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Proceedings of the workshop on
Marine Protected Area management in Myanmar

2-3 October 2014
Hotel Mergui, Myeik

Organized by IUCN, FFI and Department of Fisheries
Funded by

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THE LEONA M. AND HARRY B. HELMSLEY CHARITABLE TRUST

FONDATION SEGRÉ

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<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>BOBLME</td>
<td>Bay of Bengal Large Marine Ecosystem Project</td>
</tr>
<tr>
<td>EAF</td>
<td>Ecosystem Approach to Fisheries</td>
</tr>
<tr>
<td>FAO</td>
<td>Food and Agriculture Organization</td>
</tr>
<tr>
<td>FFI</td>
<td>Fauna and Flora International</td>
</tr>
<tr>
<td>INGOs</td>
<td>International Non-Government Organizations</td>
</tr>
<tr>
<td>IUCN</td>
<td>International Union for the Conservation of Nature</td>
</tr>
<tr>
<td>IUU</td>
<td>Illegal, Unreported and Unregulated</td>
</tr>
<tr>
<td>LMMA</td>
<td>Locally Managed Marine Areas</td>
</tr>
<tr>
<td>MFF</td>
<td>Myanmar Fisheries Federation</td>
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<tr>
<td>MNP</td>
<td>Marine National Park</td>
</tr>
<tr>
<td>MPA</td>
<td>Marine Protected Area</td>
</tr>
<tr>
<td>NGOs</td>
<td>Non-Government Organizations</td>
</tr>
<tr>
<td>PES</td>
<td>Payment for Ecosystem Services</td>
</tr>
<tr>
<td>PSU</td>
<td>Publications Services Unit (IUCN)</td>
</tr>
<tr>
<td>SAP</td>
<td>Strategic Action Programme</td>
</tr>
<tr>
<td>TDA</td>
<td>Transboundary Diagnostic Analysis</td>
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<tr>
<td>WHS</td>
<td>World Heritage Sites</td>
</tr>
</tbody>
</table>
1. Introduction

1.1. Background

Consisting of more than 800 islands surrounded by extensive coral reefs, the Myeik Archipelago in the Andaman Sea has emerged as a priority area for marine conservation in its own right and for its potential role in replenishing coral reefs throughout the Andaman Sea. The Myeik Archipelago has also been proposed as having potential for future world heritage inscription and has been included on the WHS tentative list.

In February 2014, a research cruise organized by IUCN as part of the Bay of Bengal Large Marine Ecosystem (BOBLME) Project supported activities to survey the coral reefs and associated organisms in the southern Myeik Archipelago to guide and inform future conservation efforts in the region. In March 2014, FFI also organized a liveaboard survey with international scientists in the northern part of Myeik Archipelago. Initial findings show a wide range in coral reef health status with some sites significantly impacted due to a combination of coral bleaching events, dynamite (blast) fishing and sustained fishing pressure. Of these, the impacts of dynamite fishing were found to be the most serious and far-reaching. Pervasive use of explosives, poisons and drift nets and the targeting of high-value species like sharks and groupers has devastated the fish populations and destroyed the corals that support marine productivity. The result is once vibrant coral communities replaced by wastelands of algae and sea urchins and supporting low diversity, low biomass populations of low value fish.

But the Archipelago can recover with appropriate management. Management models that include mosaics of protected areas, partnerships between the tourism industry and local people, and government efforts to cease IUU fishing could make a huge difference.

The role that Marine Protected Areas (MPAs) can play in promoting the health of our coastal and marine ecosystems has been recognized at the highest levels. The World Summit on Sustainable Development, the IUCN’s World Commission on Protected Areas, the Convention on Biological Diversity and the G8 group of nations have all called for establishment of a global system of MPA networks by the year 2012. The challenge to meet these commitments is ongoing.

MPAs are also one of the tools under the Ecosystem Approach for Fisheries (EAF) that all countries including Myanmar have committed to implement through various international instruments. Furthermore, MPAs prove to be significant in promoting local economy through coastal and marine tourism.

There is currently very little understanding and experience of Marine Protected Area (MPA) management in Myanmar. And this is particularly true within the Tanintharyi Division Government where many of the decisions impacting the use of the archipelago are being made. It is in this context that BOBLME has asked IUCN/FFI to support a workshop that would clarify MPA concepts, features and approaches and provide an opportunity to advocate MPA management as an option for the Myeik Archipelago. In this respect an MPA workshop targeting capacity development of planning and policy makers of the Tanintharyi Division, with specific interest for influencing future conservation management of the Myeik Archipelago has been organized.

This workshop aimed to share the current scientific assessment data on the archipelago and explore international best practice on MPA management, drawing on a number of international case studies and experiences. For policy makers, conservationists and natural resource managers, identifying the conservation actions needed to establish MPAs and MPA networks can be a difficult process, this workshop was a start to shed some light on the current situation and explore how the MPA management process can offer a way forward.
1.2. **Objectives of the workshop**

- Provide an overview of the biophysical characteristics of the Myeik Archipelago marine ecosystem and the features that make the archipelago an important area for biodiversity
- Strengthen knowledge and understanding of Marine Protected Areas (MPA) management as an approach for mitigating resource use conflicts, conserving biodiversity, improving fisheries and providing opportunities for sustainable coastal tourism development
- Share lessons and practical experiences of MPA management from the Asia-Pacific region - case studies analysis
- Identify a long-term vision and road map for developing capacity for MPA management for the Myeik Archipelago

1.3. **Workshop agenda**

<table>
<thead>
<tr>
<th>Time</th>
<th>Agenda Item</th>
<th>Lead</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:30 – 09:00</td>
<td>Registration</td>
<td></td>
</tr>
<tr>
<td>09:00 – 09:15</td>
<td>Welcome and opening remarks by His Excellency U Khin Maung Aye, Deputy Minister of the Ministry of Livestock, Fisheries and Rural Development</td>
<td>His Excellency U Khin Maung Aye</td>
</tr>
<tr>
<td>09:15 – 09:30</td>
<td>Key note speech by the representative from Fauna and Flora International (FFI)</td>
<td>Frank Momberg</td>
</tr>
<tr>
<td>09:30 – 09:45</td>
<td>Opening remark by International Union for the Conservation of Nature (IUCN)</td>
<td>Maeve Nightingale</td>
</tr>
<tr>
<td>09:45 – 10:15</td>
<td>Group photo/coffee</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Overview results from rapid assessments Myeik Archipelago: Biophysical and socio-economic and situation analysis</strong></td>
<td></td>
</tr>
<tr>
<td>10:15 - 10:45</td>
<td>Overview of marine resources, protected areas and measures of protection on marine resources in Myeik Archipelago</td>
<td>Dr Htun Thein, Department of Fisheries</td>
</tr>
<tr>
<td>10:45 - 11:15</td>
<td>Results of rapid assessment PSU/IUCN</td>
<td>Dr James True</td>
</tr>
<tr>
<td>11:15 - 11:45</td>
<td>Results of rapid assessments FFI</td>
<td>Rob Howard</td>
</tr>
<tr>
<td>11:45 - 12:15</td>
<td>Presentation of Myeik situation analysis report – Update overall situation, conservation status of key resources and recommendation for actions</td>
<td>Dr Panwad Wongthong</td>
</tr>
<tr>
<td>12:15 – 13:15</td>
<td>Lunch, Showing of DVD on archipelago biodiversity “Real life of the Andaman”</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Introducing MPA management as part of an integrated management solution for Myeik Archipelago.</strong></td>
<td></td>
</tr>
<tr>
<td>13:15 - 13:45</td>
<td>Works in MPA management in Bay of Bengal region promoted by BOBLME Project</td>
<td>C.M. Muralidharan</td>
</tr>
<tr>
<td>13:45 - 14:45</td>
<td>Introducing MPA management - an approach for securing biodiversity status for Myeik Archipelago and improving its fisheries and sustainable tourism development potential</td>
<td>Petch Manopawitr/ Maeve Nightingale</td>
</tr>
</tbody>
</table>
### Report of the workshop on Marine Protected Area management in Myanmar

<table>
<thead>
<tr>
<th>Time</th>
<th>Agenda Item</th>
<th>Lead</th>
</tr>
</thead>
<tbody>
<tr>
<td>14:45 - 15:15</td>
<td>Principles in developing MPA network</td>
<td>Petch Manopawitr</td>
</tr>
<tr>
<td></td>
<td>- Resilient MPA design principle (replication, representation, risk-spreading, effective management)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- The use of LMMA as network to support fisheries and conservation</td>
<td></td>
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<tr>
<td>15:15 - 15:45</td>
<td>MPA development next steps - Summary and analysis of uses and key issues affecting biodiversity in the Myeik Archipelago and ways forward for protecting the biodiversity and long term sustainable development interests of the archipelago with specific reference to experience from the Andaman Sea.</td>
<td>Frank Momberg</td>
</tr>
<tr>
<td>15:45 – 16:00</td>
<td>Coffee break</td>
<td></td>
</tr>
<tr>
<td>16:00 - 16:30</td>
<td>Discussion/Q &amp; A Discussion scenarios/outlook for the Myeik Archipelago - broad visioning exercise</td>
<td></td>
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<tr>
<td></td>
<td>(Group 1. Fisheries, Group 2. Biodiversity research Group 3. Livelihood opportunities)</td>
<td></td>
</tr>
<tr>
<td>16:30 - 17:15</td>
<td>Report back</td>
<td></td>
</tr>
<tr>
<td>17:15</td>
<td>Closing of day 1</td>
<td></td>
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</tbody>
</table>

### Day 2: Case studies and presentations of group discussions

<table>
<thead>
<tr>
<th>Time</th>
<th>Agenda Item</th>
<th>Lead</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00 - 09:15</td>
<td>Recap day 1 and overview of day 2</td>
<td>Zau Lunn</td>
</tr>
<tr>
<td>09:15 - 10:15</td>
<td>(1) Case study: small-scaled, community-based MPA A case of Apo Island, Philippines</td>
<td>Maeve Nightingale</td>
</tr>
<tr>
<td>10:00 - 10:45</td>
<td>(2) Case study: large-scaled, regional MPA A case of Coral Triangle Initiative and Great Barrier Reef</td>
<td>Petch and James</td>
</tr>
<tr>
<td>10:45 - 11:00</td>
<td>Coffee break</td>
<td></td>
</tr>
<tr>
<td>11:00 – 11:45</td>
<td>(3) Case study on MPA and fisheries management: integrating fisheries management into marine reserve design and MPA development</td>
<td>Stephen Box</td>
</tr>
<tr>
<td>11:45 - 12:30</td>
<td>(4) MPAs and tourism development: Maldives - protecting sharks and rays, house reefs tourist resorts Examples of appropriate and inappropriate tourism development in Thailand</td>
<td>Dr Panwad Wongthong</td>
</tr>
<tr>
<td>12:30 - 13:30</td>
<td>Lunch</td>
<td></td>
</tr>
<tr>
<td>13:30 - 14:15</td>
<td>(5) The Andaman MPAs in Thailand: case studies of the world heritage nomination, MPA management effectiveness evaluation and Green fins programme</td>
<td>Petch Manopawitr</td>
</tr>
<tr>
<td>14:15 - 14:30</td>
<td>Summary key messages/lessons from day 2 case studies</td>
<td>Maeve Nightingale</td>
</tr>
</tbody>
</table>
2. Speeches and presentations

2.1. Opening speech by His Excellency U Khin Maung Aye, Deputy Minister of the Ministry of Livestock, Fisheries and Rural Development

His Excellency U Khin Maung Aye expressed the importance of MPAs as one of the potential management tools for sustainable fisheries and also promoting the health of coastal and marine ecosystems. He also mentioned that this workshop is very important as it will provide benefits to Myanmar in the form of baseline information, methodologies for ecological assessment and guidelines for better management of fisheries and appropriate implementation of MPAs for fisheries management and conservation. The Deputy Minister also pointed out that every participant should take messages from this workshop as technical guidelines on MPAs and fisheries management.

2.2. Key notes speech by the representative from FFI

Frank Momberg from FFI Myanmar programme explained the past and current marine conservation programmes implemented in Myanmar - workshops and trainings, coral surveys and results, priority sites for establishment of Locally Managed Marine Areas (LMMAs) in collaboration with local communities based on series of survey results conducted by FFI and IUCN and plan of pilot LMMA that will be implemented in the Myeik Archipelago.

2.3. Key notes speech by the representative from IUCN

Maeve Nightingale on behalf of IUCN and Mangroves for the Future (MFF) said that this workshop exploring the role of MPAs for the conservation of biodiversity for the long term sustainability of fisheries and other sectors in Myanmar is one of a series of activities that IUCN has supported since the initial support in the aftermath of cyclone Nargis in 2008. She provided information that just last month the MFF National coordinating body in Myanmar established to drive the process of addressing strategic coastal management needs and project investments in Myanmar. She mentioned that the role that MPAs can play in promoting the health of the coastal and marine ecosystems has been recognized at the highest levels. The World Summit on Sustainable Development, the IUCN’s World Commission on Protected Areas, the Convention on Biological Diversity and the G8 group of nations called for establishment of a global system of MPA networks by the year 2012. Objectives of this workshop were clarified. At the end she also pointed out the complexity of issues of coastal resources management that they cannot be addressed by a single sector, ministry or department, rather we must include civil society and private sectors. She hoped that this workshop would lead to identifying appropriate management solutions including consideration for how protected areas might be adapted in Myanmar.
2.4. Overview of marine resources in Myanmar by Dr Htun Thein
Dr Htun Thein from the Department of Fisheries presented the activities relevant to marine conservation in Myanmar, fisheries laws and regulations, November and December 2013 RV Dr Fridtjof Nansen survey results. He suggested that surveys should be done in pre- and post-monsoon in order to complete the data set. Concerns over coastal and marine ecosystems in Myanmar involve overfishing, pollution from marine transportation, sewage and industrial waste, and oil and gas exploration. He indicated that MPA designation in Myanmar is essential to improve fisheries, ecological integrity and well-being of local communities who are depending on fishery resources.

2.5. Preliminary data from survey cruises to the Myeik Archipelago by Dr James True
James True from the Prince of Songkla University, Thailand presented the preliminary survey results from survey cruises to the Myeik Archipelago in February and March 2014 which was done in collaboration between IUCN and FFI and supported by the Bay of Bengal Large Marine Ecosystem (BOBLME) Project. He explained that site selection for rapid ecological assessment was based on recreational diving route. Hard corals and soft corals are both under stressors from destructive fishing and illegal fishing. The most diverse and healthy coral communities are in shallow-turbid water and mid-shelf group. It is likely that healthier reefs can be found in the north more than in the southern Myeik Archipelago. He suggested that reefs are extremely patchy so it is hard to define priority sites for reef conservation. However, as noted by Dr James True, it is important and urgent for Myanmar to protect and promote the conservation of coral reefs in the Myeik Archipelago.

2.6. Results of rapid assessment in Myeik Archipelago by Robert Howard
Robert Howard from FFI Myanmar programme presented survey results conducted by FFI Myanmar programme in Myeik Archipelago from January 2013 to May 2014. Mr Howard suggested that coral health indicator species like crown of thorns and long-spined sea urchin are found in the archipelago, indicating overfishing and degraded corals. Anchor damage on corals was observed closer to the mainland as compared to damage by dynamite fishing which was spotted far offshore. Overall reef resilience in the archipelago is average to below average. Sites that have low coral cover but high potential for recovery can be priority sites for conservation. He suggested that LMMAs in collaboration with local communities and concerned government departments is the most appropriate approach for conserving coral reefs. The key site proposed is La Ngan group (The Sisters Is).

2.7. Situational analysis of Myeik Archipelago by Dr Panwad Wongthonh
Panwad Wongthonh from IUCN presented a situational analysis of Myeik Archipelago. She presented current state of coastal and marine resources including mangroves, coral reefs, seagrass beds, fishery resources, shorebirds and marine cetaceans. Issues confronting the Myeik Archipelago are coastal land-use change, overfishing, IUU fishing, unplanned economic development and natural disasters and climate change induced impacts. She emphasized that constraints and obstructing factors for the conservation and management of coastal and marine resources in the archipelago are limited information, knowledge and understanding about coastal and marine ecosystems; inadequate capacity of line departments; gaps in laws and enforcement; weak governance; insufficient grass-root support for conservation; and limited coordination and articulation between and within agencies. All of these issues need to be addressed and the effective management of MPAs was suggested.
2.8. **Coastal and marine spatial planning: a tool for integrated coastal management by Maeve Nightingale**

Maeve Nightingale from IUCN gave a general overview of how the marine resources have been used by multiple sectors. She provided definition and purpose of marine spatial planning, as well as examples of common resource use conflicts in coastal and marine areas. She explained how marine spatial planning and zoning address resource use management, with a case study of Rhode Island spatial area management plan.

2.9. **Marine Protected Areas: design and management by Petch Manopawitr**

Petch Manopawitr from IUCN began his presentation with major threats to coastal and marine ecosystems, followed by different types and categories of MPAs and the benefits of MPAs to the local communities, biodiversity and ecosystem and revenues of the country from nature based recreation and tourism. He provided evidence that MPAs have proven effective in restoring marine resources, preventing coral loss and supporting nearby fisheries. Mr Manopawitr emphasized that the primary goal of MPAs is to conserve biological diversity but there are many other societal goals which MPAs contribute to as well. All of these needs to be considered in the design of MPAs and MPA networks - there can be many goals: ecological, social and economic. Brief overview of resilient MPAs and MPA networks was also presented.

2.10. **MPA/LMMA development next step by Frank Momberg**

Frank Momberg from FFI-Myanmar programme explained how to develop LMMAs and MPAs in Myeik Archipelago from technical point of view. He proposed over ten priority sites for conservation of coral reefs, mangroves, seagrass and mudflats in the Myeik Archipelago, both offshore and on the mainland coasts. Sites to develop LMMAs were identified as for those reefs with potential to recover and close to the village and also present cooperative fishing communities. According to Mr Momberg, next steps are to develop an enabling environment to establish MPAs/LMMAs; create a taskforce to establish LMMAs, implement pilot LMMA establishment which involves identifying stakeholders, marine resource use mapping with communities, identifying zoning system within LMMA and developing rules and regulations for LMMA.

2.11. **Works in MPA management in Bay of Bengal region promoted by BOBLME Project by C. M. Muralidharan**

C. M. Muralidharan from BOBLME Project explained major areas of works in environment and fisheries in the region supported by BOBLME, objectives of components and relevant component to MPA works in the region and activities in each of the countries in the region supported by BOBLME. He introduced two major outputs from BOBLME - Transboundary Diagnostic Analysis (TDA), a report on the major transboundary issues and their causes and Strategic Action Programme (SAP), a (strategic action) plan for addressing the major transboundary issues and their causes. The MPA related activities of the BOBLME Project range from establishing an MPA atlas and web portal for the entire Bay of Bengal, to national initiatives of developing an MPA legal framework and to assessing status, impacts and management effectiveness.

2.12. **Case study I - Apo Island, Philippines: small-scale, community-based MPA by Maeve Nightingale**

Maeve Nightingale from IUCN utilized a short video to present the small-scale community based MPA established at Apo Island in the Philippines and benefits to the community in terms of socio-economic and biodiversity after establishment of MPA. Key factors contributing to the success of Apo Island MPA are, for example, ideas from outside which stimulate shared awareness, exposure trip to see an MPA in action in other places, visionary and committed village leader, homogeneous island population, community driven process from the start, a highly committed and supportive
academic institution, local government support, clear ownership and boundaries, agreement on rules, enforcement of rule and confidence and experience to manage new issues arising. Most recent challenge for Apo Island was thought to be climate change and extreme weather events in 2011-2012.

2.13. **Case study II - Coral Triangle Initiative and Great Barrier Reef: large-scale, regional MPA by Dr James True - Prince of Songkla University**

Dr James True from the Prince of Songkla University explained the relationship between coral community of Myeik Archipelago and corals in the Andaman Sea and importance of conservation of corals in the Myeik Archipelago for the biodiversity in the region from technical point of view. He presented impacts on corals from the 2010 mass bleaching event that Andaman reefs were severely affected by bleaching mortality - many species went locally extinct with northern Andaman reefs being worse affected than southern. Dr True showed results from the surveys in 2012 and 2013 demonstrating coral recovery. Components of resilience in the context of recovery were described. It was found that replenishment is occurring but not evenly. He indicated that compared with the Thai reefs, many of the areas with high cover of dead coral in Myeik actually have high recovery potential because of strong recruitment. So the replenishment of northern offshore islands in Thailand must come from the north (the Myeik Archipelago).

2.14. **Case study III - MPA and fisheries management: Integrating fisheries management into marine reserve design and MPA development by Dr Stephen Box - Smithsonian Institution**

Dr Stephen Box from the Smithsonian Marine Station presented how to integrate fisheries management to marine reserve design and Marine Protected Area development from a technical point of view and usefulness of science in decision making guided by international best practices. He emphasized the importance of managing human behaviour together with understanding the marine environment. Case studies of marine reserve design were presented using the knowledge of how fishers use habitat and connectivity of habitat and the monitoring of chemical signature. Dr Box indicated that socio-ecological systems are essential for management decisions.

2.15. **Case study IV - MPAs and tourism development by Dr Panwad Wongthong – IUCN**

Dr Panwad Wongthong from IUCN explained how to develop tourism in the MPAs. She provided information on global net benefits of reef tourism and a wide range of economic values of reef tourism. Impacts from reef tourism worldwide were presented with a case study of Koh Phi Phi in Thailand. Limited knowledge and awareness surrounding the sustainability concept, economic driven society, gaps in legislation, weak enforcement and limited coordination between line departments are major factors to unsustainable management of reef tourism. Sustainable tourism concepts based on sustainability and stakeholder theory was described along with benefits from tourism to MPAs and MPAs to tourism. Payment for Ecosystem Services (PESs) was introduced. Dr Wongthong presented a case study of Maldives tourism management scheme as appropriate model to conserve marine resources and manage potential marine tourism in the Myeik Archipelago.

2.16. **Case study V - The Andaman MPAs in Thailand: case studies of the World heritage nomination, MPA management effectiveness evaluation and Green Fins programme by Petch Manopawitr**

Petch Manopawitr from IUCN presented the development processes and lessons learned from MPAs of Thailand in Andaman Sea and recommended how to develop MPAs in the Myeik Archipelago. He provided an introduction of Thailand’s MPAs and Andaman Bioregion. Major challenges included resource overexploitation, tourism/development pressures, pollution, governance (overlapping jurisdiction), unknown MPAs effectiveness and climate change impacts. Marine SMART Patrol, Green
Fins and Reef Guardians, and Management Effectiveness Evaluation are key management responses. Mr Manopawitir emphasized the need for developing resilient MPA networks and the need for transboundary conservation and large scale marine spatial planning.

3. **Group discussion**

3.1. **Day 1 - Fisheries, biodiversity and livelihood**

**Fisheries**
All participants agreed that fishery is declining in the region in in-shore and off-shore fisheries. A kind of protected area system such as Marine Protected Area should be established urgently to manage aquatic resources. Closed season or closed area should be established. Main threats relevant to fisheries are the use of dynamite fishing, destructive fishing gears and techniques, baby trawls/bottom trawl fishing near shore, coastal zones development, weak law enforcement, limited opportunity for grass-root conservation efforts, very few alternative livelihood opportunities, no transparency of business development, sand mining activities, charcoal production, illegal logging, development of rubber and oil palm plantations on the land, oil and gas exploration in the sea and sediment runoff. Management of fisheries requires good coordination between FD and DoF. Capacity development in the long-term basis is necessary – not only short-term project-based support. Education sector should be encouraged to be part of conservation activities. The group agreed that LMMAs establishment would lead to positive outcomes, but only if it involves and includes consultation with local communities e.g. identify priority areas for conservation and map fishing grounds. Supports from overseas in term of trainings and expertise are needed.

**Biodiversity**
Mangrove forests, seagrass beds and coral reefs situated in the Tanintharyi Region are important habitats for various kinds of aquatic organisms. Shark sanctuaries are already designated and those sanctuaries should be managed properly with effective law enforcement. Boundary and management guidelines of existing MNP (Lampi) should be made known to the public. Research and baseline data gathering on biodiversity must be conducted with concerted efforts of FD, DoF, university and NGOs. Communication channels to encourage community participation and support educational campaign are important. Given the weak law enforcement in the country, conservation initiatives can be promoted by community and private sectors. The group agreed that protection of economically important fish species is essential for livelihood of local communities.

**Livelihood**
Participants suggested that aquaculture, seaweed culture and other suitable alternative livelihoods should be explored for the communities to manage or control habitat loss in the region. Tourism development is emerging in the region, however, will take some time to play a significant role in the economy due to the remoteness, difficulty to access and limited resources. Despite the limitations, proper management control should be in place, and the public should be aware of any large scale tourism development plan in the archipelago. Ecotourism within and outside the boundary of protected areas should be encouraged. Knowledge and education to the communities in relation to sustainability concept and wise use of resources is needed. Because of the limited funding support, university researchers cannot undertake field research and publish their work effectively. Academic and university staff appear to be interested in working with international research networking.

3.2. **Day 2 - Vision for the Myeik Archipelago**

**Short term (1 to 3 years)**
La Ngann Island was thought to be a good site for pilot initiative for LMMA establishment. Steering committee and task force for MPAs establishment should be organized composing of all concerned
stakeholders including government departments, business people, local communities and national and international NGOs. Existing protected areas in the Myeik Archipelago should be managed effectively.

**Long term**

National World Heritage Site should be established in the Myeik Archipelago. Establishment of additional marine parks or community-based conservation areas should be promoted. Actions must be taken to support the transboundary conservation between Myanmar and Thailand.

**Other issues**

Nested approach should be applied within government framework such as co-management of government and civil societies. Union coastal zone act is essential in managing resources in the coastal zones. Community stewardship law is required in order to work effectively between government departments and communities. Cooperation between Myanmar and Thailand is needed to combat illegal fishing activities. Every participant agreed that the establishment of MPAs would help reduce resource use conflicts, promote sustainable fishing, protect habitats and conserve biodiversity in the Myeik Archipelago. Bringing together of policy makers, managers, commercial operators and conservationists in this forum enabled participants to agree on important next steps to achieve these goals:

- Mapping resource uses across Myeik Archipelago; fisheries, energy exploration, future tourism etc;
- Engaging private sector in dialogues on the sustainability of commercial fisheries;
- Piloting and establishing MPAs especially LMMAs in key sites, with the workshop recommending La Ngann Island Group as the first site to be established;
- Developing resilient MPA networks and transboundary conservation and large scale marine spatial planning; and
- Identifying potential solutions for collecting and analysing large data sets to understand and improve the situation of commercial fisheries in Myanmar.

4. **Closing the workshop**

His Excellency U Tin Soe, the Forest and Mining Minister of the Tanintharyi Region expressed his gratitude to the workshop participants for enthusiastic discussions to improve fisheries and livelihood of local communities in the region. He summarized that MPAs is an appropriate tool for effective conservation of marine resources, and there is potential for reef-based dive tourism development in the region. The Forest Minister also indicated that the recommendations made in this workshop are very important for the strategic planning of Tanintharyi Region and must be followed up to achieve the goal of protecting marine resources and managing the Myanmar coastal zones.

5. **Output/outcomes of the workshop**

An overview of the biophysical characteristics of the Myeik Archipelago marine ecosystems and the features that make the archipelago an important area for biodiversity were presented by various speakers from FFI, PSU, IUCN, DoF and Smithsonian. Participants from various sectors including government, universities, private sectors, civil society and NGOs had an opportunity to learn and verify results from the rapid ecological assessments from a number of expedition cruises conducted in the region between 2011 and 2014. It has been recognized that fishery resources have been in
decline and the major threats to Myanmar coastal zones are overfishing, the use of destructive and illegal fishing gears and destruction of habitats. The information presented at the workshop can be used as the essential scientific baseline data underpinning for management decision for the sustainability of the natural resources of the Myeik Archipelago. The concept and practice of MPAs was introduced together with case studies analysis - lessons and practical experiences - of MPA management from other countries in the Asia-Pacific region. The participants have increased knowledge and understanding of MPAs as one of the management tools for mitigating resource use conflicts, improving fisheries, conserving biodiversity and providing opportunities for sustainable coastal tourism development. A long-term vision and practical steps for Myanmar in adopting MPAs have been explored and discussed. Active participation can be seen during the group discussions. The participants suggested that capacity development is required, and sustaining livelihoods / food security as well as exploring alternative livelihoods is imperative. There is strong interest in applying MPAs management in the archipelago; from community protected areas, protected areas for fisheries management, to larger scale marine spatial planning that balances interests of multiple sectors. Every participant agreed that MPAs would help minimize problems currently facing the archipelago and ensure the sustainability of marine resource use. Working with the communities and local authorities to protect resources and conserve biodiversity in the form of LMMAs was thought to be appropriate and practical to begin in the near future for the Myeik Archipelago. To achieve the goal, support from development partners and INGOs is important. At the same time, better coordination among relevant agencies, participation of all stakeholders, good governance and transparency are prerequisites.
### Appendix I  List of participants

<table>
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<th>Organization/department</th>
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<tr>
<td>1</td>
<td>U Khin Maung Aye</td>
<td>Union Deputy Minister</td>
<td>Ministry of Livestock, Fisheries and Rural Development</td>
</tr>
<tr>
<td>2</td>
<td>U Tin Soe</td>
<td>Regional Minister</td>
<td>Ministry of Forest and Mine, Tanintharyi Regional Government</td>
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<td>3</td>
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**Business companies (7)**

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**Civil societies, local NGOs and international NGOs (22)**

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</tr>
<tr>
<td>104</td>
<td>Petch Manopawitr</td>
<td>Deputy</td>
<td>IUCN – SEA</td>
</tr>
<tr>
<td>105</td>
<td>Maeve Nightingale</td>
<td>Manager, Capacity Development</td>
<td>IUCN</td>
</tr>
<tr>
<td>106</td>
<td>James True</td>
<td></td>
<td>IUCN – PSU</td>
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<tr>
<td>107</td>
<td>Panwad Wongthong</td>
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<tr>
<td>108</td>
<td>Julia Fogerite</td>
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<td>IUCN</td>
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<tr>
<td>109</td>
<td>Steve Box</td>
<td></td>
<td>Smithsonian Institution</td>
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<tr>
<td>110</td>
<td>C. M. Muralidharan</td>
<td></td>
<td>BOBLME</td>
</tr>
</tbody>
</table>
Appendix II  Speeches and workshop presentations

Opening speech by His Excellency U Khin Maung Aye, Deputy Minister of the Ministry of Livestock, Fisheries and Rural Development

Ladies and Gentlemen Good Morning,

On the behalf of Ministry of Livestock, Fisheries and Rural Development and also on my own behalf, I am pleased to welcome you to this Workshop on Marine Protected Areas. I would like to take this opportunity to express my sincere thanks to our honourable speakers and organizers such as Fauna and Flora International (FFI) and International Union for the Conservation of Nature (IUCN) for their activities with such dedication not only to make a success but also having put in a great deal of effort to enable this event actually taking place.

As you may know, Marine Protected Areas (MPAs) are zones of the seas and coasts where wildlife is protected from damage and disturbance. So, why do we need MPAs? Marine Protected Areas are essential for healthy, functioning and resilient ecosystems, but some human activities damage or cause disturbance to marine habitats and their species. In order to make a healthy ocean, MPAs enable us a lot - specifically for example:

- Protect and restore the ecosystems in our seas and around our coasts.
- Ensure that the species and habitats found there can thrive and are not threatened or damaged.
- Maintain a diverse range of marine life that can be resistant to changes brought about by physical disturbance, pollution and climate change.
- Provide areas where the public can enjoy a healthy marine environment learn about marine life and enjoy activities such as diving, photography, exploring rock pools and coastal walking and,
- Provide natural areas for scientific study.

Therefore, using the Marine Protected Area is one of the potential management tools for sustainable fisheries and also promoting the health of our coastal and marine ecosystems as the highest level.

Every participant knew that a marine ecosystem survey with RV Dr Fridtjof Nansen has been conducted in three Myanmar coastal regions from 13 November to 18 December 2013, it took 38 days. In the period 1979-1980, such kind of research was also conducted. When we compare with last 30 years observed results, marine fishery resources was decreased in all areas. So, it is indicating that the action on fisheries management and conservation is great needed using by powerful tools.

That is why, as I mentioned early, using the MPAs can play in promoting health of our coastal and marine ecosystem.

As background to this Workshop, Myeik Archipelago has consisting more than 800 islands surrounded by extensive coral reefs, and has emerged as a priority area for marine conservation in Myanmar, and listed in Word Heritage, so I believe that Myeik Archipelago is a very good driving force to the implementing of Marine Protected Area in Myanmar.

So, objectives of this Workshop are very important component, and it is to be provided benefits to Myanmar in the form of enhanced information, methodologies and guidelines for better management of fisheries and for appropriate implementation of MPAs for fisheries management and conservation. Therefore, your contribution in implementing MPAs would be very valuable.

And, I hope that this workshop could be considered a draft framework outline for technical guidelines on MPAs and fisheries management.

Again and again I hope that this workshop will be informed will be stimulated on a wide range of topics including concepts and definitions, case studies of MPAs, biological factors, economic and
social considerations, governance, legal aspects, and the interface between MPAs and fisheries management.

Finally, this is an opportune time for me to declare “The National Technical Workshop: Marine Protected Area Management in Myanmar” is open officially. And I wish all two days of interesting and beneficial program and also that you have a pleasant stay in here, Myeik.

Key notes speech by the representative from FFI

---

**Myanmar MPA workshop**

- 2012
  - Limited scientific data to make informed decisions for fisheries management and marine conservation
  - Very limited marine protected area network (only islands ecosystem – Lampi NP, mangroves – Meinmahla Kyun and turtle beaches – Moscos) WS
  - Initial stakeholder consultation and identification of threats and priority sites for coral reef surveys

---

**Recent work**

- Training and capacity building of a Myanmar marine research dive team
- FFI conducted 15 month of intensive coral reef surveys throughout Myeik archipelago
- 2 live on-board-surveys with senior scientists from IUCN, Smithsonian Institute and FFI

---

**Coral reef surveys methods**

- Coral status & diversity
- Fish abundance and diversity
- Invertebrate abundance & diversity
- Impacts/ threats
- 180 sites surveyed

---

**Threats to Myanmar’s marine resources are well known (e.g. illegal and destructive fishing practices)**
- Reef check survey by FFI from 2012 – 2014 in Myeik archipelago shows widespread destruction of coral reefs. (hard coral < 30%)
- Only very few sites with intact corals remain.
- The fish stock is depleted as clearly shown by low fish numbers and a lack of mature fish that can reproduce
Key notes speech by the representative from IUCN

Deputy Minister, Ministry of Livestock, Fisheries and Rural Development
Regional Minister, Ministry of Forest and Mining
Representatives from government departments, private sector and NGO development partners
Distinguished Guests, ladies and gentleman

On behalf of the International Union for Conservation of Nature and the Mangroves for the Future Initiative, it is an honour to be here on the occasion of the opening ceremony for the Workshop on Marine Protected Areas Management in Myanmar, organized in partnership with Fauna and Flora International (FFI) with the leadership of the Department of Fisheries.
This workshop exploring the role of marine protected areas for the conservation of biodiversity for the long term sustainability of fisheries and other sectors in Myanmar is one of a series of activities that IUCN has supported since our initial support in the aftermath of cyclone Nargis in 2008. Since then we have been working consistently with the Myanmar NGO sector and government towards establishing Myanmar as a Member country of the Mangroves for the Future initiative, a regional coastal programme working to build resilience in coastal areas across 10 countries in Asia. Just last month the Mangroves for the Future National Coordinating Body in Myanmar established to drive the process of addressing strategic coastal management needs and project investments in Myanmar. Recognizing that complex issues of coastal resources management cannot be addressed by any single sector Ministry or department and must include civil society and private sector, the composition of the Mangroves for the Future National Coordinating body reflects this provides a platform for moving forward priority areas of interest. It is indeed very exciting to have Myanmar on board.

The role that marine protected areas (MPAs) can play in promoting the health of our coastal and marine ecosystems has been recognized at the highest levels. The World Summit on Sustainable Development, the IUCN’s World Commission on Protected Areas, the Convention on Biological Diversity, and the G8 group of Nations called for establishment a global system of MPA networks by the year 2012. The global targets are clear but how can we bring some of this thinking to bear in the context of Myanmar? That is what this workshop will look at.

There are three main reasons in the thinking to hold this workshop;

1. A chance to present and feedback the results of the rapid biodiversity assessments for the Myeik Archipelago area (IUCN/ PSU and FFI) (and even the Nansen oceanographic survey) that this information can be used as the essential scientific underpinning for management decision for the sustainability of the natural resources of the Myeik Archipelago. Preliminary results from the surveys reaffirm some things we already expected but also some things that are a surprise but most importantly the results provide valuable information and important scientific underpinning for making decisions for the way forward for management to secure benefits for multiple stakeholders.

2. To share knowledge and information on the concept and practice of marine protected areas management, recognizing that this is a relatively new idea for Myanmar. We would also like to explore options for how we might apply protected areas management in different ways to solve some of the resource management issues facing the Myeik Archipelago; from community protected areas, protected areas for fisheries management, to larger scale marine spatial planning that balances interests of multiple sector; fisheries (small-scale and commercial), tourism, energy,

3. To see how we can move forward to collectively identify and decide on a common vision and some key practical steps that can be taken over the next 1-5 years to progress work protected areas management as appropriate.

We have a number of people here to offer different experiences and ideas for consideration but most important will be how we take the ideas and adapt them as appropriate for the Myanmar context and this is where the discussions are equally if not more important so please participate actively.

Before concluding, I would like to express deep appreciation for the close cooperation extended by the Minister of the Ministry of Livestock, Fisheries and Rural Development, Ministry of Forest and Mining FFI, BOBLME, FAO and other development partners, I would also like to thank Myanmar Fishers Federation for hosting such a lovely dinner last night that allowed some very interesting dialogues and exchange of ideas to start already.
I hope that this workshop will be valuable for all of you and inspire learning and good discussion identifying appropriate management solutions including consideration for how protected areas might be adapted.

Thank you.

**Overview of marine resources in Myanmar by Htun Thein - Department of Fisheries**
Comparisons of Catch Rate and CPUE of Demersal Fish in Each Regions 1979-80 vs 2013

<table>
<thead>
<tr>
<th>Areas</th>
<th>1979-80 (up to 200 m depth)</th>
<th>2013 (up to 400 m depth)</th>
<th>2013 (up to 200 m depth)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(kg/ha) (kg/ha)</td>
<td>(kg/ha) (kg/ha)</td>
<td>(kg/ha) (kg/ha)</td>
</tr>
<tr>
<td>Rakhine</td>
<td>274.20 0.00</td>
<td>409.00</td>
<td>1120.75</td>
</tr>
<tr>
<td>Ayeyawady</td>
<td>1826.90 0.00</td>
<td>415.00</td>
<td>1103.67</td>
</tr>
<tr>
<td>Teninthary</td>
<td>1438.00 0.00</td>
<td>894.00</td>
<td>1503.11</td>
</tr>
<tr>
<td>Average</td>
<td>619.83</td>
<td>168.82</td>
<td>204.77</td>
</tr>
</tbody>
</table>

Species Composition

- A total of 145 fishing stations with all together 444 species belonging to 129 fish families were recorded.
- Cartilaginous species the catches showed: 32 shark species belonging to 11 different families.
- 20 ray species from 5 families and 2 species of chimaeras from two different families.
- 235 different taxonomic entities were identified on the Rakhine Coast, while 352 entities were identified in the delta area and 329 entities on the Teninthary coast.

Nutrients, chlorophyll and plankton

Box plots showing depth-specific concentrations of chlorophyll a in shallow stations (bottom-depth < 30 m), intermediate depth stations (bottom-depth = 100 m), and deep stations (bottom-depth > 500 m) from the entire study area. All stations within each bottom-depth category from the whole study area are listed. Note that the Y-axis does not reflect depth on equidistant scale.

TUNA Fishing Ground of Myanmar

- Yellowfin Tuna
- Striped marlin
- Swordfish
- Whit-tipped shark
Report of the workshop on Marine Protected Area management in Myanmar

Trans-boundary species

Tenualosa ilisha

Tenualosa tilapia

Population parameters of Trans-boundary species (Hilsa shad)

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Island water</th>
<th>Study areas</th>
<th>Marine water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at first maturity (La)</td>
<td>61.99</td>
<td>61.95</td>
<td>60.90</td>
</tr>
<tr>
<td>Growth constant (K)</td>
<td>0.700</td>
<td>0.980</td>
<td>0.850</td>
</tr>
<tr>
<td>Growth performance (P)</td>
<td>3.429</td>
<td>3.449</td>
<td>3.514</td>
</tr>
<tr>
<td>Natural mortality (M)</td>
<td>1.154</td>
<td>1.498</td>
<td>1.310</td>
</tr>
<tr>
<td>Sex ratio</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female to male</td>
<td>2.810</td>
<td>2.949</td>
<td>1.995</td>
</tr>
<tr>
<td>Total mortality (Z)</td>
<td>3.864</td>
<td>2.977</td>
<td>3.264</td>
</tr>
<tr>
<td>Sample number (N)</td>
<td>1677</td>
<td>1971</td>
<td>1963</td>
</tr>
</tbody>
</table>

Marine Protected Areas - Myanmar

MPAs are critical to ecological integrity and human well-being

There are currently six marine protected areas in Myanmar, designed to protect biodiversity and to sustain fisheries resources. These MPAs take a number of forms including nation parks, shark protection areas, wildlife sanctuaries and mangrove reserves.

Marine resources provides valuable ecosystem service

- Myanmar's total mangrove coverage is estimated at 4,219 km².
- National coral reef coverage is estimated around 1,500 km², of which 2 protected in MPAs.
- Shark protected areas have been established along the Khaingyi coastal region (Ross Island) where it is illegal to feed, collect, sell or carry all species.
- The 201 km² Lamyi Island Marine National Park, is home to rich marine and terrestrial life. Local species includes green, hawksbill, olive ridley and leatherback turtles; spinner, spotted and striped dolphins, pilot whales, false killer whales, dugongs, spiny lobsters, jack tuna, barracudas and other large fish.

Human impacts lead to degradation and depletion of natural resources

I. Overfishing and the use of destructive fishing techniques
II. Discharge of chemical fertilizer, insecticide and untreated water waste from agriculture
III. Pollution through marine transportation and disposal of sewage and industrial waste
IV. Increasing marine and coastal aquaculture of shrimp, crab, and grouper for live export
V. Illegal fishing from neighboring countries
VI. Sedimentation due to the land use charge and increased fluvial inputs
VII. Climate change and associated impacts

VIII. Oil and gas exploration and sand mining on islands in the Myeik Archipelago

Have seismic surveys been conducted in Myanmar waters in the past?

What is the “state of the science” regarding these impacts?

Little is known, also, about “cumulative, chronic, and population-level impacts of noise on marine life.”

Mortality of organisms

The kind of short-term and long-term research that would be needed to understand these impacts better

Impacts of drilling accidents on fisheries

<table>
<thead>
<tr>
<th>Direct impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Closure of fisheries</td>
</tr>
<tr>
<td>• Change in demand due to public perception</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indirect impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Reduction in harvesting rates</td>
</tr>
<tr>
<td>• Mortality of organisms</td>
</tr>
<tr>
<td>• Behaviour and reproductive capacity</td>
</tr>
</tbody>
</table>
The fishing and oil industries are intertwined in a complex relationship

Coexist with Fishing Industry?

Human impacts lead to degradation and depletion of natural resources:

I. Overfishing and the use of destructive fishing techniques
II. Discharge of chemical fertilizer, insecticide and untreated water waste from agriculture
III. Pollution through marine transportation and dispersal of sewage and industrial waste
IV. Increasing marine and coastal aquaculture of shrimp, crab, and grouper for live export
V. Illegal fishing from neighboring countries
VI. Sedimentation due to the land use charge and increased fluvial inputs
VII. Climate change and associated impacts
VIII. Offshore oil and gas exploration and sand mining on islands in the Myeik Archipelago

MPAs face serious challenges through recent years have been seen notable improvements in the management of marine protected areas in Myanmar, challenges remain

MPAs need strong regular framework

Recommendation for improving MPAs management and effectiveness:

- Develop management plans for coastal commercial fisheries to include quotas and permit
- Conduct field surveys to compile species inventories for the marine environment to assess their relative abundance and distribution
- Identify critical habitat areas
- Improve understanding and predictability of the marine and coastal environment
- Propose, develop and implement additional MPAs
- Ensure fisheries management is sustainable to ensure long term food security for coastal communities
- Involve communities in resources management decisions such as future MPA development
- Ensure new plans for coastal development are reviewed by all stakeholders and full environment impact assessment are conducted.

Thank You
Life cycle of the moon jellyfish (Aurelia aurita)

Little has been studied on polocyst biology and ecology.

Threat to fisheries sustainability

Jellyfish also reduce fish standing stocks, either by

- Direct predation
- Competing for available prey

Causes of the bloom of Jellyfish

As has already been argued in previous studies (Arut 2001, Graham 2001, Parsons & Lalli 2002, Uye & Utina 2004, Parcell 2005, Lyman et al. 2006), the following factors are in evidence, and thought to be among the causes:

1. Overfishing
   - Stock sizes of fishes
   - Competition with jellyfish
   - Removal of fish population

2. Global warming
   - Acceleration of higher temperatures
   - Abnormal reproduction

3. Excretion
   - Dissolved nitrogen inputs
   - May result in opening an ecological niche for jellyfish inside

4. Marine construction
   - Coastline modifications may provide an increased area for polyp to attach

Results on polocyst production

Combination effect of temperature and food supply

Production increased with the increase of temperature and decrease of food supply.
Preliminary data from survey cruises to the Myeik Archipelago by James True - Prince of Songkla University

**Preliminary data from Survey Cruises to the Myeik Archipelago**

SCUBA surveys of fringing reefs supported by IUCN/BOBLME and FFI
February & March 2014

James True, Prince of Songkla University, Hat Yai

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**Summary of Diversity on this cruise**

<table>
<thead>
<tr>
<th>Group</th>
<th># Families</th>
<th># Genera</th>
<th># Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fishes</td>
<td>40</td>
<td>122</td>
<td>284</td>
</tr>
<tr>
<td>Hard Corals</td>
<td>13</td>
<td>42</td>
<td>145</td>
</tr>
<tr>
<td>Soft Corals/Seafans</td>
<td>10</td>
<td>27</td>
<td>n/a</td>
</tr>
<tr>
<td>Echinoderms</td>
<td>27</td>
<td>46</td>
<td>66</td>
</tr>
<tr>
<td>Molluscs</td>
<td>36</td>
<td>62</td>
<td>92</td>
</tr>
<tr>
<td>Sponges</td>
<td>27</td>
<td>33</td>
<td>51</td>
</tr>
</tbody>
</table>

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**Teleost diversity at southern sites**

A total of 248 species were identified, representing 122 genera and 49 families.
For the most part, the offshore reefs of the Southern Archipelago had clearly suffered during the 2010 bleaching.

Some of them recovering...

The most diverse, healthy communities were in shallow, protected sites.

There was a strong trend towards healthier communities from south to north.

The really interesting reefs were those in shallow, turbid waters of the mid-shelf group.

On one dive, the group recorded over 63 species of hard corals.

Miyak may be a diversity hotspot for coral reefs.

<table>
<thead>
<tr>
<th>Location</th>
<th>Number of coral species</th>
<th>Number of coral genera</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Baringo Archipelago”</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td>“Baringo Archipelago”</td>
<td>31 (96)</td>
<td>31 (96)</td>
</tr>
<tr>
<td>“Baringo Archipelago”</td>
<td>35 Not stated</td>
<td>35 Not stated</td>
</tr>
<tr>
<td>Lamani Island</td>
<td>93</td>
<td>47</td>
</tr>
<tr>
<td>Lamani Island</td>
<td>164</td>
<td>69</td>
</tr>
<tr>
<td>Lamani Island</td>
<td>203</td>
<td>66</td>
</tr>
<tr>
<td>Northern Miyak</td>
<td>512</td>
<td>Not stated</td>
</tr>
</tbody>
</table>

Many of the observed patterns in diversity (and reef type) appear to be related to geology.

This makes it quite difficult to make broad generalizations (e.g. inshore/offshore), and means not all areas can capture high levels of diversity.

The team...
Results of rapid assessment in Myeik Archipelago by Robert Howard – FFI

Introduction

Why are coral reefs important?

Food source
- Tissues
- Polyps
- Mucous
- Propagules
- Skeleton

Habitat
- Important structure
- Escape predators
- Nursery
Report of the workshop on Marine Protected Area management in Myanmar

Introduction

• Interested in:
  - State of coral reef
  - Species diversity
  - State of coral reef fish and invertebrates
  - Identify areas for conservation

1. Reef Check Surveys

2. Coral Reef Resilience Survey

Methods

Reef Check:
1. Coral Cover
2. Fish abundance and diversity
3. Invertebrate abundance and diversity
4. Human impacts
Methods

Results: Coral

Results: Coral

Results: Coral

Results: Coral

Results: Fish
**Results: Impacts**

**Reef Resilience**

David Obura, Sophie Benbow & Zau Lunn

- **Study**
  1. Coral population
  2. Algae community
  3. Interactions
  4. Substrate condition
  5. Hydrology
  6. Depth/Visibility/Slope
  7. Impacts
  8. Sediments
  9. Recovery Potential

- **High levels of hard coral diversity**
- **287 coral species**
- **68 genera and 17 families**
- **Predict a total of 309 species**
- **Endangered Species: 2**
- **Vulnerable Species: 36**

- **Overall resilience/health of reefs: average to below average levels**
- **Outer fringing reefs** showed the greatest evidence of mortality.
- **Rocky reefs** showed low evidence of past mortality.
- **Inner reefs** were dominated by fast growing Acropora, so may have recovered faster from past impacts.

- **Outer fringing reefs** - poor recovery
- **Inner fringing reefs** - highest diversity levels and best condition of coral communities and resilience scores
- **Rock/wall reefs** – these sites are not classic reef habitats, with co-dominance of soft corals. Resilience scores were not average to poor

Coral at the survey sites suffered significant mortality in the recent past. Hypothesize that the mortality was caused by mass bleaching in relation to thermal stress in 2010.
Situational analysis of Myeik Archipelago by Panwad Wongthong – IUCN

**SITUATION ANALYSIS OF MYEIK ARCHIPELAGO**

Marine Protected Area Workshop 2-3 October 2014
Myeik, The Union of Myanmar

Dr Panwad Wongthong

**OUTLINE**

- Data Collection
  - Reviewing secondary data
  - Interviews with key people
  - Rapid assessment
- State of the Coast
  - What we were told
  - How they currently are
- Current and Potential Threats
- Conservation status of key resources
- Recommendation for actions

**WHAT WE WERE TOLD**

- Marine and coastal resources provide numerous goods and services to the coastal communities.
- The majority of coastal population depends upon fisheries and aquaculture and agriculture, with minority live on tourism and industrial development.
- Because of the isolation and difficult access by the coastal population, mangrove, coral reef and seagrass ecosystems were previously assumed to be in similar condition to what they were hundreds of years ago.
- Myanmar waters were thought to be areas of wildlife significance such as sharks, dugongs, sea turtles and manta rays.
- These ecosystems have been deteriorated and resources have been depleted over the past few decades.

**HOW THEY CURRENTLY ARE**

- There are few recent or published studies surrounding marine and coastal sphere – ecosystems are largely unexplored, species diversity and health are poorly known.
- From 1975 to 2005, some 300,000 ha of mangroves have been undergoing over-exploitation, Illegal logging, agricultural expansion and conversion to fishponds, shrimp ponds and rice paddies.
- Coral reefs have been declining due mainly to overfishing, destructive fishing and coral bleaching.
- Seagrass beds are facing a growing stress of an increase in numbers and activity of “float travelers” (vessels less than around 10 tons total displacement).
- High value resources are greatly harvested for food and export, Pelagic and demersal fish biomass had fallen by 60% and 70% respectively since 1980. Catch and CPUE (Catches Per Unit Effort) declined from 324 kg to 86 kg over the past 30 years.
- Sharks and rays, marine wildlife are threatened mainly by poaching and accidental entanglement in fishing gears.
WHY WE SHOULD BE CONCERNED

- Coastal land-use change
  - e.g. mangrove for firewood and charcoal (clear-cut) → rice paddy → shrimp pond → more encroachment or palm oil and rubber plantation
- Overfishing
  - the existing trawel fishing (1000RT) vessels (498) exceeded total allowable vessels (472) → more efforts required
- Illegal, Unreported and Unregulated (IUU) fishing
  - e.g. fishing in unauthorized areas, unreported and unlicensed vessels; use of prohibited fishing methods; encroachment of the foreign vessels.
- Unexplained tourism development
- Natural disasters and climate change

EXISTING PROTECTION MEASURES

- MPAs: Lami Marine National Park, Shark Protected Areas
- Coral reefs: limited capacities result in no coral reef monitoring and conservation programs
- Mangroves: No illegal logging and charcoal trading, Mangrove plantation programs exist but information on areas replanted varies from different sources. So far no CFAs in the Tanintharyi Region.
- Fishery resources:
  - Prohibition of fishing gears → Closed fishing areas
  - Fishing licenses → Seasonal closure
- Key marine species:
  - Sharks → no shark fishing allowed in Shark PAs
  - Whales, dolphins, dugong, turtles → no regular monitoring and long-term conservation programs

CONSTRAINTS OR OBSTRUCTING FACTORS

- Limited information, knowledge and understanding about the coastal and marine ecosystems
  - No comprehensive marine biocoral ecological survey or available data out of date and outdated
- Limited information on socio-economic characteristics or livelihoods of coastal communities
- Limited awareness of policymakers, government officials and the general public about the significance of coastal and marine ecosystems as well as the need for conservation
- Limited awareness of resource sustainability options amongst local people and businesses
- Inadequate capacities (i.e. knowledge and technique, financial, infrastructural and institutional)
- Gaps in regulatory mechanisms and law enforcement
- Weak governance
- Insufficient grass-root support for conservation
- Limited coordination and articulation (within and between agencies, within regional/union level, and between regional and union level)

RECOMMENDATIONS FOR ACTIONS

- Fill key data gaps and increase knowledge and awareness
  - Center for coastal and marine research (Center of Excellence)
  - Partnership and collaborations with the neighboring countries and international agencies with relevant expertise
- Effectively manage MPAs
  - Capacity building, sustainable financing of MPAs, and involvement of locals in the management
  - Multiple-use zoning esp. no-take zone
- Promote transnational ecosystem-based management
- Encourage community-based conservation initiatives
- Ensure sustainable development and long-term benefits of tourism
  - Draft best practices guidelines, codes of conduct, DA
- Engage local fisheries in fisheries management and against IUU fishing
- Ecosystem-based Approach to Fisheries Management (EAPF)
- Upgrading MCS capabilities
- Strengthen governance
  - A defined agency whose scope includes administration of MPAs, or any integrated management vision for multiple-stakeholder use of marine resources
- Authority to manage and enforce in the coastal zone, both inside and outside MPA boundaries

Thank you for your attention

Coastal and marine spatial planning: A tool for Integrated Coastal Management by Maeve Nightingale – IUCN
The way it was in the beginning

What it looks like today

Multiple uses of land & sea in coastal areas of Asia today

Why marine spatial planning?

- The demand for outputs (goods and services such as food, energy, transport) usually exceeds the capacity of marine areas to meet all of the demands simultaneously. Marine resources are "common property resources" with open or free access to users. This often leads to excessive use of marine resources e.g. over fishing, and eventual exhaustion of the resources.

- Because not all of the outputs from marine areas, especially natural services such as wildlife habitat and nutrient cycling, can be expressed in monetary terms, markets cannot perform the allocation tasks. Some public process must be used to decide what mix of outputs from the marine area will be produced over time and space. That process is marine spatial planning.

Defining marine spatial planning

Marine spatial planning is a public process of analyzing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives that usually have been specified through a political process. Characteristics of marine spatial planning include ecosystem-based, area-based, integrated, adaptive, strategic, and participatory.

Marine spatial planning is not an end in itself, but a practical way to create and establish a more rational use of marine space and the interactions between its uses, to balance demands for development with the need to protect the environment, and to achieve social and economic objectives in an open and planned way.

Coastal and marine spatial planning – commonly used terminology

- Marine Spatial Planning (MSP)
- Coastal Use Zonation (CUZ) (CZ)
- Integrated Coastal Zone Management (ICZM)

Outputs of marine spatial planning

The marine spatial planning process usually results in a comprehensive plan or vision for a marine region. Marine spatial planning is one element of ocean or sea use management. Zoning plans and regulations are one of a set of management measures for implementing marine spatial planning. Zoning plans can then guide the granting or denial of individual permits for the use of marine space.

Marine spatial ‘management’ not only ‘planning’

Planning is only one element of the marine spatial management process. Implementation, enforcement, monitoring, evaluation, research, public participation, and financing are equally important parts of the process for achieving effective management over time.
The purpose of coastal and marine spatial planning:

- An effective way to plan ocean space and to deal with issues of multiple use conflict and conservation (Cohnert, P. 1995)
- An ecosystem management tool that reduces conflict, uncertainty and costs by separating incompatible uses and specifying how particular areas may be used (Norse, E. A. 2009)
- A strategic plan for regulating, managing and protecting the marine environment that addresses the multiple, cumulative and conflicting uses of the sea (Canning 2003)

What it looks like today

What determines the scale and boundary of a coastal and marine spatial plan/zoning scheme?

- Jurisdictions and mandate for marine and coastal spatial planning
  - Depends on the power and authority or mandate to zone
    - National
    - Provincial
    - District/municipality
    - Community
    - Global
  - Policies, laws, legislation (e.g. national zoning law, water management law, land management law, ICM law, etc)
- Development Strategy: Vision, mission, goals, issues to be addressed
- Capacity

How does spatial planning or zoning address resource use management?

- EEZ
  - Community waters
  - District waters
  - MPAs and marine reserves
  - Commercial fishing grounds
  - Offshore fisheray areas
  - Offshore pearlfarms
  - Shipping and navigation lanes
  - Boats and anchorage areas
  - Designated tourist and recreation areas
  - Etc.

Fisheries activities and other sea uses – a typical coastal zone setting

How does zoning address resource use management?

Zoning rationalizes multiple uses to pursue multiple objectives...
Report of the workshop on Marine Protected Area management in Myanmar

Maps from the Rhode Island SAMP

Marine minerals
Fixed and mobile fishing gear

http://seagrant.gso.uri.edu/seasnmp/maps.html

Marine Protected Areas: design and management by Petch Manopawitr – IUCN

Outline

- The goal and the problems
- What are MPAs?
- Types and categories of MPAs
- Definition Marine Protected Area
- Benefits from MPAs
- Best Practice for Establishing Successful MPAs
- MPAs & Integrated Coastal Management (ICM)
- Design of resilient MPA networks

Goal

Securing biodiversity for Myeik Archipelago and improving its fisheries and sustainable tourism development potential
The Problems

Major Threats to Coastal & Marine Ecosystems
direct drivers of change

Habitat loss & conversion
- coastal development
- conversion to aquaculture ponds
- coastal deforestation
- reclamation
- mining

Habitat Degradation
- eutrophication
- pollution
- alien species invasion
- erosion & siltation
- disease
- destructive fishing practices
- salinization (estuaries & lagoons)

Overexploitation
- unsustainable levels of fishing
- pressure
- incidental take or by-catch

‘global warming’, climatic changes & sea level rise

Applying IUCN PA management categories to MPAs
(based on primary management objectives)

1a. Strict Nature Reserve: Areas managed for science, or as Strict Nature Reserve
1b. Wilderness Area: Area managed for wilderness protection
2. National Park: Area managed mainly for ecosystem protection / recreation
3. Natural Monument: Area managed mainly for conservation of specific natural features: Natural Monument
4. Habitat/Species Management Area: Area managed mainly for conservation through management intervention - Habitat/Species management Areas e.g. Sundarbans
5. Protected Landscape/Seascape: Areas managed mainly for landscape/seascape conservation and recreation - Protected landscape/ Seascape

‘management by objectives’ designed to achieve a specific aim or set of results

Types and forms of MPAs

MPAs can offer a spectrum of management strategies ranging from full protection, or no-entry areas, to multiple-use areas which prohibit limited activities. No-take MPAs are spatial closures that prohibit all forms of resource extraction, especially fishing.

Benefits of MPAs

- Conservation
- Fisheries
- Recreation
- Tourism
- Better impacts

What are Marine Protected Areas (MPAs)?

“IUCN defines a PA as: An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means”

“Any area of intertidal or subtidal terrain, together with its overlying water and associated flora, fauna, historical and cultural features, which has been reserved by law or other effective means to protect part or all of the enclosed environment.”

Guidelines for Applying the IUCN Protected Area Management Categories to Marine Protected Areas

Developing capacity for a protected planet


When appropriately placed and well-managed, MPAs contribute to

- Conserving biological diversity and ecosystems.
- Protecting critical spawning and nursery habitats and spillover benefits to adjacent areas.
- Protecting sites with minimal direct human impact to help them recover from stresses (enhancing ecosystem resilience).
- Focal points for educating the public about marine ecosystems.
- Nature-based recreation and tourism.
- Serve as baselines for research and for evaluating other areas.
- Sharing costs and benefits among local communities and other stakeholders.
- Reducing poverty and increasing the quality of life of surrounding communities.
Evidence?
MPAs have proven effective in restoring marine resources
Lester et al. 2000 compiled data from 124 no-take areas from 29 countries and showed that:

**Reserve Effect**
- **size**: 28%
- **density**: 166%
- **biomass**: 46%

Evidence?
MPAs have proven effective in preventing coral loss
Selig & Bruno 2010 compiled a global database of 8534 live coral cover surveys from 1969–2006 and compared annual changes in coral cover inside 316 MPAs to unprotected areas.

Evidence?
MPAs have proven effective in supporting nearby fisheries
Halpern et al. 2010 analysed 16 independent MPA survey and showed that spillover is a common phenomenon for species that respond positively to reserve protection. Although at relatively small scales, detectable on average up to 800 m from reserve boundaries.

Evidence?
MPAs have proven effective in mitigate coral disease
Raymundo et al. 2009; surveyed reefs across the central Philippines, including well-managed (MPAs), and found that disease prevalence was significantly negatively correlated with fish taxonomic diversity.

Summary:
The primary goal of MPAs is to conserve biological diversity but there are many other societal goals which MPAs contribute to as well:
- Sustainable livelihood
- Food security
- Coastal zone protection
- Carbon management
- Tourism revenue
- Sustainable fisheries

All of these need to be considered in the design of MPAs and MPA networks — there can be many goals: ecological, social, economic

Best Practice for Establishing Successful MPAs
1. Use best available information to understand the ecosystem dynamics & threats to the ecosystem: scientific, socio-economic, anthropological, institutional, traditional & local ecological knowledge
2. Set clear goals and objectives for the MPA
3. MPA Design & Zonation:
   - Size & shape, location, position of boundaries, zoning, ecological representation, connectivity
   - Ease of management, access, proximity to ecological threats
   - Evaluating effectiveness & acceptability of different MPA designs.
4. Secure legal authority and long-term political commitment
5. Engage stakeholders fully — information sharing, accountability, transparency of management decision making, reach consensus (good governance practice)
6. Monitor success of MPAs
7. Sustainable financing
8. Develop an integrated management framework — MPAs & Integrated Coastal Management

Resilient MPAs & Networks
Five criteria to help guide the design and planning for individual MPAs and MPA networks:
1. Representation & Replication
2. Critical Areas
3. Connectivity
4. Size, Shape, & Spacing
5. Socioeconomic
1) Representation and Replication

Why Representation?
1. Different coral reef habitats support different groupings of coral and fish species
2. Protecting a variety of coral reef habitats will help conserve biodiversity by:
   - preserving full range of coral & fish communities
   - maintaining diverse larval supply

Three factors to consider and account for in MPA planning for representation:
1. **Composition**: each habitat supports a unique community, and most marine animals use more than one habitat during their lives
2. **Structure**: the environmental/latitudinal gradients in habitats and species composition
3. **Function**: maintenance of the ecological processes of the system ('ecosystem function')

Reef classification

**What information can you use?**
- reef types, major reef zones
  - barrier, mid-shelf patch, inshore fringing
  - fore-reef, spur & groove, reef crest, back reef
- distance from shore (salinity, turbidity)
- neighboring and linked habitats
- condition: biodiversity, levels of use, threats, bleaching response
- waves, winds, currents, depth

**Consider physical characteristics**
- Extremely high wave energy: coraline algal ridge replaces corals
  - High-energy (outer) reef crest: small, low profile, robust/unructuring
- Moderate-energy (mid-shelf): large, branching, columns, tables
- Low-energy inshore/deep: branching, plates, massive heads
- Deeply sheltered bays/lagoons: delicate, branching, whorls, tables

Reef classification

**Where to find information?**
- images, maps, nautical and weather sources, experts
  - A good source to start:
    - Millennium coral reef mapping
    - Millennium Coral Reef Landscapes Archive
    - Oceanographic and current data

**Determine values and threats**

**Values:**
- recreation
- tourism
- fisheries/fish security
- coastal protection
- fish/coral biodiversity
- threatened species

**Threats:**
- destructive uses
- over-exploitation
- pollution
- disease
- predation
- development
- climate change
Why Replication?
- To provide a stepping-stone for the dispersal of marine species
- To insure against catastrophic local disasters
- For use as reference sites during monitoring and to evaluate the effects of human influences on communities

Rules of Thumb for Replication
- Aim for at least 3 replicates
- The number of replicates of each habitat type must be a balance between ensuring representation and ensuring effective monitoring and enforcement
- Large areas (100s–1000s km²): MPA should conserve a representative example of each bioregion
- Smaller areas (1 km–100s km²): MPA should include reef types and major reef zones, which can serve as proxies (or substitutes) for community types

2. Critical Areas
Identify ecologically significant areas
- Sources of larvae and spawning aggregations
- Nursery and breeding grounds of fish and other marine organisms
- Developmental and feeding habitats
- Migration corridors
- Sea turtle nesting areas
and unique or vulnerable habitats:
- Coral reefs
- Deep-sea coral communities
- Marine lakes
- Salt marshes
- Seagrass beds
- Mangroves

Also source areas

Identify reef communities or coral types that display resistance to bleaching
- Physical factors that:
  - Reduce temperature stress
  - Enhance water movement
  - Decrease light and radiation stress
  - Correlate with bleaching tolerance

and/or display resilience to bleaching
- Availability and abundance of local larval recruits
- Evidence of recruitment success
- Diversity and abundance of different coral reef taxa
- Low abundance of biorhorics, corals, and diseases
- Effective management regime supported by legal framework, participation and enforcement
- Larvae transport and connectivity by currents
- Concentration of larval supply (e.g., concentration and settlement)

3. What is connectivity?
Connectivity describes the extent to which populations in different parts of a species range are linked by the exchange of eggs, larval recruits, or other propagules, juveniles, or adults, as well as the ecological linkages associated with adjacent and distant habitats.

Connectivity includes:
- Connections between adjacent habitats
- Connections between distant habitats
- Connections through larval dispersal in the water column between and within sites
- Connections through adult movements in their home range, from one site to another, or because of spill-over effects from MPAs

Adjacent habitats are linked through the flow of matter, energy, and organisms:
- Reef flats
- Back-reef lagoons
- Seagrass beds
- Sand flats
- Mangroves
- Beaches and dunes
Coral reefs are linked to distant areas by dynamic processes and may be influenced by activities occurring in remote areas.

What can you do?
• Take a “ridge to reef” approach to resource management
• Use an integrated approach to coastal management addressing ecological linkages, fisheries, recreation, research, and ecosystem function

Estimated average larval dispersal distances

Focus on assemblage of species rather than larval dispersal patterns of a few.

What can you do?
• Gather information on target species larval dispersal and adult movement distances and patterns
• Place MPAs in a wide variety of places in relation to the prevailing currents
• In areas where currents are complex (e.g., eddies or reverse flows), spread MPA sites evenly
• With strongly directional currents, place MPAs in upstream locations to support recruitment to other management areas
• Link MPAs by prevailing currents to facilitate the recovery of damaged areas and maintenance of biodiversity

Module 3: Resilient MPAs & Networks
Patterns of larval dispersal influenced by:
• Larval behavior
• Larval duration: species-specific, ranging from hours to months, and typical pelagic duration is 28-35 days
• Food resources
• Predators encountered
• Influences of currents or other oceanographic factors

Consider adult movement patterns

Resilient MPAs and MPA Networks

Section 4:
Size, Shape, and Spacing

4) Size, Shape, and Spacing

Why size, spacing, and shape?
• Facilitate and promote connectivity between and within the MPA/network
• Influence the degree to which conditions in the wider environment affect MPA
• Vary with the goals and objectives of the MPA, as well as the social and economic environment in which it is located

Optimal Size
10-20 km in diameter - across minimum width

WHY:
• For biodiversity: few large MPAs are preferable to many smaller MPAs
• Consider feasibility of management (one large = easier)
Optimal Spacing

MPAs should be spaced within 10 - 20 km of one another (closer is better)

WHY? (Connectivity!)

- Capture the biogeographic range of variation in habitats and species
- More closely spaced MPAs are more likely to be ecologically connected and protect a greater number of species through movement of young and increased recruitment from other MPAs

Section 5: Socioeconomics

Why Socioeconomic Criteria?

- MPA creation can help move to a more holistic approach, including human and ecosystem interactions, and cumulative impacts
- Multi-objective approach can create a foundation that transforms the way people address conflicts between the environment and the economy

What can you do?

Measure ecosystem services thru:

- Valuation papers
- Practical guidelines (SOCMON)
- NOAA Coasts

Include socioeconomic info in management:

- Prioritize areas to protect
- Balance between extractive and conservation uses

Summary

- Represent! (Do it 3x)
- Function & survival
- Stay connected
- Bigger is better
- Closer is better
- Square is better
- People people people

OPTIONAL: CASE STUDY

Case study:

Applying resilience principles to zoning the Raja Ampat MPA network
Raja Ampat: A TNC Case Study

Raja Ampat MPA network:
Conservation Targets

Habitats
- Shallow: coral reefs, mangroves, seagrass, marine lakes
- Deep: oceanic waters, seamounts, upwellings
- Islands and associated flora and fauna

Species
- Rare & threatened (e.g. dugong, turtles, whales)
- Endemic (e.g. walking shark)
- Commercially important & exploited
- Large pelagic fish

Design Principles for the Raja Ampat MPA Network

- Biophysical: To maximize biological objectives by taking into account key biological and physical processes.
- Socioeconomic: To maximize benefits and minimize costs to local communities and sustainable fisheries.

Design criteria for MPA zoning: designing for resilience

Biophysical
- Minimum size NTA 10-20 km
- NTAs not spaced >15 km apart
- 20-30% of each habitat type protected within NTA
- Minimum of 3 replicates of each habitat type represented in NTA
- Include critical habitats (e.g. SPAEs, turtle nesting beaches)
- Select areas that have more than one habitat type represented
- Protect unique communities (plants/animals, high biodiversity)
- Protect biological entire units
- Areas resilient to climate change

Socioeconomic
- Respect for traditional land and sea tenure
- Protecting fishing areas and species important to local communities
- Support local and artisanal fisheries
- Minimize impacts to local livelihoods
- Consider species vulnerable to exploitation
- Minimize conflicts between different users

Datasets used for analysis

Extensive community mapping of fisheries areas & key marine resources

Spatially representing data: resource use

Ref: McLeod et al. (2009); Green et al. (2009)
**Best solution for biodiversity and fisheries**

**Raja Ampat: MPA network**

**Lessons Learned**

**Scientific design process:**
- Technical but straightforward
- Applied decision support tools (Marxan with zones)
- Expert, local, and traditional knowledge critical to design process

**Application of RESILIENCE concepts:**
- Protecting adjacent connected habitats straightforward
- Connectivity with habitat types still largely unknown
- Identifying and protecting resilient sites challenging need further data

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**Resilience assessments**

- Trialed new IUCN protocol (Ogura & Grimsditch 2009)
- Resilience assessments in 2009 & 2010
- Data collected across different reef types, exposure and 2 depths
- Data collected on:
  - Benthic cover (corals, algae, rubble etc.)
  - Fish biomass
  - Recruitment
  - Size class structure (corals, fish)
  - Overall coral community structure
  - Coral condition (disease & coral bleaching)
  - Resilience indicators

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**Thank You!**

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**MPA/LMMA development next step by Frank Momberg – FFI**
Next Steps

- Develop an enabling environment to establish MPAs/LMMAs
- Create taskforce to establish LMMAs
- Implement pilot LMMAs establishment
  - Identify stakeholders
  - Marine resource use mapping with communities
  - Identify zoning system within LMMAs
  - Develop rules and regulations for LMMAs
Works in MPA management in Bay of Bengal region promoted by BOBLME Project by C. M. Muralidharan – BOBLME

Objective of BOBLME Component 3

- Improved Understanding and Predictability of the BOBLME Environment
- to share information with other regional and global environmental assessment programmes
- for improved understanding of the BOBLME ecological functions and processes.
BOBLME Subcomponent 3.2

Marine Protected Areas in the Conservation of Regional Fish Stocks
• develop a better understanding of and promote a more comprehensive approach to
• the establishment and management of marine protected areas (MPAs) and fish refugia

MPA working Group-1
• The BOBLME MPA Working Group first met in January 2011 in Malaysia
• Discussed/ validated the MPA status review “Status of Marine Protected Areas and Fish Refugia in the Bay of Bengal Large Marine Ecosystems” (World fish and University of Washington);
• Identified gaps in MPA networks and prepared recommendations for capacity building and potential interventions

MPA working Group-2
• Second meeting was held in Thailand in February 2012 to follow up on this work, to
• gain an understanding of the FAO Technical Guidelines on MPAs and Fisheries
• provide input to the drafting process of the BOBLME MPA brochure and policy advisories.

SUPPORT TO COUNTRY LEVEL MPA WORKS

Bangladesh
A framework for establishment and management Marine Protected Areas in Bangladesh - IUCN covering
– Analysis of the Bay of Bengal (BOB) basin, coastal configurations, ecosystem, habitats,
– Foreseen socio-economic and ecological benefits from the protection of Ecologically Critical Areas (ECA) and probable MPA declarations.

Bangladesh - 2nd phase
Strengthening National Capacity on Managing Marine Protected Areas (MPA) in Bangladesh including
– finalisation and dissemination of the framework
– pilot initiatives for St Martin Island MPA

Sri Lanka
• Assessment of management effectiveness, awareness raising and compliance generation at the Bar Reef Marine Sanctuary (BRMS)
• developing evaluation techniques using biophysical, socio economic indicators for better management of the Bar reef.
• Provision of data for the adaptive management of MPA.

Indonesia
• Assessment and planning of effective management of two MPAs in Sumatra coast, Indonesia
  – Sabang District MPA
  – Pulau Pith National Marine Recreation Park
• Trained on MPA management effectiveness score card developed by MMAF - called Evaluation Tool for Management Effectiveness of Marine Protected Areas (E-KKP3K);
• Evaluation- management effectiveness of their respective MPA.
Indonesia Phase 2

Training programmes for MPA staff of Indonesia’s BOBLME area on

- community perception monitoring
- evaluation of aquatic, coasts and small island conservation area management effectiveness

Thailand

- Improving Marine Protected Area management in Thailand (AIT/ Wetland Alliance)
- Considerable progress made in Building Social Adaptive Capacity
- Other area components could not be addressed effectively due to various reasons

Myanmar

The current agreed work with IUCN on

- Improving the information base and developing a functional network or coalition for
  - addressing conservation and management of the Myeik Archipelago region
  - Uniqueness here is the live board surveys

The MPA Atlas

- The BOBLME Protected Area (MPA) Atlas website (http://boblmesatellitedata.org) created by WorldFish

  - An information system, and database portal storing information on MPAs relevant to the Bay of Bengal region.
  - The website is Public Access.
  - The objective is to provide access to the latest information on MPAs relevant to the Bay of Bengal region to marine scientists, managers, and conservationists.

The main features of the website

- BOBLME MPA database
  - Online, geospatial interactive maps with multiple data layers including MPAs, important habitats such as coral reefs, the BOBLME boundaries and bathymetry.

  - Designed with a user friendly interface and searchable features for straightforward navigation.

Interface of interactive online map in BOBLME MPA Atlas
Report of the workshop on Marine Protected Area management in Myanmar

PRODUCTION OF MPA POLICY BRIEFS

Policy briefs
- A two pager policy brief on MPA is prepared for each country
- The details are verified/corrected/supplemented with country experts
- Would be brought out soon

EAFM Trainings
- EAFM promotes sustainable development in the fisheries sector
- Balances ecological well-being and human well-being through good governance
- For future generations (our sons and daughters)

Ecological
Well-being
Good
governance
Human
Well-being
For future generations

OTHER BOBLME WORKS THAT COMPLEMENTS THE WORK IN MPAS

Socio Economic Monitoring (SocMon) trainings
- Conducted SocMon training in Myanmar with FFI, now being followed up
- SocMon trainings in South Asia with the help of IMM

Other work supports in Myanmar that may support MPA management
- FFI work to help Myanmar with Shark resource assessment, NPOA including Assessment of efficacy of shark reserves (linked to MPA capacity development concept)
- Results from Marine Ecosystem Assessment Survey by the Research Vessel Dr Fridtjof Nansen in Myanmar waters.
- Capacity building on seagrass management through FFI

Building towards Collaborative Critical Habitat Management
- Sundarban
- Mergui / Myeik Archipelago
- Malacca Straits
- Gulf of Mannar

- Collaborative management structure ("Planning and Management Committee")
- Joint research and assessments
- Capacity development
- Improved governance, MPRs / MMA

Ecosystem characterisation with CSIRO help
Case study 1 - Apo Island, Philippines: small-scaled, community-based MPA by Maeve Nightingale - IUCN

Introduction

Apo Island’s community-managed marine sanctuary is considered one of the best of its kind in the world. Established in the mid-1980s, the sanctuary became a beacon of hope that damaged reefs can, with proper protection, management, and community buy-in, be restored back to health.

The sanctuary was key to the increase of fish populations in the area, providing multiple benefits to the local coastal community.

The sanctuary was also instrumental in causing marine life to thrive beyond the southeastern coast of the island, making the waters around the entire island a haven for sea turtles and other marine species.

The History

- Until 1980s Apo Island had a sustainable fishery – traditional fishing, non-mechanized passive gears predominant
- Mid 1960s destructive methods came in: dynamite fishing, Muro-ami, cyanide, fine mesh nylon nets. Dramatic decline in fisheries – fishers travel far to catch basic needs
- 1976, researchers from the Silliman University Marine Laboratory noticed that around Apo Island fish stocks were declining and coral reefs were damaged – discussions with local stakeholders started
- 1979 Apo Island Marine Reserve was instated and the community realized that if fishing activities continued the way it did, there would soon be no fish left. Only traditional and non-destructive fishing methods were allowed.
- 1979 marine conservation and education programs were also introduced by Silliman University extension workers.
Apo Island

1982 community as a “no-take” zone or reserve declared
- 450,000 meters
- 10% total fishing area
- Easy to protect on a rotational basis by core group of 7 families
- Healthy coral but few fish

Biodiversity benefits

- Increase in fish abundance within the “no-take” zones within 3 years with fish “sprayed over” to surrounding waters where traditional fishing is allowed
- Increase in coral cover as destructive fishing techniques prohibited
- Coral cover data from 10 year intervals
  - 1982 34.7% cover
  - 2002 56.6% cover

History

- 1985 area was declared a municipal marine reserve by the municipal council of the town of Daung, Nagros and Stilman University through the assistance of the Marine Conservation and Development Program (MCDDP)
- 1985 increase in fish abundance and size “spill over effect” outside sanctuary – all families convinced and support sanctuary
- 1985 voluntary user fees were collected beginning the process of income generation for the community and for the maintenance of the marine sanctuary, education, waste collection, water supply, electricity
- August 1994, the Island was declared a Protected Landscape and Seascape under the National Integrated Protected Area System (NIPAS) and the national government assumed the leading management role and established a Protected Areas Management Board (PAMB)

Socio-economic Benefits

Increased coral cover and fish abundance resulted in a boom in diving tourism
Tourists paid to visit the reef – the PAMB had created a system of fixed fees for visitors – revenues went to national government for distribution
New occupations in tourist industry (souvenirs, catering hotels/home stays) doubled income (52% increase within 3 years)
User fees and tourism revenue reinvested in local education / schools, water, electricity waste management programmes

What contributed to the success of the Apo Island MPA?

- Ideas from outside – University partner - research, know-how, education and awareness building – stimulate shared awareness
- Exposure trip to see an MPA in action – Similan Island
- Village leader (barangay captain) visionary and committed
- Homogeneous island population (mostly related)
- Community driven process from the start – gradual process
- Local government support community initiated MPA
- National recognition, support and management of the MPA (good or bad?)
- Threat to local autonomy?
- Clear ownership and boundaries, agreement on rules, enforcement of rules
- Benefits realized quickly – environmental, social, economic
- The sanctuary is “sacred” becomes a model of collective effort – confidence and pride established

More recent challenges:
Climate Change and extreme weather events
2011 - 2012

Reefs in the south-eastern side of the island were severely damaged by typhoon (99%). Coral reef fish abundance also declined by 50%. Reefs on the northern side of the island were unaffected by the storms and remain intact.

While damage to the sanctuary was significant not all was lost because marine life around the island was already healthy. Turtles continue to feed around the island and the fish, despite reduced populations, still flourish.

Tragedy struck due to two catastrophic typhoons: Typhoon Bending in 2011 and Typhoon Pablo in 2012

Strong storm surges decimated the corals and washed them ashore. The sanctuary once known to be barren with marine life was left devastated and now resembles a coral graveyard.

What contributed to the success of the Apo Island MPA?

- Confidence and experience to manage new issues arising:
  - Island carrying capacity and number of tourists – communal decision to restrict number of tourists (economic loss but long-term sustainability)
  - Communal decision to fish only what is needed for daily consumption and living costs
  - Community decision to exclude all non-Apo Island fishers and to negotiate this with government
  - Community decision to address introduce education on population control

Thank you

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Case study II  Coral Triangle Initiative and Great Barrier Reef: large-scaled, regional MPA by James True - Prince of Songkla University
2010 coral bleaching

Andaman reefs were severely affected by bleaching mortality.
Many species went locally extinct.
Northern Andaman reefs were worse affected than southern.


2013 Survey: 3 years after mass coral bleaching crisis in 2010.

2010 coral bleaching
Components of resilience in the context of recovery

- Resistance
  - Protection, impacts, adaptations
- Regrowth
  - Resilience, reverse puberty
- Reproduction
  - Impacts, reverse puberty
- Repopulation
  - External, spatial scale issues, larval supply

Replenishment is occurring...
But not evenly

Southern Myeik Dead coral cover (% of substrate)

Recruitment appears to be concentrated on the NW side of Surin

Recruitment is very patchy, and generally dominated by brooding species

Compared with the Thai reefs, many of the areas with high cover of dead coral in Myeik actually have high recovery potential because of strong recruitment.

Similan has shown much slower coral recovery than Surin.

This is the side exposed to the flow from the north.

If larvae were being entrained from local spawning, there would be heavier recruitment in the "sandy zones" of the south.

The Porites are likely to have recruited from local sources; the Pocillopora may have originated from the few colonies that survived the 2010 event, or from longer distances.
Coral larvae develop passively at the surface of the water column for several days before becoming settlement competent.

During the week or so that they are carried by surface currents, they may disperse long distances.

There is a finite limit on how far larvae can disperse and still settle...

Most coral larvae can manage about 1/3 of this maximum distance.

The bleaching was severe in the north Andaman, but reseeding is greater in the Surin islands than in Similan.

Replenishment of the northern offshore islands must come from the north...

There may also be input from an isolated population of survivors of the Fish Lanta group, and south-central replenishment from the south.

Significant recruitment by spawners...

Suggesting recruitment from outside.

Recruitment heavily dominated by brooders...

Suggesting local sources of recruitment.

Because of local depauperisation (from the 2010 bleaching), the nearest plausible source of replenishment for Thai north Andaman reefs is Myanmar.
Case study III - MPA and fisheries management: integrating fisheries management into marine reserve design and MPA development by Stephen Box - Smithsonian Institute
Balance Long & Short Term Objectives

Conserve natural resources for future generations

Maximise economic benefits for today’s society

Managing human behavior in an ecosystem context

But this diversity presents a complex management challenge...
1 - Genetic methods:
Adult fishing banks connected to juvenile areas

2 - Rare Earth Element Analysis
Juveniles connected back to Adult grounds

Summary
Migration with age
Current Dispersal

How many fishers are there?

How many fishers are there?
- Building local and national fisher registries
Report of the workshop on Marine Protected Area management in Myanmar

Science for Decision Making

Thank You
Stephen Box
Smithsonian Institution
boxs@si.edu
Case study IV - MPAs and tourism development by Panwad Wongthong – IUCN

MARINE PROTECTED AREAS (MPAs) AND TOURISM DEVELOPMENT

Marine Protected Area Workshop
2-3 October 2014
Myeik, The Union of Myanmar

Dr Panwad Wongthong

OUTLINE

- Introduction to Coastal and Marine Tourism
- A Case Study of Koh Phi Phi, Thailand
  - Significance of Reef-based Tourism
  - Unsustainable Practices and Overdevelopment
- Sustainable Tourism Management
- Linking MPAs to Tourism
- Payment for Ecosystem Services (PES)
- A Case Study of Maldives
  - Significance of Tourism
  - Management Approaches
- Lessons Learned and the Way Forward

MARINE AND COASTAL TOURISM

- In-water activities: swimming, snorkeling, SCUBA diving, interaction with wildlife, cruise and boating, recreational fishing
- On-land activities: beach relaxing, sun tanning
- Major attractions: healthy reefs, fish diversity and abundance, marine wildlife, water clarity, white sandy beaches, good weather, staff and service
- Key marine tourism providers: hotels, dive boat operating businesses, restaurants
- Associated services: transportation, internet cafe, bars

TOURISM IN CORAL ENVIRONMENTS

- Tourism, as a whole, is the most international trade item, with reef tourism becoming an increasingly large component.
- Account for more than 15% of GDP in at least 23 countries and territories
  - Top destinations: Australia’s Great Barrier Reef (GBR), the Red Sea, East Africa, the Bahamas and the Caribbean, Hawaii, Maldives, and Southeast Asia.

BENEFITS FROM REEF-RELATED GOODS & SERVICES

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ecosystems (million US$)</td>
<td>Tourism (million US$)</td>
<td>Total (million US$)</td>
<td></td>
</tr>
<tr>
<td>Coral reef destruction</td>
<td>500 million</td>
<td>900 million</td>
<td>1,400 million</td>
</tr>
<tr>
<td>Wharf &amp; port development</td>
<td>200 million</td>
<td>400 million</td>
<td>600 million</td>
</tr>
<tr>
<td>Rake</td>
<td>150 million</td>
<td>300 million</td>
<td>450 million</td>
</tr>
<tr>
<td>Marine biodiversity</td>
<td>100 million</td>
<td>200 million</td>
<td>300 million</td>
</tr>
<tr>
<td>Environmental conservation</td>
<td>50 million</td>
<td>100 million</td>
<td>150 million</td>
</tr>
<tr>
<td>Total benefits</td>
<td>1,500 million</td>
<td>2,700 million</td>
<td>4,200 million</td>
</tr>
</tbody>
</table>

- A wide range of economic values of reef tourism from US$ 2 to 1 million per hectare per year

CONCEPTUAL ISSUES/CONSTRAINTS TO SUSTAINABLE TOURISM

<table>
<thead>
<tr>
<th>Environment</th>
<th>Financial Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nature-based tourism</td>
<td>Local livelihoods</td>
</tr>
<tr>
<td>Nature-based tourism</td>
<td>Tourism planning and management</td>
</tr>
<tr>
<td>Nature-based tourism</td>
<td>Tourist attractions</td>
</tr>
<tr>
<td>Nature-based tourism</td>
<td>Tourism products and services</td>
</tr>
<tr>
<td>Nature-based tourism</td>
<td>Infrastructure development</td>
</tr>
<tr>
<td>Nature-based tourism</td>
<td>Nature-based tourism</td>
</tr>
</tbody>
</table>

IMPACTS OF REEF-BASED TOURISM

- Located in the Andaman Sea, a short boat ride from Phuket.
- Started as a backpacker destination but became popular and underwent extensive construction after “The Beach” was filmed in 2000.
- Prior to 2004, annual tourist arrivals reached 1.2 million; (at times 5,000 tourists a day and 2,000 day visitors)
- Building legislation and EIA in place but no enforcement.
- Issues: pollution, shortage of freshwater, rapid and unplanned development, blackouts, uneven distribution of benefits, high cost of living.
**KEY FACTORS TO UNSUSTAINABLE MANAGEMENT**

- Limited knowledge and awareness (surrounding the sustainability concept) → overdevelopment and encouragement of mass tourism
- Economic priority over social and environmental concerns
- Gaps in legislation
- Weak enforcement (and corruption)
- Lack of coordination (vertical and horizontal scales)

**SUSTAINABLE TOURISM**

- **Sustainability Concept and Stakeholder Theory**
  - The conservative use of natural and social resources
  - The competitive advantage for the tourism businesses
  - The quality of life of the host community
  - A high level of tourist satisfaction

**MANAGEMENT STRATEGIES FOR MARINE TOURISM**

- **Management approaches:**
  - Economic approaches (e.g. entrance fees)
  - Regulatory approaches (e.g. zoning)
  - Institutional approaches (e.g. property rights)
  - Educational approaches (e.g. briefings)
  - Voluntary approaches (e.g. green flag)

- **Target or site specific:**
  - At dive sites (e.g. buoys, alternative dive sites)
  - At dive operators (e.g. best practices)
  - At tourists/divers (e.g. responsible behaviours)

**LINKING MPAS AND TOURISM**

**Benefits to Tourism from MPAs**
- Safeguarding critical habitats
- Protecting iconic species
- Habitat restoration
- Cultural and historic resource preservation
- Healthy coral reefs and abundant and diverse reef-associated fish communities can add value to the experience of visiting tourists

**Benefits to MPAs from Tourism**
- Revenue
  - Entrance fees/visitor user fees
  - Private sector concession
  - Donation
- Employment
- Political justification for MPAs
- Environmental education
  - Nature guide
  - Visitor center
  - On-shore signage

**PAYMENT FOR ECOSYSTEM SERVICES (PFES)**

- Increasingly acknowledged as an alternative to failed regulatory mechanisms.
- Adding PFES to existing regulatory schemes can make them more effective in protecting both environments and livelihoods.
- Benefits:
  - Compensating for lost earnings e.g. no-take zone Vs. fishing communities
  - Restoring habitats e.g. financial and in-kind benefits to communities for planting mangrove trees
  - Conserving endangered species e.g. payment for turtle nest adoption

**WAYS PFES CAN BE ADDED TO EXISTING REGULATORY SCHEMES**

**MALDIVES**

- Situated in the Indian Ocean, south-west of India
- Contain 1,190 small islands – only one-sixth are populated
- Tourism accounts for over 30% of GDP
- High standards of environmental care and local benefit-sharing
- The “tourism industry” is synonymous with “resort islands”
- Developed under “one island one hotel scheme”
- Attractions: coral reefs, wildlife (e.g. whale sharks, mantas, rays, turtles), lagoons, island vegetation, white sandy beaches
- Key issues: beach erosion, coral bleaching, solid waste and discharge, sedimentation

**BENEFITS FROM SHARKS & RAYS VIEWING TOURISM**

- **Benefits**
  - US $3.7 million
  - US $7.9 million
  - US $12 million
  - US $18 million
  - US $38.6 million
  - US $42.2 million
  - US $48.2 million
  - US $54.0 million
  - US $59.8 million
  - US $72.8 million
Report of the workshop on Marine Protected Area management in Myanmar

RESORT ISLANDS AND HOUSE REEF CONCEPTS

PROTECTING ICONIC SPECIES AND CORAL REEFS
- The first MPA established in 1993
- Currently 33 MPAs, in which only diving and bait fishing are allowed
- Significant aggregations of whale sharks and rays
- Whale Shark Sanctuary: Aril Atoll (Maaamgill MPA) and Baa Atoll (Hanifaru MPA and Angalufu MPA) → banning sharks and rays fishing - illegal to capture, keep or harm
- Designated for the explicit purpose of tourism, aiming to provide an alternative income for locals which encourage them to move away from harmful fishing practices and at the same time preserve the whale sharks habitats

CODES OF CONDUCT
For tour operators
- Vessels: reduce their speed, locking out for animals, no vessel traffic directly above the aggregation site, drop off guests at a safe distance upstream and pick up guests downstream from the aggregation site
- On-board: pre-encounter briefing
- In-water: distance from the animals

For divers
MANTA RAY: Make a quiet entry; Adhere to minimum distance; Never chase; No Touching; Alert and calm; Rest and remain still; Avoid obstructing; Enjoy your experience!

LESSONS LEARNED FROM KÔH PHI PHI & MALDIVES
To sustainably manage tourism, these key factors are required:
- Capacity development
- Consideration of a complex range of sub-national, national, and transnational relationships
- Regulatory frameworks
- Community involvement, trust, acceptance, and support
- PES: compensating for loss earnings, protecting and restoring habitats, conserving endangered species
- Sustainable financing: entrance fees, fund raising, private-sector partnerships
- Coordination between multi-sectoral and multi-faced agencies
- Collaboration of all stakeholders

REFERENCES
Thank you for your attention.
Case study V - The Andaman MPAs in Thailand: case studies of the world heritage nomination, MPA management effectiveness evaluation and Green Fins programme by Petch Manopawitr – IUCN

Thailand Andaman MPAs:
Conservation initiatives and lesson learned

Petch Manopawitr
Deputy of IUCN Southeast Asia Group
Email: petch.manopawitr@iucn.org
James Triv, Philip Doordan, Niphon Phongsawan and Rudolf Hermes

Contents

- Introduction:
  - Thailand’s MPAs and Andaman Bioregion
  - Challenges and climate change impacts
- Management responses:
  - Marine SMART Patrol
  - Green Fins and Reef Guardians
- Management Effectiveness Evaluation
- Recommendation:
  - The need for transboundary conservation and large scale marine spatial planning

Thailand’s MPAs

- 28 MPAs established
- National Park Act 1961
- Wild Animal Preservation Act
- Comprehensive legislation

Challenges:
- Resource overexploitation
- Tourism/development pressures
- Pollution
- Overlapping jurisdiction
- MPA effectiveness unknown

Thailand’s Andaman Bioregion

- Unique confluence of many biogeographic regions
- Diverse ecosystems with 6 distinct ecoregions
- Global Biodiversity hotspot
- Important livelihoods

The Northern Offshore Islands ecoregion

1. Mu Ko Surin NP
2. Mu Ko Similan NP
3. Phang-nga Province

Key aspects:
- coral reefs hotspots
- world class dive tourism
- key sea turtle nesting sites
- free from land-based pollution
- high tourism pressure seasonally
- well-established parks
- small aboriginal communities

The Northern Mangrove and Inshore Islands ecoregion

1. Larn Narok-Nai NP
2. Mu Ko Ranong NP
3. Larn Son NP
4. Ranong & Phang-Nga Provinces

Key aspects:
- Extensive mangrove forest
- Beach fringing
- Strong land-sea connection
- Intensive fishery pressure
- Moderate tourism potential

The Central Beaches and Coastal Gallery Forests ecoregion

1. Mu Ko-a-Ko Phra Thong NP
2. Khao Lak-Lam Ru NP
3. Khao Lapi-Hat Thai Muang NP
4. Siiran NP
5. Phang-nga & Phuket Provinces

Key aspects:
- Connect to other terrestrial protected areas
- Strong land-sea connection
- Some are recently established
- High-end tourism at Khao Lak
- Emerging community-based tourism and resource management
- Former nesting site of endangered leatherback turtle
Key Challenges

• Resource overexploitation
• Tourism/development pressures
• Pollution
• Governance: overlapping jurisdiction
• MPAs effectiveness unknown
• Climate change impacts
As tourism continues to expand, coral reefs come under increasing threats and pressure from tourists.

### The main issue associated with tourism

- Sedimentation from construction development
- Ecosystem changed from land reclamation/marina and sea port construction
- Water pollution from boats, hotels near shore
- Algae bloom from waste water

### Direct

- Lack of awareness among tourists, guides and tour boat operators of the impacts of improper recreational use.
  - Holding, Touching, stepping on corals
  - Fish feeding
  - Littering
  - Anchoring in the reef

### Situations

- Coral degradation
- Tourism impact to coral reefs
- Number of dive-operators and speed boats increasing

#### Major mass coral bleaching events in Thailand

<table>
<thead>
<tr>
<th>Year</th>
<th>Andaman Sea</th>
<th>Gulf of Thailand</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>Very extensive bleaching - moderate mortality</td>
<td>Very extensive bleaching - moderate mortality</td>
</tr>
<tr>
<td>1999</td>
<td>Very extensive bleaching - moderate mortality</td>
<td>Very extensive bleaching - very high mortality</td>
</tr>
</tbody>
</table>

#### Unprecedented mass coral bleaching in Thailand: summer 2010

- 90-95% of coral reefs bleached across the region
- >50% mortality reported at monitoring sites
- Many key dive sites closed to recreational diving (Jan.-Jun. 11)
- Management recommendations submitted to FM (Feb. 11)

#### Devastating impacts in 2010 across Andaman region

<table>
<thead>
<tr>
<th>Place</th>
<th>% live coral cover</th>
<th>% mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boulder Islands</td>
<td>75</td>
<td>78.9</td>
</tr>
<tr>
<td>Similan Islands</td>
<td>80</td>
<td>99.9</td>
</tr>
<tr>
<td>Sirena Island (North)</td>
<td>84.7</td>
<td>75.8</td>
</tr>
<tr>
<td>Sirena Island (South)</td>
<td>71.2</td>
<td>85.9</td>
</tr>
<tr>
<td>Phang Nga</td>
<td>92</td>
<td>90.4</td>
</tr>
<tr>
<td>Koh Lipe</td>
<td>27.6</td>
<td>70.5</td>
</tr>
<tr>
<td>Koh Rok</td>
<td>53.9</td>
<td>84.0</td>
</tr>
</tbody>
</table>

#### Devastating impacts across the region

<table>
<thead>
<tr>
<th>Place</th>
<th>% live coral cover</th>
<th>% mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phi Phi Islands and the colonies</td>
<td>40</td>
<td>31.5</td>
</tr>
<tr>
<td>Ko Lanta</td>
<td>19.4</td>
<td>24.8</td>
</tr>
<tr>
<td>Ko Phi Phi</td>
<td>51.7</td>
<td>50.8</td>
</tr>
<tr>
<td>Ko Yao Yai</td>
<td>53.1</td>
<td>58.8</td>
</tr>
<tr>
<td>Ko Phi Phi (East)</td>
<td>67.4</td>
<td>58.5</td>
</tr>
<tr>
<td>Ko Phi Phi (Central)</td>
<td>16.5</td>
<td>58.8</td>
</tr>
<tr>
<td>Ko Phi Phi (Southwest)</td>
<td>50.2</td>
<td>58.8</td>
</tr>
<tr>
<td>Ko Phi Phi (Northwest)</td>
<td>54.7</td>
<td>58.4</td>
</tr>
</tbody>
</table>

...but also varied widely from site to site.
Management Responses

- Improve law enforcement by developing Marine SMART Patrol system
- Reduce dive activities impact by promoting Green Fins and forming REEF Guardian programme
- IUCN led Management Effectiveness Evaluation of Thailand MPAs
- Designing resilient MPA network
- Initiate transboundary conservation with Myanmar

Provide necessary gears and equipment to patrol staff

Technical Training on marine endangered species and navigation technique

Green Fins Partnerships

- Regional
  - UNEP
  - MFF
  - Reef World Foundation
- National
  - Government
  - NGOs
  - Private sectors

Mission Statement
GREEN FINS PROGRAMME
To protect and conserve coral reefs by establishing and implementing environmentally friendly guidelines to promote a sustainable diving & tourism industry.

Green Fins Thailand Implementation

- Strengthening membership and network
- Promote Green Fins Code of Conduct
- M&E: assess the quality of diving & snorkelling operators
- Training: Reef Watch monitoring; eco-friendly cleaning products workshop to achieve “minimum discharge policy”
- E-learning: Reef Watch monitoring. Reef Watch Database

Law enforcement training
“Green Fins members” assist in coral reef monitoring (using Reef Watch method) by providing data illustrating changes in coral reef health.

**Green Fins Certificate**

- **Certificate of participation**
- **Certificate of excellence**
  - based on additional activities/criteria in the Code of Conduct that the member has fulfilled.
Closing remarks by His Excellency U Tin Soe, Forest and Mining Minister of the Tanintharyi Region
Report of the workshop on Marine Protected Area management in Myanmar

The workshop on Marine Protected Area management in Myanmar was held on [date]. The workshop aimed to discuss and identify key challenges and opportunities for effective MPA management in Myanmar.

The workshop was attended by representatives from various government agencies, non-governmental organizations, and academic institutions. The discussions covered topics such as biodiversity conservation, sustainable livelihoods, and governance.

One of the main outcomes of the workshop was the identification of several priority areas for future MPA management. These include the need for better coordination among stakeholders, enhancing community participation, and improving monitoring and evaluation systems.

Participants also highlighted the importance of incorporating traditional knowledge and local perspectives in MPA management. This approach is essential for ensuring the sustainability of management practices and their acceptance by local communities.

The workshop concluded with a commitment from all participants to work collaboratively towards the establishment of effective management frameworks for MPAs in Myanmar.

Fauna and Flora International (FFI) will continue to support the implementation of these recommendations. FFI has been actively involved in promoting biodiversity conservation in Myanmar and is committed to fostering partnerships for sustainable development.
Report of the workshop on Marine Protected Area management in Myanmar

နောက်မှန်ကြားမှုအားဖော်ပြပါပြီးသော်တစ်ရပ်ကို အကြံပေးကြည့်ရှုသည်ကို သင်ကြားခြင်းဖြစ်သည်။

ဒစ္စတာများကို အပြင်ပြောပြပါသည်။

သင်ယူတွေ့ရှိသောကြောင့်ကို ပြောပြပါသည်။
Bangladesh, India, Indonesia, Malaysia, Maldives, Myanmar, Sri Lanka and Thailand are working together through the Bay of Bengal Large Marine Ecosystem (BOBLME) Project to lay the foundations for a coordinated programme of action designed to better the lives of the coastal populations through improved regional management of the Bay of Bengal environment and its fisheries.

The Food and Agriculture Organization (FAO) is the implementing agency for the BOBLME Project.

The Project is funded principally by the Global Environment Facility (GEF), Norway, the Swedish International Development Cooperation Agency, the FAO, and the National Oceanic and Atmospheric Administration of the USA.

For more information, please visit www.boblme.org