.a.	n.a.	L-M	L-M	M (Palau)
Disturbance, e.g., noise, increased boat activity	?	?	?	?	?	?
Pollutants in the animals	n.a.	n.a.?	n.a.	?	L?	?
Unsustainable hunting	n.a.	n.a.	n.a.	n.a.	n.a.-H (depends on location)	H?
Poaching	n.a.	n.a.	n.a.	M	M	M

Key:
L, low threat; M, medium threat; H, high threat; n.a., not applicable.

ANNEX 6

CURRENT AND POTENTIAL DUGONG MANAGEMENT TOOLS IN EASTERN INDIAN OCEAN AND PACIFIC SUBREGION (CMP objectives 1, 3, 5, 7, 8)

Impact	Current management tools	Potential management tools or needs
Incidental capture in fishing gear		• Information: dugong distribution & abundance • Social/economic impact • Alternate incentives/livelihood • Optimal mesh size: fish vs dugong capture rate • Fisher education: significance of impact
• Gill nets	• Area closures (Australia, Myanmar, Papua New Guinea) • Time closures (Australia, Myanmar, Papua New Guinea) • Gear modification (Australia, Myanmar) • Acoustic alarms/pingers (Australia) • Fisher education (Australia, Myanmar, Thailand) • Net attendant rules (Australia)	
• Beach seine nets	• Method of fishing (Myanmar, Pakistan) • Gear specification, e.g., mesh size (Pakistan)	
• Purse seine nets	• Similar to beach seine nets	
• Stake traps	• Rescue stranded dugongs (Thailand) • Regulate new traps	
• Longlines for stingrays	• Legislate to reduce gear (Thailand)	
• Trawl nets		• Use of turtle excluder devices (Thailand, Pakistan, Myanmar, Australia)
• Crab pot lines	• Fisher education (Australia) • Gear modification: straight tight lines	
Marine debris	• Fisher education: significance of impact (Australia) • Underwater clean-ups (Thailand) • Capacity & resources	• Reporting of lost gear • Reducing use of gear in key dugong areas
• Fishing line and hooks		
• Ghost nets		
Habitat destruction	• Environmental impact assessment/guidelines • Regulations, restrictions & rehabilitation requirements (SPREP, New Caledonia) • Public education & extension (Thailand, Pakistan, Myanmar)	• Environmental offsets/mitigation? investments in conservation
• Reclamation		
• Climate change		• Mapping of habitats • Maximizing resilience of ecosystem • Minimizing impacts
• Water quality (e.g., agricultural, land & mining run-off)		
• Coastal		

Impact	Current management tools	Potential management tools or needs
development		
Boat strike	• No go or go slow zones (Palau, Australia) • Reduction of number of boats (Thailand) • Change of travel paths (Thailand) • Education & awareness (Palau, Australia)	• Information: dugong distribution & abundance and use of habitat • Social & economic impacts to fishers
Disturbance, e.g., noise, increased boat activity, vibration, construction activities, dredging	• Same as boat strike	• Information: dugong distribution & abundance and use of habitat
Pollutants in the animals		• Monitoring of dugong tissues • Monitoring of environment, e.g., Sediments, seagrass, water quality • Enforcement of restrictions and reducing use of pollutants
Unsustainable hunting	• Increased community capacity & resources to manage • Sharing of experiences & skills • Education & awareness • Addressing socio-economic impacts, well-being • Informing/influencing policy • Monitoring of catch rates • Monitoring of population size • Use of traditional knowledge & traditional practices for management	• Understanding social, cultural, economic and ecological drivers/impacts • Long-term incentives • Long-term interventions • One size does not fit all communities • Need to be pragmatic • Identification of a box of tools which can be used
Poaching (illegal hunting)	• Enforcement of legislation (New Caledonia, Australia) • Education: existing legislation, biological information, impacts on dugongs, need for conservation (New Caledonia, SPREP, Australia) • Enforcement using traditional knowledge & practices (New Caledonia, SPREP, Australia)	• Lack of resources for enforcement

ANNEX 7

INFORMATION NEEDS AND PRIORITIES IN EASTERN INDIAN OCEAN AND PACIFIC SUB-REGION (CMP objectives 2 and 4)

	Dugong information gaps	Dugong habitat information gaps
Thailand	• Population size: Gulf of Thailand • Movement & habitat use • Genetic sampling • Identification of genetic populations (Cambodia, Vietnam)	• Mapping of seasonal seagrass habitats for dugong (Eastern Gulf)
Key priorities • Cooperation with countries in South-East Asian region on dugongs and habitat to address by-catch of marine mammals, including dugong (exploring opportunities to cooperate with regional organizations such as SEAFDEC) • Undertaking in Thailand: (a) tagging studies; (b) mapping of seasonal seagrass habitat in the eastern area of Gulf of Thailand		
Pakistan	• Surveys to investigate links to Indian populations? Eastern coastal	• Mapping of seagrass on western coast
Key priorities • Surveys to investigate links to Indian population on Pakistan's south-eastern coast (Indus delta) • Mapping of seagrass in areas of Kalmat Hor, Astola Island (off Pasni coast) and Jiwani on western coast of Pakistan		
Myanmar	• Extend fisher surveys: where? • Dugong movements & habitat use	• Seagrass mapping: where?
Key priorities • Assessment of dugong occurrence and distribution in Rakhine and Tanintharyi coastal area • Seagrass mapping in Rakhine and Tanintharyi coastal areas • Marine mammal by-catch study in Rahkine coastal area (explore linkages to Thailand priorities) • Transboundary dugong survey in Tanintharyi coast (Myanmar) and east Andaman coast (Thailand)		
New Caledonia	• Biological parameters • Dugong mortality • Movement & habitat use • Better understanding of cultural relationship between dugong & indigenous people and how it is being used in management	• Ongoing seagrass monitoring • Better understanding of cultural relationship between dugong & indigenous people and how it is being used in management
Key priorities • Identify dugong movement and important habitats; 20 dugongs tagged using GPS and TDR tags in intercountry collaboration • Quantify threats: coastal communities questionnaire surveys • Better understand cultural relationship between dugong & indigenous people through supporting a masters degree on social and cultural values and traditional use of dugongs all around the island • Identify genetic population (intercountry collaboration) • Obtain knowledge of biological parameters and dugong mortality through collaboration, network, coordination to monitor strandings, ongoing long-term project		

	Dugong information gaps	Dugong habitat information gaps
Australia	• Better understanding of spatial distribution and relative importance of human impacts on dugongs in northwestern Australia • Better understanding of cultural and socio-economic relationship between dugongs & indigenous people • Better transfer of traditional knowledge about dugongs and consideration of how it could be used in management • Better understanding of capacity-building requirements across the range for community-based management • Better understanding of spatial distribution and relative importance of human impacts on dugongs	• Better understanding of spatial distribution and relative importance of human impacts on dugong habitat in northern Australia • Better understanding of cultural and socio-economic relationship between dugongs & indigenous people • Better transfer of traditional knowledge about dugong habitat and how it could be used in management • Better understanding of the capacity-building requirements across the range for community-based management • Better understanding of spatial distribution and relative importance of human impacts on dugong habitat
Key priorities • Genetic sampling (international cooperation)		
SPREP	• Better understanding of dugongs in SPREP countries (numbers, habitat use) • Understanding of capacity to undertake research & management • Identification of opportunities for community-based management • Better understanding of cultural relationship between dugongs & indigenous people and how it is being used in management	• Research, mapping & prioritizing seagrass habitats • Better understanding of cultural relationship between dugongs & indigenous people and how it is being used in management
Key priorities • Identify important dugong populations using appropriate methodology in Papua New Guinea, Vanuatu, Solomon islands and Palau • Determine genetic population structure in SPREP range States by collecting and analysing specimens		

ANNEX 8

MEMORANDUM OF UNDERSTANDING ON THE CONSERVATION AND MANAGEMENT OF DUGONGS (*Dugong dugon*) AND THEIR HABITATS THROUGHOUT THEIR RANGE

The Signatory States,

Aware that the populations of dugongs are seriously threatened throughout the range of the species and that effective conservation and management requires an integrated ecosystem approach;

Recognising that dugongs migrate and disperse over vast distances, which makes their survival dependent on their conservation and management over a wide area and in a wide range of marine and coastal habitats;

Acknowledging that human activities that may threaten dugong populations directly or indirectly include destruction or modification of habitat, coastal development, pollution, fishing activities, vessel strikes, unsustainable hunting or poaching, uncontrolled mariculture and tourism;

Concerned about the harm caused to dugongs by the gear used in some forms of fishing, such as coastal trawling and driftnet fishing, including activities by vessels of Distant-Water Fishing Nations, while recognizing that some fishing activities are conducted responsibly;

Acknowledging their shared responsibility for the conservation and management of dugong populations and their habitats highlighting the importance of seagrass beds;

Recognising the desirability of involving other States whose nationals or vessels conduct activities that may affect dugongs of the region, as well as States that may be in a position to contribute resources or expertise that may promote the implementation of this Memorandum of Understanding;

Noting that dugongs have a priority for conservation action through their listing in the respective appendices of the Convention on the Conservation of Migratory Species of Wild Animals (CMS) and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES);

Noting that CMS calls for international cooperative action to conserve migratory species, and that CMS Article IV encourages CMS Contracting Parties to conclude Agreements, including non-legally binding agreements, in respect of any population of migratory species;

Recalling also Resolution 2.6 of the Second Meeting of the CMS Conference of the Parties which recommended that Parties implement where appropriate CMS Article IV, paragraph 4, within the spirit of the Convention through the use of instruments such as memoranda of understanding; and

Further noting recommendation 7.5 and resolution 8.5 of the Seventh and Eighth Meetings of the CMS Conference of the Parties called on Range States of dugongs to cooperate among themselves, as appropriate, and participate actively to develop and conclude a Memorandum of Understanding and a Conservation and Management Plan to conserve and manage dugongs throughout the species' range;

Express their desire to work closely together to improve the conservation status of dugongs and the habitats on which they depend. To this end, the Signatory States to this Memorandum of Understanding, in the spirit of co-operation, have reached the following understandings. They will:

1. Endeavour to co-operate closely in order to restore, or where appropriate maintain, a favourable conservation status for dugongs and the habitats on which they depend, taking into account, where appropriate, subsistence and customary use of dugongs in those States where it is permitted.

2. Consider joining those international instruments most relevant to the conservation and management of dugongs and their habitat, in order to enhance the legal protection of the species in the region.

3. Make every effort to review, formulate, revise and harmonise national legislation or regulations, as necessary, relevant to the conservation and management of dugongs and their habitats.

4. Implement, subject to the availability of necessary resources, the Conservation and Management Plan annexed to this Memorandum of Understanding. The Conservation and Management Plan will address:

    (a) Direct and indirect causes of dugong mortality;
    (b) Research and monitoring of dugong populations;
    (c) Protection, conservation and management of habitats;
    (d) Research into and monitoring of important dugong habitats;
    (e) Awareness of dugong conservation;
    (f) National, regional and international cooperation;
    (g) Implementation of the MoU;
    (h) Legal protection of dugong and their habitats; and
    (i) Capacity building at all levels.

5. Establish a Secretariat, based in an appropriate organisation or institution, to be decided by consensus of the Signatory States, to assist in the administration and implementation of this Memorandum of Understanding by communicating with, reporting on and facilitating activities between and among Signatory States and performing such other functions as may be assigned by the Signatory States, such as convening meetings.

6. Assess the implementation of this Memorandum of Understanding, including the Conservation and Management Plan, at regular meetings to be attended by representatives of each of the Signatory States concerned, and persons or organisations technically qualified in dugong conservation and management.

7. Facilitate the timely exchange of relevant information necessary to coordinate conservation and management measures and to cooperate with relevant organizations and recognized experts and so as to facilitate the work conducted in relation to the Conservation and Management Plan.

8. Designate a competent national authority to serve as a focal point for communication among Signatory States and for implementing activities under this Memorandum of Understanding, and communicate the complete contact details of this authority (and any changes thereto) to the Secretariat.

9. Provide to the Secretariat a regular report on their implementation of this Memorandum of Understanding, the frequency of which will be determined at the first meeting of the Signatory States. The Secretariat will make available to the Signatory States the national reports received and will prepare a periodic review of progress made to implement the Memorandum of Understanding and the Conservation and Management Plan.

10. Assess at the first meeting of Signatory States, and review periodically, the need for and possibilities of obtaining financial resources, as well as the establishment of a special fund for purposes such as:

    a) Contributing towards any expenses required to operate the Secretariat and activities carried out under this Memorandum of Understanding; and
    b) Assisting the Signatory States to carry out their responsibilities under this Memorandum of Understanding.

Basic Principles

11. This Memorandum of Understanding is an agreement under Article IV, paragraph 4, of CMS and is not legally binding.

12. The Conservation and Management Plan is an integral part of this Memorandum of Understanding.

13. This Memorandum of Understanding is open for signature by the Range States of the dugong. It will take effect with two signatures. It will become effective for each subsequent signatory on the date of signature.

14. This Memorandum of Understanding will remain open for signature indefinitely, and will remain in effect indefinitely subject to the right of any Signatory State to terminate its participation by providing one year's written notice to all other signatories.

15. The Memorandum of Understanding, including the Conservation and Management Plan, may be amended by a consensus of the Signatory States.

16. Signatory States acknowledge that they may implement more stringent measures domestically than those specified in the Conservation and Management Plan.

17. Signatory States may establish, by mutual agreement, bilateral, sub-regional or regional management plans that are consistent with this Memorandum of Understanding.

18. Actions under this Memorandum of Understanding will be coordinated with Signatory States, as well as with sub-regional institutions in the Region.

19. The original text of this Memorandum of Understanding, in the Arabic, English, French and Chinese languages, each language version being equally authentic, shall be deposited with the CMS Secretariat, which will act as the depositary. The working language for all matters related to this Memorandum of Understanding will be English.

Signed at Abu Dhabi on this 31st day of October 2007

ANNEX 9

CONSERVATION AND MANAGEMENT PLAN FOR THE MEMORANDUM OF UNDERSTANDING ON THE CONSERVATION AND MANAGEMENT OF DUGONGS (*Dugong dugon*) AND THEIR HABITATS THROUGHOUT THEIR RANGE

Species Aspects

Objective 1 – Reduce direct and indirect causes of dugong mortality				
Action	**Priority Level**	**Time-scale**	**Organizations**	**Target**
1.1 Identify, assess and evaluate the threats to dugong populations and develop appropriate measures to address these threats	High (Across all of the range of dugong)	Ongoing	Relevant government agencies, intergovernmental and non-governmental organizations, universities and research institutions, scientists and researchers	Threats to dugongs and their required conservation measures are identified assessed and evaluated
1.2 Reduce to the greatest extent practicable the incidental capture and mortality of dugongs in the course of fishing activities	High	Ongoing	Relevant government agencies, intergovernmental and non-governmental organizations, universities and research institutions, scientists and researchers, fishers and fishing communities	Incidental fishing mortality of dugongs is minimized
1.3 Reduce to the greatest extent practicable the incidental mortality of dugongs arising from other anthropogenic activities	High	Ongoing	Relevant government agencies, intergovernmental and non-governmental organizations, universities and research institutions, scientists and researchers and other stakeholders (e.g., tourism operators, recreational fishers)	Mortality arising from other anthropogenic activities on dugong is minimized
1.4 Reduce to the greatest extent practicable the illegal take of dugong	High	Ongoing	Relevant government agencies, intergovernmental and non-governmental organizations and communities	Illegal take of dugong is minimized
1.5 Ensure that subsistence and customary use of dugong is sustainable in areas where it is permitted	High (In areas where subsistence and customary harvest is permitted)	Ongoing	Relevant government agencies, intergovernmental and non-governmental organizations, universities and research institutions, scientists and researchers and community-based organizations	Subsistence and customary use is managed sustainably

Objective 2 – Improve our understanding of dugong through research and monitoring				
Action	**Priority Level**	**Time-scale**	**Organizations**	**Target**
2.1 Determine the distribution and abundance of dugong populations to provide a base for future conservation efforts and actions	High	Immediate	Relevant government agencies, intergovernmental and non-governmental organizations, universities and research institutions, scientists and researchers	An understanding, across the range of dugong, of distribution and numbers
2.2 Conduct research and monitoring into dugong	High	Ongoing	Relevant government agencies, intergovernmental and non-governmental organizations, universities and research institutions, scientists and researchers	Research and monitoring that promote dugong conservation are conducted
2.3 Collect and analyse data that supports the identification of sources of mortality, the mitigation of threats and improved approaches to conservation practices	High	Ongoing	Relevant government agencies, intergovernmental and non-governmental organizations, universities and research institutions, scientists and researchers	Data are collected and analysed to improve conservation practices and are reported in national reports

Habitat Aspects

Objective 3 – Protect, conserve and manage habitats for dugong				
Action	**Priority Level**	**Time-scale**	**Organizations**	**Target**
3.1 Identify and map areas of important dugong habitat such as sea grass beds	High	Immediate	Relevant government agencies, intergovernmental and non-governmental organizations, universities and research institutions, scientists and researchers	Important dugong habitat identified and mapped
3.2 Establish necessary measures to protect and conserve dugong habitats	High	Ongoing	Relevant government agencies, intergovernmental and non-governmental organizations, universities and research institutions, scientists and researchers and local communities	Measures to protect dugong habitat are developed and implemented
3.3 Assess the risk of, and develop measures to mitigate against, the degradation of dugong habitats	High	Ongoing	Relevant government agencies, intergovernmental and non-governmental organizations, universities and research institutions, scientists and researchers and local communities	Dugong habitats at risk are assessed and action to mitigate those risks are taken

Action	Priority Level	Time-scale	Organizations	Target
3.4 Identify and where appropriate, rehabilitate degraded dugong habitats	Medium	Ongoing	Relevant government agencies, intergovernmental and non-governmental organizations, universities and research institutions, scientists and researchers and local communities	Degraded important habitats for dugong are identified and where appropriate remedial steps are taken
Objective 4 – Improve our understanding of dugong habitats through research and monitoring				
Action	**Priority Level**	**Time-scale**	**Organizations**	**Target**
4.1 Conduct research into and monitoring of important dugong habitats	High	Ongoing	Relevant government agencies, intergovernmental and non-governmental organizations, universities and research institutions, scientists and researchers and local communities	Research and monitoring that promote dugong conservation are conducted

Awareness and Education

Objective 5 – Raise awareness of dugong conservation				
Action	**Priority Level**	**Time-scale**	**Organizations**	**Target**
5.1 Establish education, awareness and information programmes	High	Ongoing	Relevant government agencies, Intergovernmental and non-governmental organizations, universities and research institutions, scientists and researchers	Programmes are implemented and the conservation needs of dugong are widely understood by all stakeholders
5.2 Consult with local communities to encourage their active participation in conservation efforts	High	Ongoing	Relevant government agencies, intergovernmental and non-governmental organizations, and local communities	Local communities are actively involved in dugong conservation

Objective 6 – Enhance national, regional and international cooperation				
Action	**Priority Level**	**Time-scale**	**Organizations**	**Target**
6.1 Collaborate with, and assist Signatory and non-Signatory States to combat illegal international and domestic trade, and to cooperate in enforcement activities relating to dugong products	Medium	Ongoing	Relevant government agencies, inter-governmental and non-governmental organizations	Illegal trade is controlled by cooperative action
6.2 Develop and implement mechanisms for effective exchange of information	High	Ongoing	Relevant government agencies, Intergovernmental and non-governmental organizations, universities and research institutions, scientists and researchers and local communities	Mechanisms for cooperation and information exchange are established and used by Signatory States
6.3 Improve coordination among government and non-government sectors and communities in the conservation of dugongs and their habitats	High	Ongoing	Relevant government agencies, intergovernmental and non-governmental organizations, universities and research institutions and local communities	Coordination amongst government and non-government and community sectors is established for the conservation of dugong and their habitats
6.4 Develop and implement a regional database of relevant information in relation to dugong conservation and management	High	Ongoing	Relevant government agencies, intergovernmental and non-governmental organizations, universities and research institutions, scientists and researchers	Important information in relation to dugong, across their range, is available to all parties to the MoU
Objective 7 – Promote implementation of the MoU				
Action	**Priority Level**	**Time-scale**	**Organizations**	**Target**
7.1 Encourage all Range States to participate in the MoU and its conservation and management activities	Medium	Ongoing	Relevant government agencies, intergovernmental and non-governmental organizations	The MoU encompasses all dugong Range States
7.2 Support the Secretariat of the MoU to ensure the objectives of the Conservation and Management Plan are met	High	Ongoing	Relevant government agencies, intergovernmental and non-governmental organizations	The Secretariat is established and is effective in implementation of the MoU and Conservation and Management Plan
7.3 Seek resources to support the implementation of the MoU	High	Ongoing	Relevant government agencies, intergovernmental and non-governmental organizations, donor agencies and the private sector	Adequate resources are obtained to implement the MoU

Action	Priority Level	Time-scale	Organizations	Target
7.4 Create links and develop synergies with other relevant regional conservation conventions, MoUs and Agreements	Medium	Ongoing	Relevant government agencies, intergovernmental and non-governmental organizations and other agreement Secretariats	Potential complementarities between dugong and other marine wildlife species in conservation and management are identified and enhanced

Crosscutting Issues

Objective 8 – Improve legal protection of dugongs and their habitats				
Action	**Priority Level**	**Time-scale**	**Organizations**	**Target**
8.1 Encourage all Range States, and ensure Signatory states, incorporate dugong and habitat conservation and protection measures into national legislation	High	Immediate	Relevant government agencies	Dugongs and their habitats are given appropriate protection in the national legislation of all Range States
8.2 Review, and where necessary, strengthen national legal protection for dugongs and their habitats	Medium	Ongoing	Relevant government agencies and other stakeholders (e.g., consultation with non-governmental organizations, local communities and academic institutions)	Laws protecting dugong are reviewed, strengthened and where appropriate, enforced
Objective 9 – Enhance national, regional and international cooperation on capacity building				
Action	**Priority Level**	**Time-scale**	**Organizations**	**Target**
9.1 Promote capacity building at all levels to strengthen conservation measures	High	Ongoing	Relevant government agencies, intergovernmental and non-governmental organizations, universities and research institutions, scientists and researchers donor agencies, the private sector and philanthropic organizations	Mechanisms to support capacity building activities within Signatory States are established and used

ANNEX 1: EXAMPLES OF SPECIFIC ACTIONS THAT COULD BE IMPLEMENTED UNDER THE CMP

This annex provides a list of examples that are related to Conservation and Management Plan objectives. The examples provide an indication of the types of activities that could take place at local, national and regional scales. Some of the examples are only applicable to some areas and State Signatories to the Memorandum of Understanding will need to assess the relevance of particular approaches in the context of their own national circumstances.

Species Aspects

Objective 1 – Reduce direct and indirect causes of dugong mortality

1.1 Identify, assess and evaluate the threats to dugong populations and develop appropriate measures to address these threats

Examples of specific actions that could be implemented:

a) Establish baseline data collection and monitoring programmes to gather information on the nature and magnitude of threats
b) Regularly update existing data on threats to dugong populations and their habitats
c) Determine those populations affected by traditional subsistence and customary use, incidental capture in fisheries, and other sources of mortality
d) Conduct socio-economic studies among communities that interact with dugongs and their habitats
e) Implement programmes to correct adverse social and economic incentives that threaten dugong populations
f) Facilitate the development of means of subsistence to minimise resultant adverse social and economic impacts
g) Enact, where not already in place, legislation and prohibit the direct use (capture or killing) of, and domestic trade in, dugongs their parts or products, whilst allowing exceptions for traditional subsistence or customary use
h) Establish management programmes to enforce such legislation
i) Negotiate, where appropriate, management agreements in consultation with other concerned States
j) Identify resources and sources of funding for the above programmes

1.2 Reduce to the greatest extent practicable the incidental capture and mortality of dugongs in the course of fishing activities

Examples of specific actions that could be implemented:

a) Develop and use gear, devices and techniques to minimise incidental capture of dugongs in artisanal and commercial fisheries, such as the use of alternative gears and spatial closures or limit or control the use of gears known to be harmful to dugongs throughout the range of dugong

b) Develop procedures and extension programmes to promote implementation of these measures
c) Exchange information and, upon request, provide technical assistance to other Signatory and cooperating States to promote these activities
d) Liaise and coordinate with fishing industries, fisheries management organisations and community groups to develop and implement these activities
e) Develop and implement net retention and recycling schemes to minimise the disposal of fishing gear at sea and on beaches
f) Provide and ensure the use of onshore facilities for the disposal of ship-borne waste

1.3 Reduce to the greatest extent practicable the incidental mortality of dugongs arising from other anthropogenic activities

Examples of specific actions that could be implemented:
a) Assess the level, location and impact of anthropogenic impacts on dugongs at ecologically relevant scales
b) Reduce as much as possible all other human impacts on dugongs and their habitats in areas that sustain subsistence and customary use
c) Establish appropriate management programmes to ensure that anthropogenic impacts are addressed, taking account of the temporal and spatial variability of dugong reproductive rates and other impacts on the species in a precautionary manner

1.4 Reduce to the greatest extent practicable the illegal take of dugong

Examples of specific actions that could be implemented:
a) Assess the level, location and impact of the illegal take of dugongs
b) Establish appropriate management programmes to ensure that the illegal take of dugongs is addressed

1.5 Ensure that subsistence and customary use of dugong is sustainable in areas where it is permitted

Examples of specific actions that could be implemented:
a) Assess the level, location and impact of subsistence and customary use on dugongs at ecologically relevant scales
b) Reduce as much as possible all other human impacts on dugongs and their habitats in areas that sustain subsistence and customary use
c) Determine the cultural and subsistence values and uses of dugongs (both consumptive and non-consumptive)
d) Establish culturally appropriate management programmes to ensure that subsistence and customary use is sustainable, taking account of the temporal and spatial variability of dugong reproductive rates and other impacts on the species in a precautionary manner
e) Ensure that such programmes do not have adverse unintended consequences (e.g., increase use of other threatened species such as marine turtles)
f) Consider the development of alternative means of subsistence in areas where the subsistence and customary use of dugong is permitted to alleviate adverse social and cultural impacts

g) Negotiate, where appropriate, management agreements on the sustainable level of subsistence and customary use where it is permitted, in consultation with other concerned States, to ensure that such use does not undermine conservation efforts
h) Ensure that the management of other species (including fisheries) does not have adverse unintended consequences on the subsistence and customary use of dugongs where it is permitted

Objective 2 – Improve our understanding of dugong through research and monitoring

2.1 Determine the distribution and abundance of dugong populations to provide a base for future conservation efforts and actions

Examples of specific actions that could be implemented:
a) Conduct baseline studies or gather secondary information on dugong populations using cost effective techniques where possible, including community-based monitoring

2.2 Conduct research and monitoring into dugong

Examples of specific actions that could be implemented:
a) Initiate and/or continue long-term monitoring of priority dugong populations at appropriate spatial scales in order to assess conservation status, using a combination of traditional, community-based and scientific techniques where appropriate
b) Identify migratory routes through the use of techniques such as genetic studies and/or satellite tracking where appropriate
c) Carry out studies on dugong population dynamics and survival rates
d) Promote the use of traditional ecological knowledge in research and management studies, where possible
e) Involve local communities in research and monitoring programmes with training as required
f) Review periodically and evaluate research and monitoring activities
g) Identify and include priority research and monitoring needs in regional and sub-regional action plans
h) Conduct collaborative studies and monitoring of genetic identity, conservation status, migrations, and other biological and ecological aspects of dugongs

2.3 Collect and analyse data that supports the identification of sources of mortality, the mitigation of threats and improved approaches to conservation practices

Examples of specific actions that could be implemented:
a) Identify and prioritise populations for conservation actions
b) Identify population trends using local information where appropriate

c) Use research results to improve management, mitigate threats and assess the efficacy of conservation activities (e.g., habitat loss, etc.)
d) Involve local communities in research and monitoring programmes with training as required
e) Develop and harmonise data collection and analysis protocols
f) Where appropriate, develop and harmonise the reporting format that can be used for informing decision-making (local, national and regional)

Habitat Aspects

Objectives 3 – Protect, conserve and manage habitats for dugong

3.1 Identify and map areas of important dugong habitat such as seagrass beds

Examples of specific actions that could be implemented:
Identify and map areas of critical habitat such as seagrass beds and migratory corridors, using rapid assessment techniques where appropriate

3.2 Establish necessary measures to protect and conserve dugong habitats

Examples of specific actions that could be implemented:
a) Designate and manage protected/conservation areas, sanctuaries or temporary exclusion zones in areas of critical habitat, or take other measures (e.g., modification of fishing gear, banning destructive fishing practices, restrictions on vessel traffic) to remove threats to such areas and involving the local community as much as possible
b) Consider protecting dugong habitats as part of ecosystem based management (e.g., networks of marine protected areas)
c) Develop incentives for adequate protection of areas of critical habitat outside protected areas
d) Assess the environmental impact of marine and coastal development and other human activities on dugong populations and their habitats
e) Monitor and promote the protection of water quality from land-based and maritime pollution, including marine debris, which may adversely affect dugongs and their habitats
f) Strengthen the application of existing bans on the use of poisonous chemicals and explosives in the exploitation of marine resources

3.3 Assess the risk of, and develop measures to mitigate against, the degradation of dugong habitats

Examples of specific actions that could be implemented:
a) Identify and enhance recovery of degraded seagrass habitats used by dugongs
b) Identify and enhance recovery of degraded mangrove and coral reef habitats used by dugong
c) Undertake measures to restore degraded habitats

3.4 Identify and where appropriate, rehabilitate degraded dugong habitats

Examples of specific actions that could be implemented:

a) Identify and undertake measures where appropriate to enhance recovery of degraded seagrass habitats used by dugongs

Objective 4 – Improve our understanding of dugong habitats through research and monitoring

4.1 Conduct research into and monitoring of important dugong habitats

Examples of specific actions that could be implemented:

a) Conduct baseline studies or gather secondary information on dugong habitats using cost effective techniques where possible, including community-based monitoring
b) Initiate and/or continue long-term monitoring of priority dugong habitats
c) Promote the use of traditional ecological knowledge in research and management studies, where possible
d) Involve local communities in research and monitoring programmes with training as required
e) Review periodically and evaluate research and monitoring activities
f) Identify and include priority research and monitoring needs in regional and sub-regional action plans

Awareness and Education

Objective 5 – Raise awareness of dugong conservation

5.1 Establish education, awareness and information programmes

Examples of specific actions that could be implemented:

a) Collect, develop, co-ordinate and disseminate education materials (e.g., dedicated regional web site)
b) Identify key persons/champions to help disseminate messages about the need to conserve dugongs and their habitats
c) Establish community learning/ information centres
d) Develop and implement mass media information programmes
e) Develop and conduct focused education and awareness programmes for target groups (e.g., policy makers, teachers, schools, fishing communities, subsistence and customary users, media)
f) Encourage the incorporation of dugong biology and conservation issues into school curricula

g) Organise special events related to dugong conservation and biology (e.g., Dugong Day, Year of the Dugong, symposia, community education workshops)
h) Promote public participation in conservation activities
i) Involve stakeholders, including key policymakers, subsistence and customary users, and local communities in particular, in planning and implementation of conservation and management measures
j) Encourage the participation of government institutions, intergovernmental government organisations, non-governmental organisations, the private sector and the general community (e.g., students, volunteers, fishing communities, local communities) in research, conservation and management efforts
k) Implement, where appropriate, incentive schemes to encourage public participation (e.g., T-shirts, public acknowledgement and certificates)

5.2 Consult with local communities to encourage their active participation in conservation efforts

Examples of specific actions that could be implemented:
Identify, develop and facilitate alternative programmes (including means of subsistence and incentives) that are not detrimental to dugongs and their habitats, in consultation with local communities and other stakeholders

Cooperative Aspects

Objective 6 –Enhance national, regional and international cooperation

6.1 Collaborate with and assist Signatory and non-Signatory States to combat illegal international and domestic trade, and to cooperate in enforcement activities relating to dugong products

Examples of specific actions that could be implemented:
a) Encourage Signatory States that have not already done so to become Parties to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
b) Review at a national level, compliance with obligations under CITES relating to illegal international trade in dugong parts or products
c) Facilitate better compliance with CITES through training of relevant authorities in cooperation with other Signatory States, the CITES Secretariat and other relevant organisations
d) Identify routes of international illegal trade through monitoring, and seeking cooperation to take action to prevent, deter and, where possible, eliminate i.t
e) Exchange and discuss information on compliance and illegal trade issues at regular intervals, such as through annual reporting to the MoU Secretariat and at meetings of the Signatory States

f) Identify, prevent, deter and, where possible, eliminate domestic illegal trade through monitoring, implementation of legislation, identification of gaps in enforcement capabilities in each country, and training of enforcement officers

6.2 Develop and implement mechanisms for effective exchange of information

Examples of specific actions that could be implemented:

a) Identify and strengthen existing mechanisms for cooperation at the regional and sub-regional level
b) Develop a website and/or newsletter to facilitate networking and exchange of information
c) Develop a web-based information resource for dugong conservation (including data on populations, migration, on-going projects) based on IUCN website
d) Regularly update a directory of experts and organisations concerned with dugong conservation
e) Develop networks for cooperative management of shared populations, within or across sub-regions, and, where appropriate, formalise cooperative management arrangements
f) Cooperate where possible in the establishment of transboundary marine protected areas using ecological rather than political boundaries
g) Develop a streamlined format for reporting and exchanging information (through the MoU Secretariat and among Signatory States) on the state of dugong conservation at the national level
h) Encourage MoU Signatory States that have not already done so to become Parties to the Convention on Migratory Species (CMS)
i) Encourage Signatory States to become contracting parties to global fisheries agreements such as the UN Fish Stocks Agreement (1995) and the FAO Compliance Agreement (1993) and implement the FAO Code of Conduct for Responsible Fisheries (1995)
j) Establish relationships with regional fisheries bodies with a view to obtaining data on incidental capture and encourage them to adopt dugong conservation measures within Exclusive Economic Zones (EEZ) and territorial waters
k) Determine the most appropriate methods for information dissemination e.g., internet and community forums
l) Exchange at regular intervals scientific and technical information and expertise among nations, scientific institutions, non-governmental and international organisations, in order to develop and implement best practice approaches to conservation of dugongs and their habitats
m) Disseminate traditional knowledge on dugongs, their habitats and traditional practices for conservation and management in a culturally appropriate manner
n) Update data on dugong populations of regional interest on a regular basis (e.g., country status reports).

6.3 Improve coordination among government and non-government sectors and communities in the conservation of dugongs and their habitats

Examples of specific actions that could be implemented:

a) Review the roles and responsibilities of government agencies related to the conservation and management of dugongs and their habitats
b) Designate a lead agency responsible for coordinating national dugong conservation and management policy
c) Identify non-governmental organisation with an interest in dugong conservation and management
d) Encourage cooperation within and among government and non-government sectors, including through the development and/or strengthening of national networks

6.4 Develop and implement a regional database of relevant information in relation to dugong conservation and management

Examples of specific actions that could be implemented:

Collate and manage information relevant for dugong conservation and management in a regional database that is easily accessible to all interested parties

Objective 7 – Promote implementation of the MoU

7.1 Encourage all Range States to participate in the MoU and its conservation and management activities

Examples of specific actions that could be implemented:

a) Encourage non-Signatory States to sign the MoU
b) Arrange regional and sub-regional workshops involving non-Signatory States to raise awareness of the MoU
c) Consider at the first meeting of the Signatory States the development of a timetable for regular review of implementation the MoU

7.2 Support the Secretariat of the MoU to ensure the objectives of the Conservation and Management Plan are met

Examples of specific actions that could be implemented:

Secure reliable sources of funding to support the MoU Secretariat.

7.3 Seek resources to support the implementation of the MoU

Examples of specific actions that could be implemented:

a) Prioritise conservation and management activities for funding
b) Explore funding options with governments and other donors such as the Asian Development Bank, World Bank, UNDP, European Union, UNEP, GEF, etc.
c) Solicit funding and other contributions from industries that have impacts on dugongs and their habitats (e.g., fisheries, tourism, oil industry, real estate)
d) Explore international funding support and other incentives for Signatory States that effectively manage populations

7.4 Create links and develop synergies with other relevant regional conservation conventions, MoUs and Agreements

Examples of specific actions that could be implemented:

Identify, facilitate and explore links to other international, regional, sub-regional fora, conventions, agreements and MoUs

Cross-cutting Issues

Objective 8 – Improve legal protection of dugongs and their habitats

8.1 Encourage all Range States, and ensure Signatory States incorporate dugong and habitat conservation and protection measures into national legislation

Examples of specific actions that could be implemented:

a) *Encourage MoU Signatory States that have not already done so to become Parties to the Convention on Migratory Species (CMS)*
b) *Encourage the establishment of legislation to protect dugongs and their habitats while recognising existing traditional management systems*
c) *Review domestic policies and laws to address gaps or impediments to dugong conservation*
d) *Ensuring appropriate sanctions for harming dugongs or destroying habitat, training law enforcement authorities, raising public awareness to boost surveillance for reporting of illegal activities*

8.2 Review, and where necessary, strengthen legal protection for dugongs and their habitats.

Examples of specific actions that could be implemented:
Cooperate in law enforcement to ensure compatible application of laws across and between jurisdictions (including through bilateral/multilateral agreements and intelligence sharing)

Objective 9 – Enhance national, regional and international cooperation on capacity building

9.1 Promote capacity building at all levels to strengthen conservation measures

Examples of specific actions that could be implemented:
a) Identify needs for capacity-building in terms of human resources, knowledge and facilities
b) Provide training (e.g., through workshops) in conservation and management techniques for dugongs and their habitats to relevant agencies, individuals and local communities
c) Coordinate training programmes and workshops
d) Develop partnerships with universities, research institutions, NGOs, training bodies and other relevant organizations to support capacity building initiatives
e) Identify assess, develop and implement training programmes for local communities, NGOs, community-based organisations, media, enforcement officers, policy makers, law makers and decision makers
f) Enhance capacity at all levels to develop and undertake joint research programmes on dugong and their habitats
g) Organise forums (local, national and regional as appropriate) with the involvement of all relevant stakeholders to enable knowledge sharing and capacity building
h) Provide training on development, implementation and monitoring of community rehabilitation programmes
i) Support local communities and relevant national organizations with necessary basic equipment and facilities to enable protection, conservation and management of dugong and their habitats