

Marine Spatial Planning *for Myanmar*

Strategic Advice for Securing
a Sustainable Ocean Economy



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Myanmar Program

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ACRONYMS

BOBLME	Bay of Bengal Large Marine Ecosystem		(fishing)
BANCA	Biodiversity and Nature Conservation Association	KBA	Key Biodiversity Area
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora	MALI	Ministry of Agriculture, Livestock and Irrigation
DMA	Department of Marine Administration, Ministry of Transportation and Communication	MARPOL	International Convention for the Prevention of Pollution from Ships
DoF	Department of Fisheries, Ministry of Agriculture, Livestock and Irrigation	MCRB	Myanmar Centre for Responsible Business
DRD	Department of Rural Development	MCS	Monitoring, control and surveillance
EAFM	Ecosystem Approach to Fisheries Management	MERN	Myanmar Environment Rehabilitation-conservation Network
ECD	Environment and Conservation Department, Ministry of Natural Resources and Environmental Conservation	MFF	Myanmar Fisheries Federation
EDC	Energy Development Committee	MIC	Myanmar Investment Commission
EDF	Environmental Defense Fund	MIMU	Myanmar Information Management Unit
EEZ	Exclusive Economic Zone	MONREC	Ministry of Natural Resources and Environmental Conservation
EIA	Environmental Impact Assessment	MPF	Ministry of Planning and Finance
FD	Forest Department (FD)	MOGE	Myanma Oil and Gas Enterprise
FFI	Flora Fauna International	MPA	Marine Protected Areas
FAO	Food and Agriculture Organization of the United Nations	MSP	Marine Spatial Planning
GAD	General Administration Department	NAG	Network Activities Group
GEGG	Green Economy Green Growth	NECC	National Environmental Conservation Committee
GOM	Government of the Republic of the Union of Myanmar	NEMC	National Energy Management Committee
ICZM	Integrated Coastal Zone Management	NGO	Non-governmental organization
IOC	Intergovernmental Oceanographic Commission	NECC	National Environmental Conservation Committee
IUCN	International Union for the Conservation of Nature	PA	Protected Area
IUU	Illegal, Unreported and Unregulated	RBM	Rights-based Management
		SAP	Strategic Action Plan
		SEZ	Special Economic Zone
		UNESCO	United Nations Educational, Scientific and Cultural Organization
		WCS	Wildlife Conservation Society

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FOREWORD

Traditionally, marine fisheries resources have played a crucial role in securing food security and livelihoods in Myanmar. However, we are now learning that the health of our marine fisheries resources face serious challenges, potentially compromising the wealth of the communities relying on them. Currently, the marine biodiversity of Myanmar is degrading due to the increasing pressure from tourism activities, overfishing, oil and gas exploitation, shipping and seabed mining. In particular, urban and industrial waste is responsible for a considerable environmental pollution.

Marine resources include a wide range of habitats, species, and various products that need to be conserved systematically so that future generations can still benefit from these great assets. We should act now to collectively move towards a sustainable ocean economy, where public and private sectors work closely together to identify the causes and mitigation measures for marine biodiversity degradation through surveys and research.

Together, we can find effective solutions to future challenges and conflicts. The Marine Spatial Planning report provides an innovative opportunity to review the role of different sectors of the Myanmar economy and to work for balancing the increasing economic demands on ocean resources with our social and environmental interests.

I acknowledge that this Marine Spatial Planning Strategy provides opportunities for a robust roadmap for action, and thus I encourage all stakeholders to carefully study it as we look to secure the financial, natural and social benefits provided by our ocean.



U Khin Maung Maw
Director General
Department of Fisheries (DoF)
Ministry of Livestock, Agriculture and Irrigation (MALI)

FOREWORD

Due to an urbanization and industrialization along the coastal areas, our seas are highly susceptible to land-based pollution. At the same time, we also need to pay great attention to prevent overexploitation of marine living resources, degradation of sea grass and mangrove ecosystems. In this context, I believe that this document provides an important set of recommendations for integrated, sustainable management of coastal areas and the marine environment.

As the department responsible for implementing Myanmar's environmental conservation policies, this Marine Spatial Planning Strategy provides us with a clear vision for the sustainability of our oceans future. Not only does it recognize the need for enhanced institutional arrangements, it also highlights the need for improved knowledge development and data management.

By developing a marine spatial data infrastructure, we will be able to strengthen our knowledge of Myanmar's ocean environment. While ocean data has historically been limited in availability, it is being increasingly collected through a variety of public and private organizations. By developing a central data repository, we will be able to secure important inputs to decision-making processes, and support sustainable spatial scenarios and policies.

By adopting the recommendations of this Marine Spatial Planning strategy, we will be taking steps towards a well-governed and sustainable ocean. Most importantly, it will prove that marine industries do not have to be in conflict with nature and shared prosperity can be achieved.

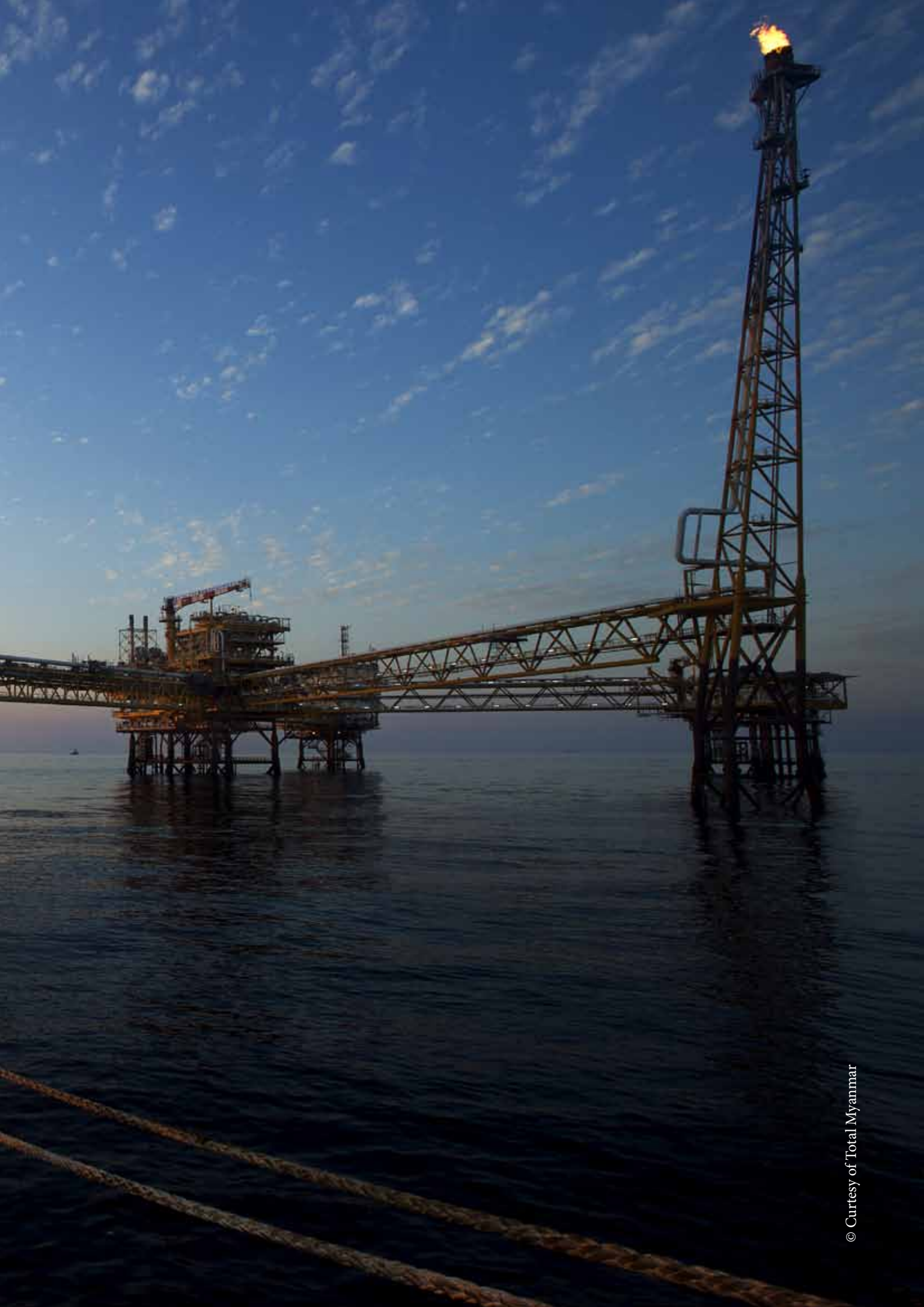
A handwritten signature in blue ink, appearing to read 'H.M. Thein', is written diagonally across the page.

U Hla Maung Thein

Director General a.i.

Environment and Conservation Department (ECD)

Ministry of Natural Resources and Environmental Conservation (MONREC)



FOREWORD

Hydrocarbons (oil & gas) are natural resources that are vital for the economic growth and wealth of mankind. Year after year, a larger proportion of these are produced offshore, sometimes below very deep seas (beyond 1,000m).

Myanmar is no exception, and more than 90% of its hydrocarbon production (exclusively gas) is produced offshore (Myanmar oil production is only produced onshore).

TOTAL E&P Myanmar developed the first offshore gas field in Myanmar more than 20 years ago. The Yadana field is still the largest producer in the country, both exporting to Thailand and supplying 50% of Myanmar's domestic gas consumption while enabling power to be produced with a minimum CO2 footprint.

Thanks to a stringent environmental policy covering every aspect of our operations, this activity has been carried out over the years without affecting the marine environment, and even providing sanctuary to marine wildlife. This clearly demonstrates that a critical multi-sector blue economy (like gas production and fishing) can be developed simultaneously through a coordinated approach to ocean planning and governance.

This report gives strategic advice in support of creating a sustainable ocean economy for Myanmar, and is a major contribution to this critical – and sometimes misunderstood – issue. Thank you to WCS for leading the effort to advance this approach in Myanmar.



Xavier Prével
General Manager
TOTAL E&P Myanmar



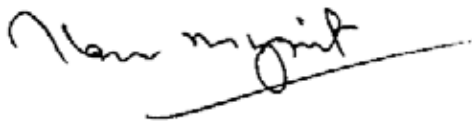
FOREWORD

With over twenty years working in Myanmar, the Wildlife Conservation Society (WCS) has amassed a wealth of institutional knowledge and delivered numerous conservation initiatives. More recently, our marine program has been working to bring contemporary concepts to Myanmar - to support our goal to create a sustainable ocean economy.

Myanmar's vast marine resources are an integral part of our future development. This strategy presents the results of a significant effort to understand the opportunities and challenges associated with our ambitious sustainable ocean economy goal. It makes recommendations to support cross-sector dialogue, enhanced ocean data management and for the identification and analysis of current and potential future conflicts.

Importantly the strategy recognizes that, if Myanmar is to capitalize on securing sustainable wealth from its oceans, we need to place significant emphasis on developing our national capacities and strengthening our institutions. Only then can we safeguard our oceans tremendous potential and secure the ecological, social and economic prosperity that it has to offer. To that end, we must find new means to build links between government departments and with the many people and private sector organisations that capture value from our ocean.

I hope this Marine Spatial Planning strategic advice reaches a broad audience. It presents a step-wise approach and I'm optimistic it will motivate others to join us in our work to safeguard Myanmar's wildlife and wildplaces, and to secure a sustainable ocean economy.



U Than Myint

Country Program Director

Wildlife Conservation Society

Myanmar Program

EXEC SUM (MYANMAR)

မြန်မာနိုင်ငံသည် အရှေ့တောင်အာရှ၏ကုန်းမြေပေါ်တွင် ရှည်လျားသောကမ်းရိုးတမ်းဒေသနှင့် ကြီးမားကျယ်ပြန့်သော ကုန်းမြေပိုင်ဆိုင်သလို ပင်လယ်ပြင်၏ အကျယ် အဝန်းမှာလည်း ၄၈၆ ၀၀၀ မိုင် စတုရန်းကီလိုမီတာ ခန့်ကျယ်ဝန်းပါသည်။ ပင်လယ်ပြင်၏နေရာ အများစုကို အကာအကွယ် မပေးနိုင်သလို စီမံအုပ်ချုပ်မှုနှင့်လည်း ကင်းလွတ်လျက်ရှိနေပါသည်။ မြန်မာ့ပင်လယ်ပြင်၏ သယံဇာတ အရင်းမြစ်များသည် လုပ်ငန်းနှင့်ဆက်စပ်နေ သူများ၏ တိုးမြှင့်ထုတ်ယူခြင်းကိုခံနေရပါသည်။ ကမ်းရိုး တန်းဒေသနှင့် ပင်လယ်ပြင်ရင်းနှီးမြှုပ်နှံမှုများ တိုးပွား လာစေရန်ကိုလည်း နိုင်ငံတော်မှ မြန်ဆန်စွာ ခွင့်ပြုပေး လျက်ရှိပါသည်။ ဥပမာ၊ ရေနံနှင့်သဘာဝဓါတ်ငွေ့ တူးဖော် မှု လုပ်ငန်းများသည် မြန်မာ့ရေပိုင်နက်ပြင်တွင် တက် ကြွစွာတူးဖော် ရှာဖွေနေသလို၊ ပင်လယ် ရေနက်ဆိပ်ကမ်း များလည်း ဆောက်လုပ်လျက်ရှိနေကြပါသည်။ ကမ်းရိုး၊ ကမ်းဝေး သယံဇာတ အရင်းမြစ်များအတွက်လည်း ထူးခြားသော ဈေးကွက်အသစ်များ၏ အလားအလာ နှင့် ကြီးစိုးလွှမ်းမိုးမှု များကြောင့် ရေလုပ်သားများ၏ အဓိက အသက်မွေးဝမ်းကြောင်းမှု လုပ်ငန်းများနှင့် ပင်လယ်ပြင် ၏ဂေဟစနစ်ကောင်းမွန် ကြံ့ခိုင်ရေးမှာ အထူးအရေးပါ လျက်ရှိနေပါသည်။

အက္ကဝါအထူးအစီအမံဖြစ်သည့် (MSP) မှ အက္ကဝါ ဆိုင်ရာ ပကတိနှင့် အနာဂတ်တွင်ဖြစ်နိုင် ခြေရှိသည့် အခက်ခဲများအပေါ် ရေလုပ်ငန်းနှင့် ဆက်နွယ် ကဏ္ဍ အသီးသီးမှ အားလုံး ပါဝင်ပိုင်းဝန်း ချိတ်ကျယ်ပြန့်စွာ အဖြေရှာခြင်းမှတစ်ဆင့် စနစ်ကျသော လေ့လာ ဆန်းစစ် မှုများအပေါ်အခြေခံ၍ အားလုံး ပါဝင်သော လုပ်ငန်းစဉ် တခုကို ဆောင်ရွက် နိုင်ကြ မည်ဖြစ်သည်။ ယင်းသို့ သော အခြေအနေမျိုးတွင်၊ ပင်လယ်ပြင်၏ ရေရှည် စဉ်ဆက် မပြတ်ဖွံ့ဖြိုးတိုးတက်ရေးအတွက်အစီအစဉ်နှင့် မြန်မာ့ သီးသန့်စီးပွားရေးဇုန် (EEZ) အတွင်းရှိ ပင်လယ် ပြင်နှင့် ဆက်စပ်နေသော လုပ်ငန်းများ၏လှုပ်ရှား ဆောင် ရွက် မှုများ ၊ အပြန်အလှန်ဆက်ဆံမှုများနှင့် ယင်း လွှမ်းမိုး မှု တို့ ၏ထိခိုက်မှုအခြေအနေ အပေါ်ပိုမိုရှင်းရှင်း လင်းလင်း သဘောပေါက် နားလည်ကြရန် အရေးတကြီး လိုအပ်နေ ပါသည်။ စီမံအုပ်ချုပ်မှုလုပ်ငန်းစဉ်အတွက် ချည်းကပ် ဆောင်ရွက်ရာတွင် တိုက်ရိုက် မူဝါဒနှင့် လူမှုလှုပ်ရှား ဆောင်ရွက်မှု လုပ်ငန်းစဉ်များဆိုင်ရာ သင့်တော်သော စီမံခန့်ခွဲမှု လုပ်ငန်း၏အဖြေကို ကူညီအဖြေရှာပေးမည် လည်းဖြစ်ပါသည်။ (ဥပမာ။ အက္ကဝါပြင်ထိန်းသိမ်းရေး နယ်မြေ၊ ကမ်းရိုးတန်းဒေသ လူထုအခြေပြု စီမံခန့်ခွဲမှု ဧရိယာ၊ စက်မှုလက်မှုဖွံ့ဖြိုးမှုဧရိယာ၊ ကမ္ဘာ့လှည့်ခရီး သွားလုပ်ငန်းအတွက် ခွဲဝေချထားသောနေရာနှင့် ငါးဖမ်း ဆီးရေးဆိုင်ရာ နယ်မြေစု စသည်တို့ဖြစ်ပါသည်။) ပင် လယ်ပြင်၏ နေရာအတွင်း ဒေသ အပိုင်း အခြား အ လိုက် နှင့် ယာယီအခိုက်အတန့် အတွင်း ဂေဟ စနစ် ဆိုင်ရာနှင့် လူမှုရေး

စီးပွားရေးဆိုင်ရာ အကျိုးအမြတ် များကို ရရှိ လာမည်ဖြစ်ပါသည်။ အရှေ့တောင် အာရှဒေသကြီး၏ နိုင်ငံပေါင်း(၇)နိုင်ငံတွင်အက္ကဝါပြင်၏ ဒေသအပိုင်းအခြားအလိုက် အစီအစဉ်(MSP)ကို ကောင်းမွန်သောအစီအစဉ်ကို အကောင်အထုံး သော စီမံခန့်ခွဲမှုတို့ဖြင့် စတင်ဆောင်ရွက်နေကြပြီဖြစ်ပါ သည်။ သို့သော်လည်း မြန်မာနိုင်ငံအနေနှင့် ယင်းသို့ သော အစီ အစဉ်ကို စတင်ဆောင်ရွက်ရန် လိုအပ်နေကြောင်းတွေ့ရှိ ရသည်။ မြန်မာနိုင်ငံအနေဖြင့် အကောင်အထည်ဖော် ဆောင်ရွက်နိုင်မည့် MSP အစီအစဉ်ကို သိရှိနားလည် နိုင်စေရန်၊ သားငှက်ထိန်းသိမ်းရေးအဖွဲ့ မှ အက္ကဝါပြင် ထိန်းသိမ်းရေးနှင့်ဖွံ့ဖြိုးရေးအတွက် ရေရှည် အစီအစဉ် တွင် အကူအညီရစေရန် ကနဦး လက်တွေ့ဆောင်ရွက် အကောင်အထည် ဖော်နိုင်သော အစီအစဉ်ကို ဆောင်ရွက် နေပါသည်။

ထိုလုပ်ငန်းစဉ်၏မဟာဗျူဟာသည်ခြောက်လကြာမြင့် မည်ဖြစ်ပြီး လုပ်ငန်းနှင့်ဆက်စပ်နေသူများ၏ကဏ္ဍစုံမှ ပါဝင်ပြီး တိုင်ပင်ညှိနှိုင်းဆွဲနွေးအဖြေရှာခြင်း၊ ဆန်းစစ် ခြင်း၊ အချက်အလက်များ ခွဲခြားစိတ်ဖြာခြင်းနှင့် ကွာဟ ချက် ဆန်းစစ်ခြင်းတို့ ပါဝင်ပြီး၊ ဘက်စုံ စေ့ငှသော ဆန်းစစ် မှုတို့၏ ရလဒ်လည်း ဖြစ်ပါသည်။ ကဏ္ဍစုံ ပါဝင်ဆွဲနွေးသူများမှာ မြန်မာ့အက္ကဝါရေပြင်ကို အသုံးပြုခြင်း အပေါ်အထူးစိတ်ဝင်စားသော အဖွဲ့အစည်း များပါဝင်ပါသည်။ ၎င်းတို့မှာ ပြည်ထောင်စု သမ္မတ မြန်မာနိုင်ငံတော်အစိုးရ၏ ဝန်ကြီးဌာနများနှင့် ယင်းတို့ နှင့် ဆက်စပ်သော သက်ဆိုင်ရာဌာနများ၊ ဒေသခံ အဖွဲ့ အစည်းများ၊ ပြည်တွင်း၊ ပြည်ပ အစိုးရ မဟုတ်သော အဖွဲ့ အစည်းများ၊ သုတေသန အဖွဲ့အစည်းများနှင့် ပုဂ္ဂလိက ကဏ္ဍတို့ ပါဝင်ပါသည်။ ပြည်ထောင်စု သမ္မတ မြန်မာနိုင်ငံ တော် အစိုးရ၏ အမျိုးသားအဆင့် ဖွံ့ဖြိုးရေး အစီအစဉ် ၏တစ်စိတ်တဒေသဖြစ်သော ကမ္ဘာ့လှည့် ခရီးသွား လုပ်ငန်း မူဘောင်၊ လူမှုရေး စီးပွားရေး၊ ဇီဝမျိုးစုံမျိုးကွဲများခြင်း၊ သစ်တောရေးရာ တို့ အပေါ်တွင် အခြေခံတည်ဆောက် ထားသောကြောင့် အမျိုးသား အဆင့် အက္ကဝါပြင်ဒေသ အပိုင်းအခြားအလိုက်နေရာ သတ်မှတ်ခြင်းအစီအစဉ် ဖွံ့ဖြိုးလာစေရန်အတွက် အခြေခံပြီး (၅)နှစ်စာ လမ်းပြ မြေပုံကို မဟာဗျူဟာဖြင့် ချမှတ်ထားပါသည်။ ယင်းအစီအစဉ်မှ အပြန်အလှန်အားဖြင့် မြန်မာနိုင်ငံ အတွက် ရေရှည်စဉ်ဆက်မပြတ် ဖွံ့ဖြိုး တိုးတက်မှုကို ဖြစ်ပေါ်လာစေမည့် အက္ကဝါပြင်၏ စီးပွားရေးမှတစ်ဆင့် အစားထိုး၍မရနိုင်သော ပင်လယ်သမုဒ္ဒရာ၏ သဘာဝ အရင်းမြစ်များ၊ လူမှု ရေးအရင်းမြစ်များနှင့် စီးပွားရေး အရင်းအမြစ်များကို လုံခြုံစိတ်ချ ဘေးကင်းနေစေရေး သည်လည်း တစ်စိတ်တဒေသ အစိတ်အပိုင်းအဖြစ် ပါဝင် နေပါသည်။

EXECUTIVE SUMMARY

Myanmar is the largest country in mainland Southeast Asia with a long coastline and a large marine territory covering about 486,000 km², the majority of which is unprotected and lacks management. At the same time, Myanmar's marine resources are increasingly being accessed and impacted by a wide range of stakeholders with growing influences. The country is rapidly opening up to increased coastal and marine investments. For example, the oil and gas sector is actively exploring Myanmar's waters, deep seaports are under construction, and new markets for inshore and offshore marine resources are emerging with significant potential influences on fishers' livelihoods and marine ecosystem health.

As such, there is an urgent need to have a clearer understanding of the influences and interactions of these and other marine-related activities across Myanmar's Exclusive Economic Zone (EEZ) and plan for development sustainably.

Marine spatial planning (MSP) assists with the identification and analysis of current and potential future conflicts through multi-sectoral stakeholder dialogue. This public process typically involves merging decision support science with participatory planning processes. The approach can provide solutions and help to direct policy and allocate human activities through appropriate management mechanisms (e.g. marine protected areas, coastal co-management areas, industrial development areas, allotments for tourism development,

and fishery zones) in the ocean space spatially and temporally to achieve ecological, economic, and social benefits.

In South-east Asia, seven out of the eleven countries have started to use MSP processes to better plan and ultimately manage their marine space. However, Myanmar has yet to initiate such a process. To help understand how Myanmar might implement a MSP process, WCS conducted an initial scoping exercise to aid in the long-term planning for marine conservation and development. This strategy is the result of a 6-month scoping process incorporating stakeholder consultations and analysis, data identification and gap analysis. The stakeholders consulted were organizations who have a vested interest in the use of Myanmar's marine space. They included various ministries within the Government of the Republic of the Union of Myanmar (GOM) and their line departments, regional bodies, non-governmental organizations – both local and international, research institutes and the private sector.

Building on the GOM's socioeconomic, biodiversity, forestry and tourism frameworks as part of its National Comprehensive Development Plan, this strategy sets out a five-year roadmap that sets the foundations for developing a national MSP process. This in turn will play a part in securing the irreplaceable natural, social, and financial capital supported by oceans and coasts through a Sustainable Marine Economy for Myanmar.



STRATEGY OVERVIEW

The MSP Roadmap sets the conditions for developing a new cycle of ecological and economic prosperity around ocean space management. This is set out under three important strategic programs:

- I. Consensus building and capacity development
- II. Development of institutional arrangements
- III. Data knowledge strengthening

The strategy outlines goals, objectives and activities for each of these strategic programs. Firstly, there is a need to build MSP consensus between primary stakeholders so that they

can work towards identifying common goals for a national MSP process, which will require improved government capacity for strong leadership. Institutional arrangements need to be developed in parallel for a more robust legal and regulatory environment that will enable stronger coordination and promote collaborations. At the same time, marine spatial data infrastructure has to be developed to facilitate data knowledge strengthening for the decision support analyses needed to produce alternative spatial scenarios. These in turn will guide the development of a comprehensive spatial management plan for Myanmar, which will be a 10-20 year “vision for the future” that sets out spatial and time-bound priorities.

EARLY ENABLERS

To aid in implementing immediate next steps, the following actions were identified as “quick wins” that would require minimal investment of time and resources but would gather initial momentum for the MSP process:

Strategic Program I: Consensus building and capacity development

- Convene a roundtable discussion(s) to discuss findings from the MSP scoping initiative and lessons learnt from other MSP case studies
- Identify pilot states/regions to develop pilot marine spatial plans as a learning mechanism
- Collate freely available data of the pilot states/regions to analyze current conditions and identify area/s for MSP pilot

projects

Strategic Program II: Development of institutional arrangements

- Harmonize representation needed in the proposed MSP governance structure with other similar emerging initiatives
- Prepare operational processes to establish an MSP Ministerial Committee

Strategic Program III: Data knowledge strengthening

- Consult other existing national database managers to inform the establishment of a national marine spatial database management authority
- Convene a roundtable with marine data holders to build consensus on sharing of data



WHAT IS MARINE SPATIAL PLANNING

Marine spatial planning (MSP) as defined in the United Nations Educational, Scientific and Cultural Organization (UNESCO)/ Intergovernmental Oceanographic Commission (IOC) guide to ecosystem-based MSP 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 goals and objectives that are usually specified through a political process.”¹

The marine space is often regulated or allocated within individual sectors. Examples of “sectoral zoning” include shipping channels, military security zones, concession zones for oil and gas extraction, fishing zones, and marine protected areas. MSP aims to attain consensus around the regulation of sea-uses among sectors through a ‘brokerage process’ in which conflicting or competing interests are identified and workable solutions are sought². MSP does not replace single-sector planning. Instead, it is a transparent, comprehensive and integrated approach for a range of decision-makers responsible for particular sectors to balance demands for development with the need to protect marine ecosystems.

The main characteristics of MSP are:

- **Integrated and multi-objective**
MSP works across sectors and across multiple levels of government; it aims to achieve the “triple-bottom line” of ecological, social and economic objectives
- **Continuing and adaptive**
MSP learns from experience; it is a continuous activity of planning to generate information for the development of management strategies that respond to changing conditions
- **Strategic and anticipatory**
MSP is focused on the long-term
- **Participatory**
Stakeholders are actively and effec-

tively involved in multiple steps of the process

- **Ecosystem-based**

Focusing on an ecosystem of a specific place or area and the range of activities affecting it, instead of focusing on a single species, sector, activity or concern

MSP has been increasingly recognized as an operational process for ecosystem-based management of marine areas³. As of 2014, MSP was underway in about 40 countries around the world and in the coming decade, MSP could be approved and implemented by more than 50 countries, covering about half of the world’s exclusive economic zones⁴. In the Asia-Pacific region, Australia and China have already implemented MSP while Philippines, Malaysia, Indonesia, Timor-Leste, Solomon Islands and Papua New Guinea could have approved marine spatial plans by 2025⁴.

RELATIONSHIP BETWEEN MSP AND OCEAN ZONING

Ocean zoning is often used interchangeably with MSP. However, it should be noted that zoning is not planning. The marine space is often zoned for an individual sector (e.g. offshore oil and gas concessions), without considering other uses or nature. Nonetheless, zoning is an important tool in the MSP toolkit—but not the only one. Not all marine space needs to be zoned. Other spatial and temporal tools include⁵:

- Permits (such as for fishing), often tied to specific areas within zones
- Enforceable management plans
- Site plans/special management areas
- Other spatial restrictions, e.g., defence training areas
- Best environmental practice/codes of practice

WHY IS MSP IMPORTANT

The key role of MSP is to promote a more rational arrangement of marine activities and to reconcile competing and conflicting policy goals. Such an integrated approach creates economic, social and environmental benefits by creating more stable and predictable conditions for investment and development; by securing community benefits from development; and, by promoting prudent use of marine space and its natural resources for sustainable development. Some of the key benefits of MSP⁵ are as follows:

Economic

- Identification and early resolution of conflicts among incompatible uses through planning instead of litigation
- Increased certainty of access to desirable areas for new private sector investments, where infrastructure is frequently liquidated over 20-30 years
- Streamlined and more transparent permit and licensing procedures
- Improved capacity to plan for new and changing human activities, including emerging technologies and their associated effects

Environmental

- Identification of ecologically and biologically significant areas, and important ecosystem services that are considered

in marine space use allocation

- Establish context for planning and siting of a marine protected area network
- Identification and reduction of the cumulative effects of human activities on marine ecosystems

Social

- Improved opportunities for local community and citizen participation in planning
- Identification of effects of decisions on the allocation of ocean space (e.g., closure areas for certain uses, protected areas) on communities
- Identification and preservation of social, cultural, and spiritual values related to use of ocean space

Administrative

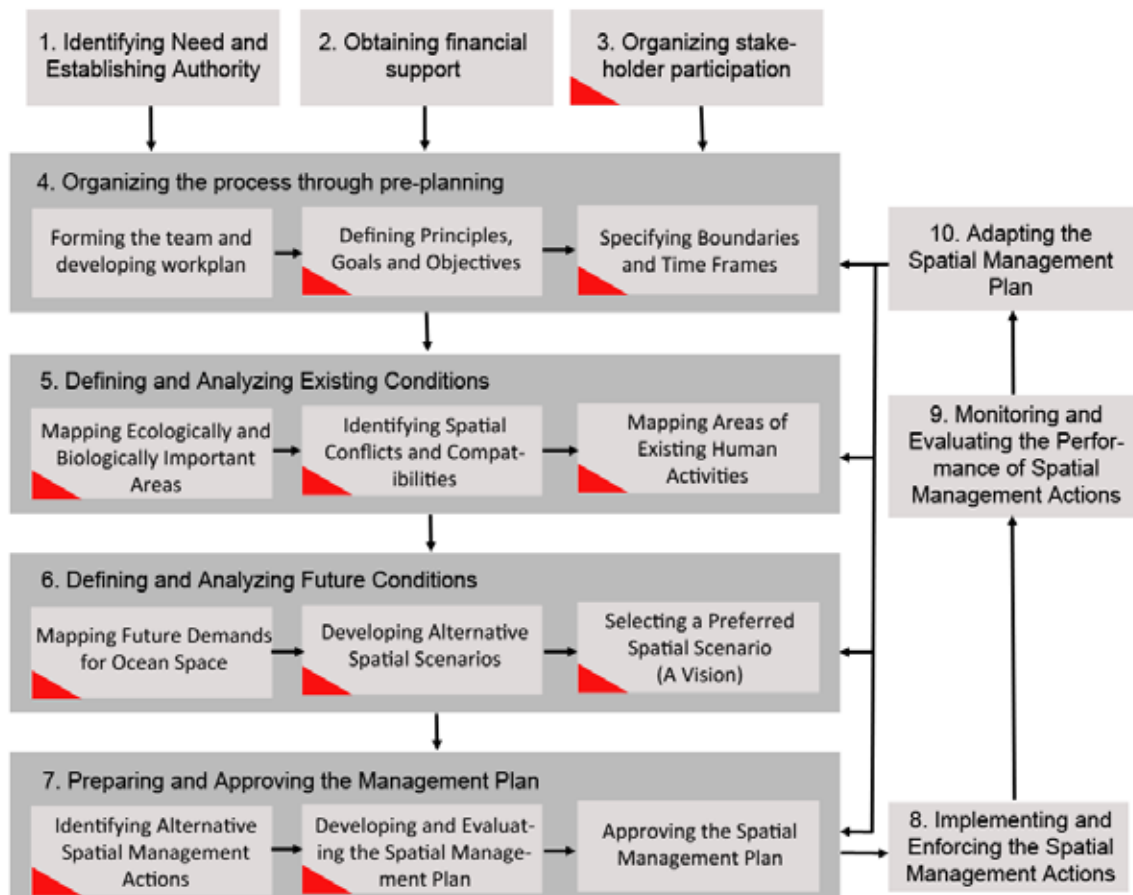
- Improve speed, quality, accountability, and transparency of decision making, and reduction of regulatory costs
- Improved coordination between different departments and spheres of government and between sectoral policies
- Provide a vision and common direction for marine policies and programs
- Improve information collection, storage and retrieval, access, and sharing.

THE MSP PLANNING PROCESS

The development and implementation of MSP involves a number of steps¹, typically:

1. Identifying need and establishing authority
2. Obtaining financial support
3. Organizing stakeholder participation
4. Organizing the process through pre-planning
5. Defining and analyzing existing conditions
6. Defining and analyzing future conditions
7. Preparing and approving the spatial management plan

Figure 1 A step-by-step approach to marine spatial planning⁵. The red triangles indicates a step in which stakeholders should be actively engaged.



8. Implementing and enforcing the spatial management plan
9. Monitoring and evaluating performance
10. Adapting the marine spatial management process

These 10 steps do not move linearly from one step to another but instead function as a feedback loop as shown in Figure 1 A step-by-step approach to marine spatial planning⁵. The red triangles indicates a step in which stakeholders should be actively engaged.. The UNESCO/OIC guide to ecosystem-based MSP¹ provides details to the entire process.

The four fundamental questions in the MSP process are:

(1) **Where are we today?**

Defining existing conditions requires data collection best managed and made accessible through the setup of spatial data infrastructures. Baseline characterization may involve characterizing seascapes and relevant land areas to identify ecologically important areas, human dimension

research methods to analyze human-uses, and cumulative impact assessments⁶ however expanding anthropogenic impacts on coastal and marine areas reinforce the need to adopt an MSP approach to manage societal demands while preserving the marine environment. The development of theory and methods to implement MSP are on the rise across the nation to address coastal and marine environmental challenges. Critical components of marine spatial planning are (1.

(2) **Where do we want to be?**

Objectives and outcomes need to be agreed upon to develop alternative management scenarios and analyze future scenarios (see Figure 2 for an example from WCS Congo). Scenarios are stories about the future and not predictions, they include what might be, preferences and/or forecasts. Good scenarios are plausible, challenging and rigorously constructed to address the most critical questions that decision-makers need to face.

They can generate insights, both from exploring each scenario individually and from comparing and contrasting them. This can be done using decision support tools (see Textbox 1).

(3) *How do we get there?*

The principal output of MSP is a comprehensive spatial management plan for a marine area that has been chosen

from a set of alternative spatial scenarios. It is a “vision for the future” that sets out spatial and time-bound priorities for the area in the form of a 10-20 year strategic plan that is often implemented through a zoning map(s) and regulation(s) and/or a permit system⁵.

(4) *What have we accomplished?*

MSP does not produce a one-time

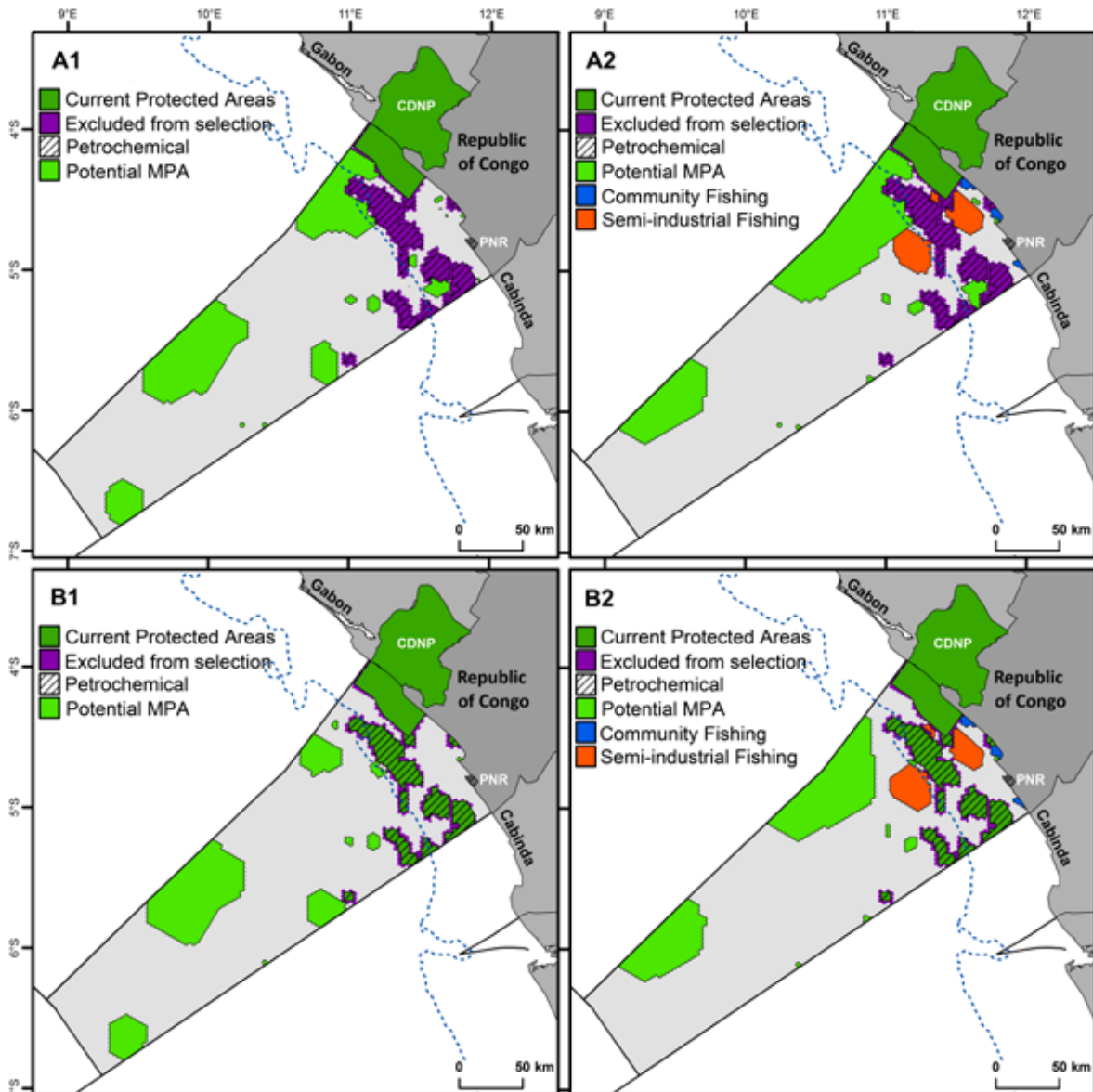


Figure 2. Alternative spatial scenarios for MPA siting from a Marxan analysis for decision support (see Textbox 1) conducted by University of Exeter for WCS Congo:

- A1) Biodiversity conservation excluding areas currently licensed for petrochemical exploitation;
- A2) A1 with the incorporation of fishing zones to minimize impacts to fishers;
- B1) Biodiversity conservation and co-location with petrochemical exploitation, as there are exclusion zones around infrastructure which could act as fishing refuges;
- B2) B1 with the incorporation of fishing zones to minimize impacts to fishers.

“master plan” for a marine area. It is a continuing, iterative process that learns and adapts over time. Monitoring and evaluation is hence an essential step in MSP, to assess the effectiveness, efficiency, and equity of the plans and their time scales and implementation incentives. Improvements can then be included during adaptive management where the next round of planning includes modified goals and objectives, management actions, and reallocating resources.

The data needed for the MSP process is dependent on the goals and objectives set, but may include the following:

Biological:

- Main habitat types: Corals, seagrass, mangroves
- Nursery habitats
- Fish spawning aggregation sites
- Threatened species: e.g. turtle habitat/migration pathways
- Larval dispersal connectivity
- Geomorphic features/benthic biodiversity
- Marine landscapes or bioregions

Human Uses:

- Overfishing/destructive fishing
- Coastal development (including hotels, ports, SEZs, sand abstraction etc)
- Marine-based pollution and damage
- Watershed based pollution
- Thermal stress
- Social or economic data that may act as a proxy for any of the above
- Fishing zones
- Offshore aquaculture areas
- Renewable and non-renewable energy production (e.g. oil and gas blocks)
- Shipping/transportation routes
- Military areas
- Recreation areas
- Community management areas
- Coastal developments (inc. hotels, ports, sand/gravel abstraction etc)

Physical environmental:

- Bathymetry
- Currents
- Sediments

EXAMPLES OF DECISION SUPPORT TOOLS

There are a range of decision support tools that provide additional value over standard spatial analysis²³. They can be used to analyze:

- ecological, economic, and social objectives and data
- transparently assess management alternatives and trade-offs
- involve stakeholders
- evaluate progress towards management objectives

While an extensive coverage of DSTs can be found on The Ecosystem-Based Management (EBM) Tools Network (<http://www.ebmtools.org/>), the following are some examples commonly used in MSP:

Marxan

Marxan is the most widely used conservation

planning software in the world. It was developed to identify a network of locations for conservation management that meet biodiversity targets (e.g. protect 20% of all coral reef in the study area) and are relatively socially and economically cost-effective (e.g. at the minimum opportunity cost to fishing). An extension of Marxan, known as Marxan with Zones, was developed to further incorporate multiple zone types, which often represent different types of activity or conservation management. It allows users to identify a combination of sites to achieve targets for different zones simultaneously.

Zonation

Zonation is another well-known conservation planning tool that can be used to decide where to place or expand conservation areas, and also be used to evaluate existing or proposed conservation areas. It differs from Marxan in that it does not necessarily require conservation targets to be

set. Instead, trade-offs are defined by weighting biodiversity features e.g. species weighted by their importance in meeting conservation goals, using benefit functions and setting connectivity responses.

Marine InVEST

Marine Integrated Valuation of Ecosystem Services and Trade-offs (InVEST) tool was developed to map and quantify changes in the delivery of marine ecosystem goods and services, including renewable energy, seafood supply, aesthetic, recreation, carbon sequestration, water quality, and habitat risk. It investigates trade-offs under different management and climate change scenarios across these services both in biophysical and

monetary and/or non-monetary value terms.

SeaSketch

Seasketch is a cloud-based decision-support tool for open and participatory spatial planning in the marine environment. It can be used to engage stakeholders face-to-face and online; users can share their sketches, discuss ideas, share views of maps, and post file uploads to discussion forums. SeaSketch can also provide analytical reports that can identify habitats protected, potential social or economic costs and benefits, and other metrics that can inform the development of broadly supported marine spatial plans, including outputs from other conservation planning software such as Marxan.

HOW MSP RELATES TO OTHER PLANNING PROCESSES

A number of ecosystem-based management approaches focusing on or related to the marine space are currently being proposed or are in the initial stages of being applied in Myanmar. The following sections outline how MSP relates to these planning processes and how it can contribute to each management approach.

- **Integrated Coastal Zone Management and other Terrestrial Planning Approaches**

Integrated Coastal Zone Management (ICZM) is a planning approach that shares the same principles as MSP, in that both are integrated, strategic, and participatory. The difference between the two lies in the defined boundaries of management. "Coastal zone" is often defined as "the area of land affected by the sea and the area of the sea affected by the land". However, the boundaries of coastal zone management have often been limited to the coastline strip within a kilometer or two from the shoreline¹. Rarely have the boundaries of coastal management included

coastal watersheds or catchment areas nor seawards to the territorial sea and beyond to the exclusive economic zone.

The terrestrial, coastal and marine ecosystems are closely linked and activities that take place in one realm can have a significant effect on another, e.g., agriculture on land can affect the marine environment through run-off. However in Myanmar, conservation and sustainable management is only just starting to be introduced into land-use planning⁷ which currently does not consider impacts on the marine space. MSP should be integrated with terrestrial planning to address these connections. Liaison between respective terrestrial and marine planning authorities through the MSP process will allow for marine planning to be designed with terrestrial planning in mind.

- **Marine Protected Areas (MPA) and MPA Networks**

Like MSP, MPA and MPA networks are spatial

approaches to marine management, often using zoning. MPAs can also be multi-objective, though often MPAs primarily focus on conservation and to lesser degree fisheries, particularly in South-east Asia. MPA processes can be integrated into MSP, which can help in the placement of MPAs within a more comprehensive framework as it considers multiple objectives derived through consensus from various marine-use sectors. MSP can also be used to implement MPA management measures and provides a wider context for integration of MPA management with other marine management approaches like ecosystem approach to fisheries management and climate change adaptation.

- **Ecosystem Approach to Fisheries Management (EAFM)**

Fisheries management in Myanmar is limited and EAFM has only recently been proposed⁸. As MSP deals with management goals across diverse sectors which include fisheries, MSP can provide spatial information on important ecological and biologically sensitive areas for EAFM. Through scenario planning, MSP can also develop spatial information on other existing and future uses of the marine environment within and

around the EAFM area.

- **Rights Based Management (RBM) of fisheries**

RBM is administered as area-based or catch-based programs. Area-based tenure systems allocate secure and exclusive privileges to fish in a specified area and the groups or, in rare cases, individuals assigned to fish in these areas are in turn required to comply with appropriate controls on fishing mortality and maintain a healthy ecosystem. Catch-based tenure systems have a fishery-wide catch limit and assign portions of the allowed catch to participants. Area-based management could benefit from MSP as it allows for integration with other spatial marine management approaches. MSP also allows for a platform for community participation for the implementation of RBM within a wider context of other marine uses.

- **Climate Change Adaptation**

Like climate change adaptation, MSP works on long time-scales. MSP can support the planning and implementation of climate change adaptation actions and can incorporate changes in species and habitat distribution or timing of ecological processes due to climate change.





THE MYANMAR CONTEXT

MARINE USES

Myanmar's political and economic reforms have opened the country to an upsurge in foreign direct investment that is helping drive rapid economic growth. Much of the foreign direct investment aims to harness the country's extensive array of natural resources, many of which are located both inshore and offshore. Gas exploration and extraction, for example, make up nearly a third of foreign direct investment⁹, with slightly less than half of the oil and gas blocks being offshore¹⁰. Other activities attracting foreign investors that could potentially impact the marine space include mining and forestry operations, manufacturing enterprises, hydro-power dams, and expanding and intensifying agricultural production.

Special Economic Zones (SEZs) have also been established to encourage economic growth and foreign investment. Currently three SEZs are being implemented, all located near or at the coasts: Kyauk Phyu SEZ in Rakhine State, Thilawa SEZ in southern Yangon region and Dawei SEZ in the Thanintharyi Region (Figure 3. Myanmar's three Special Economic Zones (SEZ) in relation to the two priority marine conservation corridors identified in the Myanmar Biodiversity Conservation Investment Vision 11.). Thilawa SEZ is already operational while Kyauk Phyu SEZ and Dawei SEZ will involve rapid coastal development through either reclamation and/or construction of Deep Sea Ports for container shipping and adjacent industrial development. Both these SEZs are located within the two marine conservation corridors which were identified based on key biodiversity areas (KBAs) in the Myanmar Biodiversity Conservation Investment Vision¹¹. Kyauk Phyu SEZ in particular has the potential to become the country's largest and busiest port due to its strategic location as the quickest trade route by sea between India and China. The development of new mega ports and the proposed upgrading of existing ports to deep-sea ports will create alternative shipping routes. Together with the normalisation of EU and US trade relationships, shipping traffic through the country is expected to increase rapidly.

Another major driver of coastal development in Myanmar is tourism. Prior to 2011, the coun-

try's tourism sector was barely developed due to a restrictive visas and limited destination/transport options, and later as a consequence of a tourism boycott called for by opposition groups¹⁴. Since then, the then opposition party, National League for Democracy, asked for the tourism boycott to be lifted and the country has seen unprecedented growth in international tourist arrivals. The majority of the main tourist destinations have been inland, with the exception of Ngapali beach in the Rakhine State¹⁴. More recently, the relatively untouched Myeik archipelago in the south has been earmarked as an emerging tourist destination, with many new permits for hotel and resort projects in mid-2015¹⁵.

Other than intensifying inshore and offshore development, Myanmar's abundant marine resources also face pressures from the fisheries sector. Myanmar's offshore fish stocks have been depleted by up to 80% since 1979¹⁶ and the total number of vessels in the offshore fishery sector is widely considered to exceed the carrying capacity of target stocks. Myanmar has an almost entirely growth oriented fisheries policy¹⁷ while domestic and foreign Illegal, Unreported and Unregulated (IUU) fishing exists, despite a ban on the licensing of foreign vessels that was imposed in 2015. Nearly half of Myanmar's population lives in coastal states and regions and this issue of declining resources has knockdown effects on coastal communities where fishing and fish processing is often the only livelihood option. Businesses in the fisheries sector also miss out on capturing the economic upsides of sustainably managed fisheries.

Against this backdrop of increasing human pressures on the coastal marine environment, is a growing recognition of the importance of its living resources and the need for sustainable resources management for biodiversity conservation, livelihoods and security. Currently, of the 45 officially recognized protected areas in Myanmar, only 6 (13%) have marine elements and the existing marine protected areas, including large offshore shark protected areas (PAs), have limited functioning management. Nonetheless, a national 2020 target has been set to expand the protected area network to cover

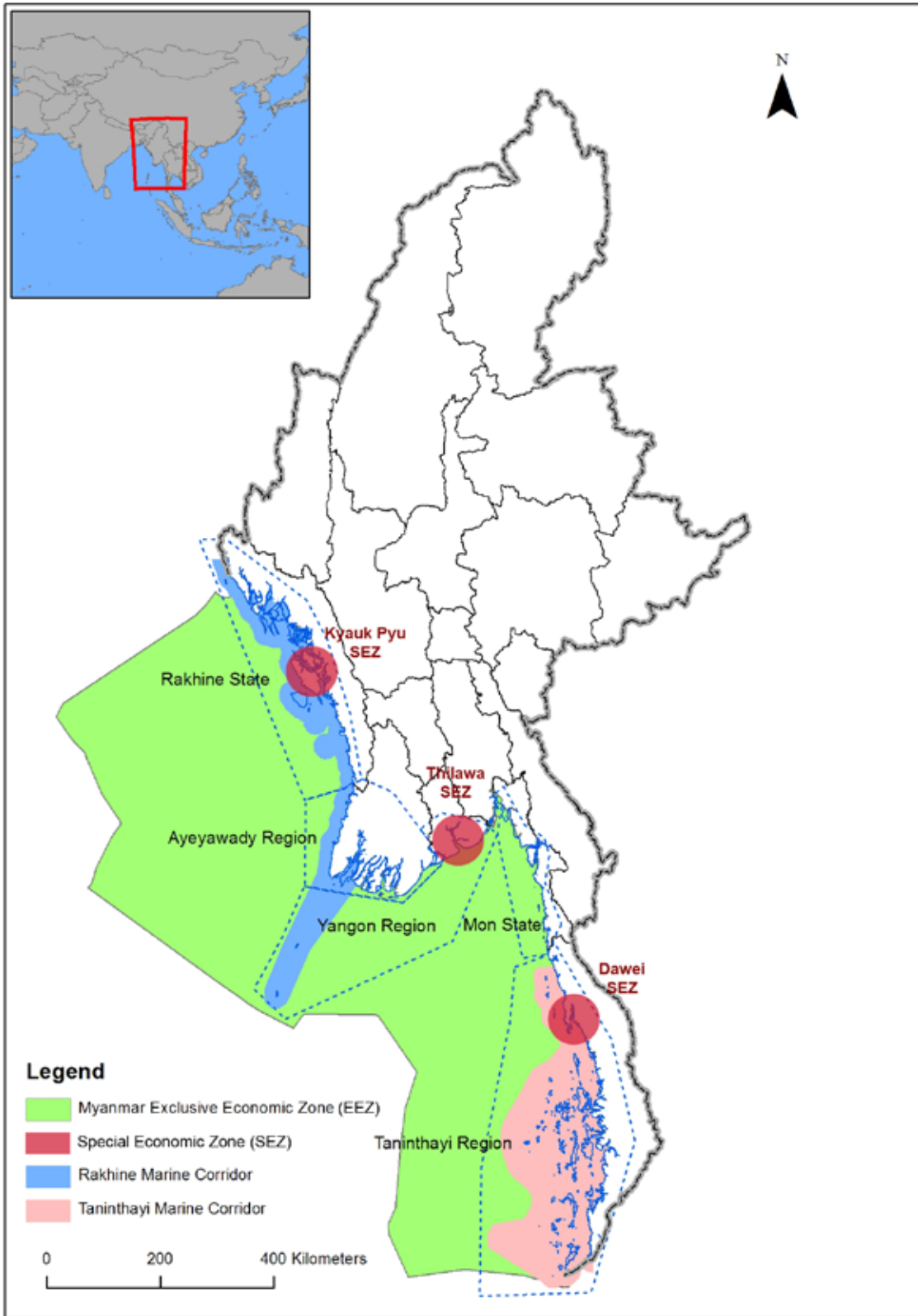


Figure 3. Myanmar's three Special Economic Zones (SEZ) in relation to the two priority marine conservation corridors identified in the Myanmar Biodiversity Conservation Investment Vision 11.

30% of the country's coral reefs and key gaps in the terrestrial system, including mangrove forests⁷. There has also been a push to develop an ecosystem-based fisheries management plan and an inter-agency system to control illegal and destructive fishing in the Myeik Archipelago⁷.

Myanmar's marine space is currently still very much an interconnected "commons" with few incentives for users to tackle shared environmental problems. Given the big political and economic influence of the private sector in Myanmar's marine space, there is opportunity for businesses to create shared value through developing best practices in corporate ocean responsibility. While there is a want by responsible

companies to address marine environmental issues, current attempts in responsible business practices are often reactive and not coordinated - undertaken by one company in a limited area. MSP provides a unique platform for all forward-thinking companies to be engaged with decision makers and other marine stakeholders. The wider multi-sectoral context that MSP provides allows corporates to better incorporate environmental and social considerations into the core of their operations in the oceans which will in turn help them to minimize business risks. They can also act as enablers of marine research which would help integrate ocean values and services into decision-making processes for a sustainable marine economy for Myanmar.

THREATS

The primary threats to the coastal and marine environment¹⁸ are summarized below:

- **Overfishing and destructive fishing**

Lack of sector governance has led to widespread IUU fishing in Myanmar. Fishers are also using inappropriate technologies such as trawling in inshore waters.
- **Coastal development**

Poorly planned tourism developments and other coastal developments such as the SEZs can lead to destruction of near-shore habitats through construction, dredging, sedimentation and pollution. In addition, there have been reports of illegal sand mining from beaches for resort construction¹⁴.
- **Watershed degradation**

In the coastal zone, mangroves are threatened by deforestation, with more than 58% of mangroves lost since 1980¹⁹. From 2000 to 2012, 88% of this mangrove loss was due to conversion to rice agriculture²⁰. Before the logging ban in April 2016, illegal logging had been rampant further upstream which affects siltation in the major rivers²¹. Not only does this lead to increased sedimentation, agricultural runoff from land conversion also creates major threats to near-shore habitats.
- **Marine pollution from extractive industries**

There are potential spills related to oil and gas extraction, particularly from oil tankers or pipelines transporting oil and from leaks and accidents during the drilling process. Water produced and discharged into the sea during the oil extraction operation also contains varying amounts of oil and other pollutants. There may also be disruptions to marine mammal behaviour due to increased boat traffic or noise pollution from offshore seismic operations. The mineral mining industry may discharge mine tailings or other pollutants into the freshwater or marine systems while sand mining from river bottoms and the sandy seafloor destroys habitats and causes sedimentation of water bodies.

- **Climate change**

Climate change is expected to worsen existing threats to Myanmar's biodiversity both directly through habitat loss and reduced resilience of ecosystems and indirectly through impacting people and increasing their dependence on natural resources

Other cross-cutting issues highlighted include weak in-country capacity to conduct marine research which are critical to develop action plans, inadequate policies and laws and corresponding enforcement and lack of access by coastal communities to alternative livelihoods. There are also weak collaboration and communication channels between the various marine stakeholders.

INSTITUTIONAL STRUCTURES AND POLICIES

The three key ministries with responsibilities relating to conservation in the coastal and marine realm are the:

- Ministry of Agriculture, Livestock and Irrigation (MALI)
- Ministry of Natural Resources and Environmental Conservation (MONREC)
- Ministry of Defense

Under MALI is the **Department of Fisheries (DoF)** which is responsible for the management of Myanmar's fisheries and coastal resources. Its four directorates are responsible for capture fisheries, aquaculture, research and development and administration. It performs the role of Myanmar's scientific authority for aquatic species for CITES. They also oversee and manage the marine component of some conservation areas such as the Thamihla Kyun Wildlife Sanctuary and the Khaing Thaung Island Reserve Forest and are the management authority for two Shark Protected Areas. This includes managing seasonal closures and related spatial restrictions in Myanmar waters.

MONREC's **Environment and Conservation Department (ECD)** is responsible for implementing Myanmar's environmental conservation policies. It designs and implements monitoring programs, prescribes environmental quality standards and conducts activities relating to waste management. It also oversees Environmental Impact Assessments (EIAs).

MONREC's **Forest Department** is responsible for the management of forests, including mangrove forests, through some mangroves are ceded to the DoF for possible aquaculture development. The Forest Department is the key implementing agency for the designation and management of protected areas in the country.

The Ministry of Defense oversees the **Navy**, which conducts at-sea patrolling and policing efforts exclusively targeting offshore fisheries operations²². The **Maritime Police** is Myanmar's maritime law enforcement authority and together with the **Coast Guard**, it is also gradually taking on fisheries patrol duties²².

In 2011, the GoM set up a coordinating body called the National Environmental Conservation

Committee (NECC) with the aim of overseeing the balance between economic development and environmental conservation across multiple sectors⁷. NECC is chaired by the MONREC Minister, and its members include deputy ministers from related ministries:

- Ministry of Home Affairs
- Ministry of Foreign Affairs
- Ministry of Agriculture, Livestock and Irrigation
- Ministry of Construction
- Ministry of Transportation and Communication
- Ministry of Hotels and Tourism
- Ministry of Industry
- Ministry of Electrical Power and Energy
- Ministry of Education
- Ministry of Health
- Ministry of Planning and Finance

There are Special Task Forces under the NECC that cover 1) land use; 2) rivers, streams and wetlands; 3) industrial projects, large industries and urban and rural areas; 3) environmental policy, law and procedures; and 4) environmental education and awareness; and climate change. There is none specific to the marine realm.

There is a current lack of clarity in certain sector specific policies and institutional structures. For example, it is unclear as to who has authority to manage and enforce in the coastal zone and whether the Nature and Wildlife Conservation Division within the Forest Department of the MONREC or the DoF within MALI that has authority for the conservation and management of marine (in-water) components both in and outside marine protected areas (MPAs). There is also no coordination between the fisheries administration (DoF) and the law enforcement agencies (Navy, maritime police, coast guard) when DoF has no dedicated division in charge of fisheries monitoring, control and surveillance (MCS) and the officers of the law enforcement agencies have no training in fisheries matters, neither with regards to fisheries biology, nor with regards to fishing gear technology²². These obscure and/ or overlapping responsibilities hinder an efficient implementation of marine-

related plans and regulations, especially when combined with a lack of cooperation and coordination between different ministries or departments and between national and regional/state level management.

Myanmar's existing policies, strategies and frameworks that relate to the marine space,

including international conventions and agreements of which it is a signatory are presented in Table 1. Myanmar's existing marine policies, strategies and frameworks. International conventions and agreements of which it is a signatory is presented in italics and years are that of ratification or accession..

Sector	Laws and Policies	Year
General	National Environment Policy	1994
	<i>United Nations Convention on the Law of the Sea</i>	<i>1996</i>
	Myanmar Agenda 21	1997
	<i>Millennium Development Goals (MDG)</i>	<i>2006</i>
	National Sustainable Development Strategy (NSDS)	2009
Conservation	Forest Law	1992
	Protection of Wildlife and Protected Areas Law	1994
	Environmental Conservation Law	2012
	National Biodiversity Strategy and Action Plan	2015 - 2020
	Environmental Impact Assessment Guidelines	2016
Fisheries	Law Relating to Aquaculture	1989
	Myanmar Marine Fisheries Law	1993
	Law relating to the fishing rights of foreign fishing vessels	1993
	<i>FAO Compliance Agreement</i>	<i>1994</i>
	<i>United Nations Fish Stocks Agreement</i>	<i>Not yet ratified</i>
	<i>Agreement on Port State Measures</i>	<i>2010</i>
	National Plan of Action on Illegal, Unreported and Unregulated Fishing	Not yet ratified
Mining (including Oil and Gas)	Myanmar Mines Law	1994
	<i>Extractive Industries Transparency Initiative</i>	<i>National target to be certified as compliant by 2017</i>
	National Energy Policy	2016
Maritime Transportation	<i>International Convention for the Prevention of Pollution from Ships (MARPOL)</i>	<i>1988</i>
Tourism	Myanmar Tourism Master Plan	2013-2030
	Myanmar Responsible Tourism Policy	2012
	Policy on Community Involvement in Tourism	2013
	Ecotourism Policy and Management Strategy	2015-2025
	Directives for Coastal Beach Areas	2004
General Investment	Investment Law (has provisions that either require or at least support responsible business conduct)	2015

Table 1. Myanmar's existing marine policies, strategies and frameworks. International conventions and agreements of which it is a signatory is presented in italics and years are that of ratification or accession.



MSP ROADMAP

As part of the development of this strategy, WCS carried out stakeholder consultations with various ministries in the Government of the Republic of the Union of Myanmar (GOM) and their line departments, regional bodies, non-governmental organizations – both local and

international, research institutes and the private sector. These consultations involved introducing the idea of MSP for Myanmar, gathering initial feedback for such an initiative and understanding how each stakeholder could contribute to the MSP process.

THEORY OF CHANGE

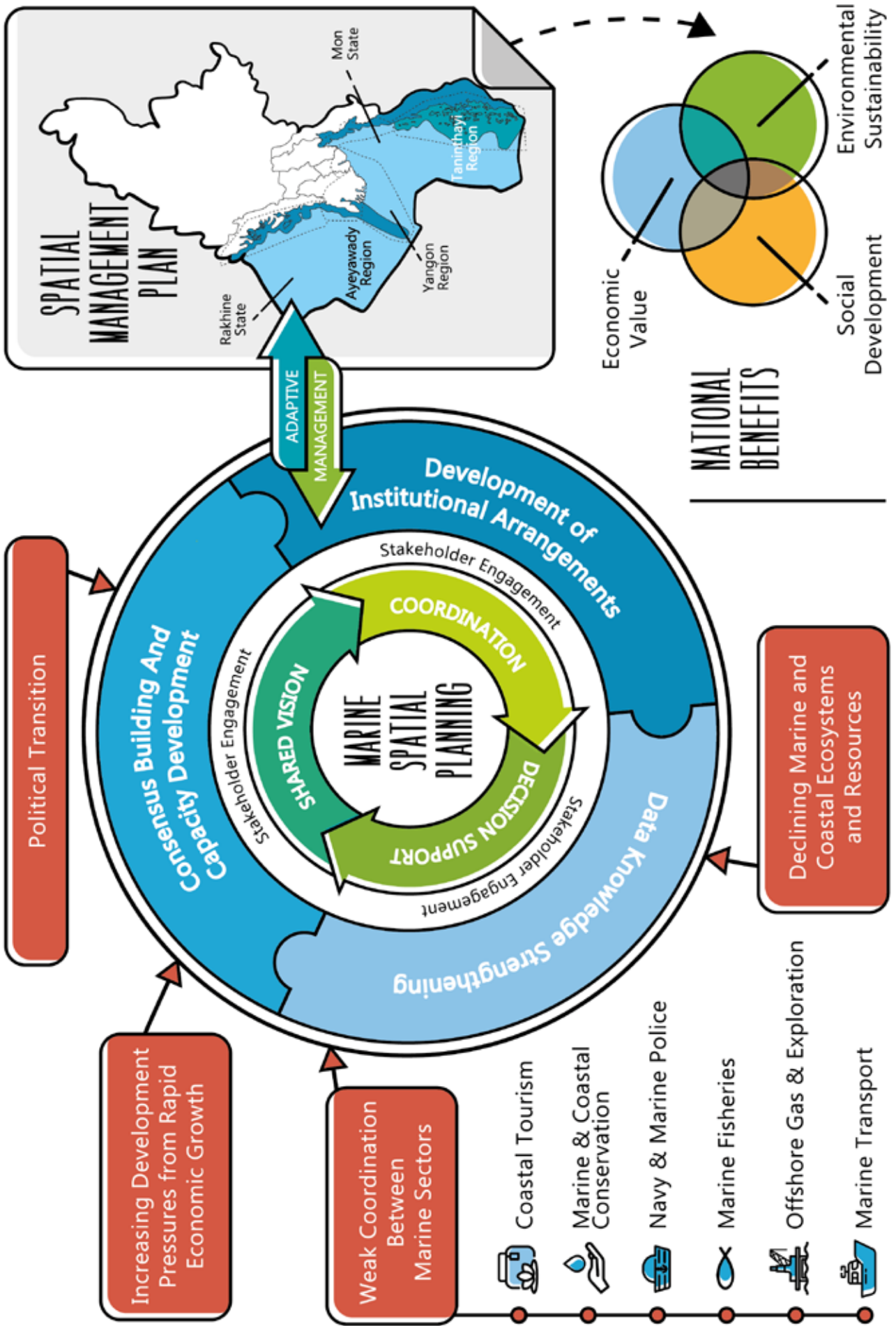
As the demands & conflicts for Myanmar's ocean space and resources increase due to a wide range of stakeholders with growing influences, single sector management can no longer create the scale or pace of change needed to meet multiple objectives. There is current little to no coordination between Myanmar's marine users. However with open dialogue, the right collaborations and knowledge sharing, we can create a new cycle of economic social and ecological prosperity around ocean space management. MSP provides an overarching coordinating framework that enables this change through the creation of solutions merging science and participatory planning.

Myanmar's current transitional political climate is ripe for sweeping policy, regulatory and management reform across various marine sectors. A new Environmental Conservation Law established in 2012 has provided the legislative environment for the setup of an environmental impact assessment (EIA) system, the procedures of which was just launched in 2016. While this new safeguard does not focus only on the marine realm, it forms the framework to support strategic actions and priorities for intervention in MSP. Initiatives related to the management of Myanmar's coastal habitats and marine living resources have also only recently started to emerge. These include the Mangroves for the Future initiative in Myanmar, which is currently pursuing a national ICM arrangement and MON-REC's OneMap Myanmar initiative, which aims to provide technical support to enable the creation of an online open access spatial data platform.

These recent developments provide a good opportunity to build on the growing governmental awareness of such integrated, strategic and participatory approaches of planning for the marine and coastal space.

MSP provides a forum for government, businesses, fishermen, nonprofit organizations, and coastal communities to create a shared vision, find opportunities for coordination and collaboration and share knowledge to improve decision-making for the use of marine resources and space. The MSP Roadmap outlines three important approaches that will create the conditions for making this a reality. Firstly, there needs to be a consensus for MSP built amongst primary stakeholders so that they can work towards identifying common goals. The development of pilot marine spatial plans will be a good learning mechanism to help build the shared vision, which in turn will drive the momentum towards a national MSP process. Government capacity also needs to be strengthened to lead the national MSP process (Strategic Program I). Institutional arrangements need to be developed in parallel for a more robust legal and regulatory environment that will enable stronger coordination and promote collaborations (Strategic Program II). At the same time, there is also an urgent need to develop marine spatial data infrastructure to facilitate data knowledge strengthening for the decision support analyses needed to produce alternative spatial scenarios (Strategic Program III).

This five-year roadmap will cumulate in a long-term Strategic Action Plan (SAP) for Myanmar which has input from newly formed MSP state



planning bodies, as state-level implementation is essential for driving the national MSP process. The SAP would detail further steps to guide the development of a comprehensive spatial management plan for Myanmar, which may be a 10-20 year “vision for the future” that sets out spatial and time-bound priorities for the area. It may be implemented through a zoning map(s) and regulation(s) and/or a permit system. However, this spatial management plan is not

final and will go through adaptive management: there will be revisions every set number of years as the plan’s effectiveness, efficiency, and equity is assessed. As MSP continues to provide a forum for stakeholder engagement, lessons learnt will be shared, enabling faster adoption for even greater collective impact on ocean space management to achieve economic, environmental and social benefits.

STRATEGIC PROGRAM I: CONSENSUS BUILDING AND CAPACITY DEVELOPMENT

Marine spatial planning is relatively new globally, with majority of known MSP case studies being implemented only within the past 10 years². MSP is a very new concept in Myanmar hence it is essential that understanding of this concept is strengthened, particularly with stakeholders likely to form the MSP governance structure. This can be done through a multi-stakeholder discussion of the MSP scoping initiative and lessons learnt from other countries’ MSP experiences.

With greater understanding of MSP amongst stakeholders, consensus can then be built around a shared vision during a series of objective-setting workshops that convene the primary stakeholders. A broad-based and clearly articulated MSP vision agreed upon by as many stakeholder groups as possible would lead to vastly reduced user conflict, improved and more efficient management of coasts and seas, healthy ecosystems and intact biodiversity, and maintenance of the ecosystem services that they provide. Roadblocks to achieving the vision such as pressures, conflicts and drivers behind threats will then need to be identified and goals for management that overcome the most important roadblocks then need to be outlined.

A pilot study on a sub-national level will allow for stakeholders to better understand the entire MSP process. This will involve setting MSP objectives specific to the pilot study area(s), determining the minimum amount of data required to build, adopt and implement a plan, conducting analyses on current and future conditions and going through the process of decision support analysis to draft a spatial management

plan for the identified pilot study area(s).

The shared vision and goals identified then set the direction for an inter-organization development (OD) and capacity building strategy, which is the underpinning of sustained success. The initial scoping exercise has revealed that at this present time, Myanmar lacks sufficient human resources with programmatic and administrative skills for the MSP process. The skills required include program management, legal analysis, spatial database management and geographic information systems knowledge, problem assessment and strategy design, conflict resolution, monitoring and evaluation and communications¹. GOM’s role is to drive the policy making process and while other stakeholders with technical expertise on ecology and socio-economics can provide sound impartial advice on alternatives and the implications of policies (see Strategic Program II). Cross-sectoral MSP training between both spheres is hence important for effective working relationships.

Capacity needs assessments of both national and regional MSP bodies will allow for priority skills gaps to be identified and an OD strategy developed from the assessment findings will provide a framework for systematic building of skillsets for GOM which could include staff training workshops led by some of the non-government stakeholders who have the relevant expertise e.g. in mapping or stakeholder engagement.

2018 Goal: All primary MSP stakeholders share a common vision for implementing MSP, a draft marine spatial plan for a pilot area is produced and a capacity needs assessment across the focal national government agencies has started.

2022 Goal: All focal national and regional government agencies have gone through relevant training as guided by a MSP organiza-

tional development strategy, including learning exchanges with MSP practitioners from other countries at international or regional fora.

Objective I.1.: Strengthen understanding of MSP

- Activity I.1.1.: Consultation on findings from the Myanmar MSP scoping initiative and lessons learnt from other MSP case studies amongst all primary stakeholders
- Activity I.1.2.: Convene multi-agency meetings to discuss potential shared vision and goals and identify pilot states/regions
- Activity I.1.3.: Facilitate roundtables to identify current and future conflicts

Objective I.2.: Develop a pilot marine spatial plans for pilot areas as a learning mechanism

- Activity I.2.1.: Set MSP objectives for the pilot states/regions
- Activity I.2.2.: Collate data for pilot states/regions
- Activity I.2.3.: Analyze current conditions to identify area/s for MSP pilot project/s
- Activity I.2.4.: Conduct decision support to analyze future conditions of the pilot area/s
- Activity I.2.5.: Develop a draft spatial management plan for the pilot area/s

Objective I.3.: Design an inter-organization development (OD) and capacity building strategy

- Activity I.3.1.: Conduct capacity needs assessment of focal national government agencies
- Activity I.3.2.: Conduct capacity needs assessment of focal regional government agencies
- Activity I.3.3.: Based on assessment results, prepare and approve a MSP OD strategy

Objective 1.4.: Establish programs and action plans to implement the MSP OD strategy

- Activity I.4.1.: Deliver short-term priority training led by stakeholders with relevant expertise to allow for cross-sectoral learning between stakeholders
- Activity I.4.2.: Encourage staff in focal government agencies and relevant stakeholders to attend external MSP courses/symposiums.

STRATEGIC PROGRAM II: DEVELOPMENT OF INSTITUTIONAL ARRANGEMENTS

An analysis of the current marine policy landscape will enable the GOM to identify main categories of policy drivers and strengthen synergies and address tensions between these different policy drivers. This should include the harmonization across sectoral policies of economic development, environmental and social cohesion. For example, the recently established social and environmental safeguard policies like the national requirements for EIAs, policies that may cover potential MSP financing mechanisms and policies that relate to spatial database infrastructure. The creation of governance arrangements for stakeholder participation is particularly important since strong stakeholder engagement was identified as the most common enabling factor for successful progress towards meeting MSP objectives². This should include procedures whereby appeals can be considered and arbitrated when there are grievances against the actions of other bodies. It is also crucial to clarify 1) which government agency has the authority to manage and enforce in the coastal zone 2) which has authority for the conservation and management of marine components both in and outside MPAs and 3) which has authority for fisheries monitor-

ing, control and surveillance (MCS) and related law enforcement.

Other than the need for horizontal integration, i.e. synergy between sectoral policies, there is also a need for vertical integration, i.e. cooperation between the various administrative levels. This will require an MSP governance structure led nationally, e.g. by a Ministerial Committee, but working closely with MSP state planning bodies through an MSP Steering Committee. Non-governmental stakeholders with expertise in various fields may form Technical Working Groups to advise the MSP Steering Committee (Figure 4. Potential Myanmar MSP Governance and Process Structure). Such an MSP governance structure working on a reciprocity principle will allow local and state authorities to adapt their spatial planning objectives to measures decided on at a higher level, while the national authorities in turn take these localized plans into consideration in their decisions.

Through constitutional or other law, the GOM can determine which competences can be exercised and by which actors in government, by establishing a marine spatial planning and management framework. This framework should be

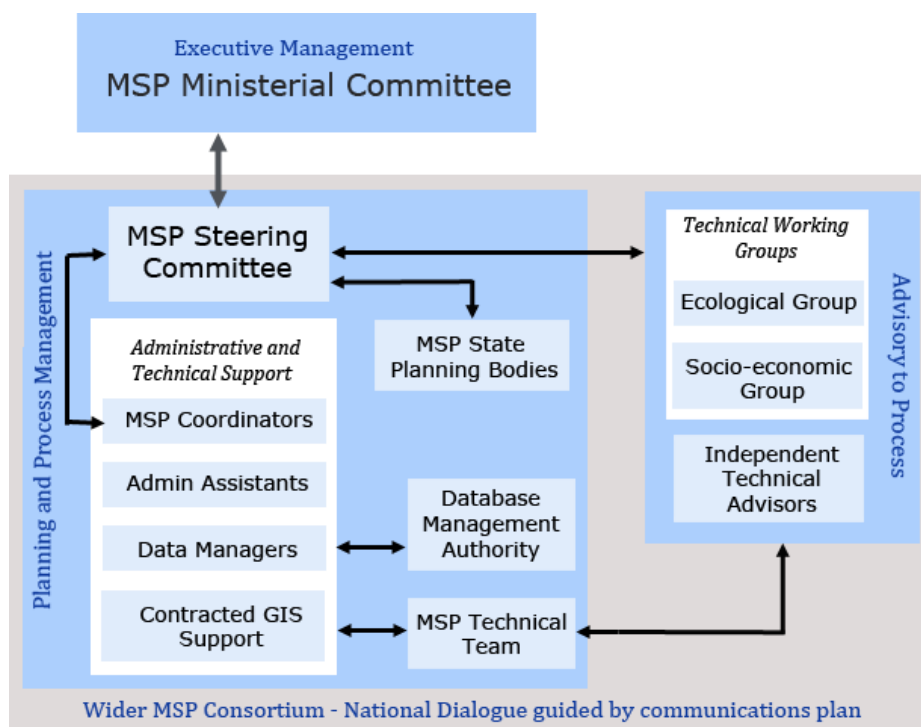


Figure 4. Potential Myanmar MSP Governance and Process Structure

produced before the setup of MSP state planning bodies as it will support the national-level MSP governance structure and outline how the various levels of administration should cooperate and share competences to produce plans that are in conformity with each other across geographical and sectoral boundaries. The framework should establish consistent minimum standards for planning and decision-making, but should also allow for variation so that regional and local governments respond to their local circumstances and needs.

After MSP state planning bodies have been established, the MSP framework can guide the formulation of initial MSP steps at the state level, which will form the basis of state-level implementation plans that will influence the national process. Measurable objectives relating to the goals set in the MSP framework also need to be

determined cooperatively between the National authorities and MSP state planning bodies, with substantial stakeholder and public input. These, together with lessons learnt from the development of the draft pilot area spatial management plan and a guidance regarding the development of a national information management system, will cumulate in a detailed long-term Strategic Action Plan for MSP.

2018 Goal: Gaps and needs for additional provisions in legal and institutional support identified; executive management of the MSP governance structure has been established and a MSP framework is released.

2022 Goal: New and revised legal provisions and regulations for MSP under debate, consultation and drafting; a long-term strategic action plan for MSP is released and implemented.

Objective II.1.: Develop the legal and regulatory environment for MSP

- Activity II.1.1.: Conduct a marine policy landscape analysis to identify synergies and contradictions between existing policies
- Activity II.1.2.: Strengthen legal and regulatory systems to collect and manage potential MSP financial sources
- Activity II.1.3.: Strengthen legal and regulatory systems to collect and manage MSP data
- Activity II.1.4.: Develop systems for stakeholder participation including dispute resolution mechanisms

Objective II.2.: Establish a MSP governance structure

- Activity II.2.1.: Harmonize representation needed in MSP governance structure with other similar emerging initiatives
- Activity II.2.2.: Prepare and approve operational processes and decree to establish an MSP Ministerial Committee
- Activity II.2.3.: Establish an MSP Steering Committee and Technical Working Groups
- Activity II.2.4.: Establish MSP state planning bodies

Objective II.3.: Develop a marine spatial planning and management framework

- Activity II.3.1.: Determine the geographic scope of the national MSP
- Activity II.3.2.: Define national MSP goals and guiding principles (results from Activity I.1.2.)
- Activity II.3.3.: Develop legal analysis and recommendations for legislative changes (results from Objective II.1.)
- Activity II.3.4.: Create a roadmap for how the marine spatial plans will be developed and implemented

Objective II.4.: Develop a Long-term Strategic Action Plan for MSP (after consultation with MSP state planning bodies)

- Activity II.4.1.: Determine measurable objectives for MSP
- Activity II.4.2.: Share lessons learnt from the development of the draft pilot area spatial management plan that will inform the SAP (leading from Activity I.2.3)
- Activity II.4.3.: Develop guidance regarding the development of a national information management system that will inform the SAP (leading from Activity II.1.3.)
- Activity II.4.4.: Convene workshop/s with MSP state planning bodies to determine an MSP implementation plan for Myanmar

STRATEGIC PROGRAM III: DATA KNOWLEDGE STRENGTHENING

Setting up a central data repository of coastal and marine data for Myanmar is essential to coordinating data and knowledge sharing for the MSP process. This is in line with Myanmar's National Biodiversity Action Plan 2015 – 2020, where the design and establishment of a national biodiversity database has been identified as priority action for Aichi Target 2: "By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems⁷".

Currently, there are similar national databases: MONREC's OneMap and what was previously The Ministry of Science and Technology's National Spatial Data Infrastructure. The UN's Myanmar Information Management Unit also has plans to develop a National Spatial Data Infrastructure. Harmonization of data manage-

ment protocols, including data quality standards and use of data with these databases, will allow for ease of data exchange and less confusion amongst data users.

Developing decision support systems based on the MSP goals defined in the MSP framework will allow for geographic and thematic data gaps to be identified so that historical and baseline data and information can be compiled based on these priorities. Primary sources of data could include scientific literature, expert scientific opinion, government sources, local knowledge, and direct field measurement¹. The latter can be facilitated through research and monitoring programs.

2018 Goal: Database management authority established and external MSDI consultant engaged.

2022 Goal: National Marine Spatial Database is in operation with downloadable datasets.

Objective III.1.: Establish a National Marine Spatial Database

Activity III.1.1.: Establish database management authority

Activity III.1.2.: Establish data management protocols, which should be harmonized with other current national databases

Activity III.1.3.: Compile historical and baseline data and information at the regional (and national) level based on geographic and thematic priorities identified by the data gap analysis (see Objective III.2.)

Activity III.1.4.: Create an open source platform to make the data available

Objective III.2.: Identify priority data gaps nationally and develop plans to secure new data

Activity III.2.1.: Conduct decision support analyses based on defined MSP goals (from Activity I.1.2.) to identify data gaps nationally

Activity III.2.2.: Promote (natural science and social science) research and monitoring programs both in local research institutions and through private-public partnerships



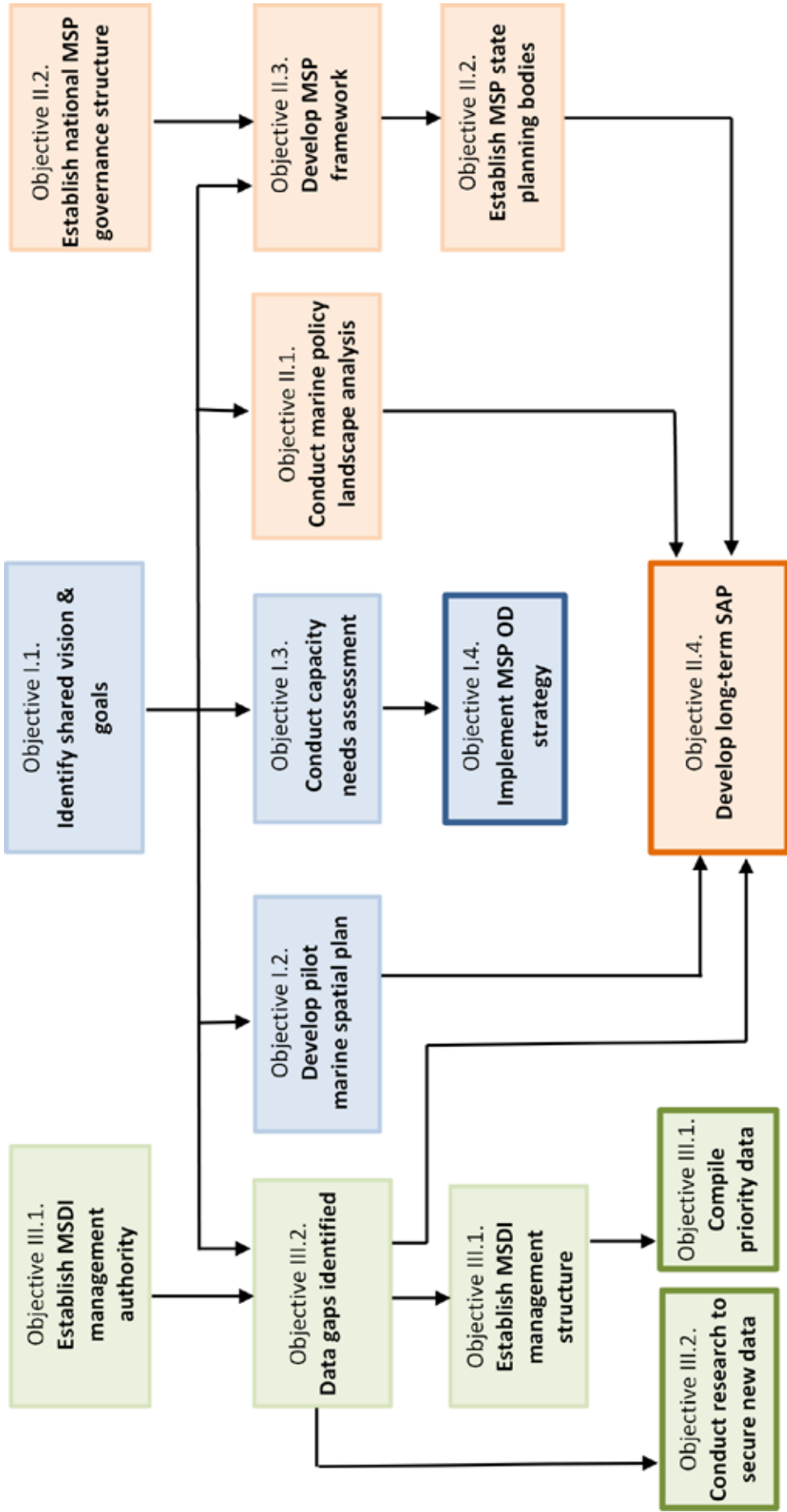


Figure 5. Flowchart showing parallel and interdependent processes of the roadmap. The textboxes in bold represent final outputs of the five-year road-map. OD = Organization Development; MSDI = Marine Spatial Database Infrastructure

TIMELINE

Table 2. Myanmar MSP Roadmap Matrix. Timeframe: Short = 1 year; Medium = 2-3 years, Long = >3 years

Strategic Program	Objective	Activity	Timeframe	Focal Institutions
I. Consensus Building and Capacity Development	I.1. Strengthen understanding of MSP concept	I.1.1. Consultation on findings from the Myanmar MSP scoping initiative and lessons learnt from other MSP case studies	Short	All primary stakeholders
		I.1.2. Convene multi-agency meetings to discuss potential shared vision and goals and identify pilot states/regions	Short	All primary stakeholders
		I.1.3. Facilitate roundtables to identify current and future conflicts	Short	All primary stakeholders
	I.2. Develop a pilot marine spatial plan for a pilot area	I.2.1. Set MSP objectives for the pilot states/regions	Short	State governments of pilot areas and support partners
		I.2.2. Collate data for pilot states and regions	Short	Data holders
		I.2.3. Analyze current conditions to identify area/s for MSP pilot project/s	Short	Technical partners to state governments of pilot areas
		I.2.4. Conduct decision support to analyze future conditions of the pilot area/s	Medium	Technical partners to state governments of pilot areas
		I.2.5. Develop a draft spatial management plan for the pilot area/s	Medium	State governments of pilot areas and support partners
	I.3. Design a human resources development (HRD) and capacity building strategy	I.3.1. Conduct capacity needs assessment of focal national government agencies	Medium	External consultant/s, National government agencies
		I.3.2. Conduct capacity needs assessment of focal regional government agencies	Medium	External consultant/s, Regional government agencies
		I.3.3. Based on assessment results, prepare and approve a MSP HRD strategy	Long	External consultant/s, MSP Steering Committee
	I.4. Establish programs and action plans to implement the MSP HRD strategy	I.4.1. Deliver short-term priority training led by stakeholders with relevant expertise to allow for cross-sectoral learning between stakeholders	Long	All primary stakeholders
		I.4.2. Encourage staff in focal government agencies and relevant stakeholders to attend external MSP courses/symposiums	Long	Focal government agencies and relevant stakeholders

II. Develop Institutional Arrangements	II.1. Develop the legal and regulatory environment for MSP	II.1.1. Conduct a marine policy landscape analysis to identify synergies and contradictions between existing policies	Short	External legal consultant
		II.1.2. Strengthen legal and regulatory systems to collect and manage potential MSP financial sources	Medium	Ministry of Planning and Finance, and other relevant government agencies
		II.1.3. Strengthen legal and regulatory systems to collect and manage MSP data	Medium	Ministry of Natural Resources and Environmental Conservation/ Ministry of Agriculture, Livestock and Irrigation
		II.1.4. Develop systems for stakeholder participation including dispute resolution mechanisms	Medium	MSP Steering Committee
	II.2. Establish a national MSP governance structure	II.2.1. Harmonize representation needed in MSP governance structure with other emerging initiatives e.g. integrated coastal management led by Mangroves for the Future	Short	Lead Ministry
		II.2.2. Prepare and approve operational processes and decree to establish the MSP Ministerial Committee	Short	
		II.2.3. Establish an MSP Steering Committee and Technical Working Groups	Short	
		II.2.4. Establish the MSP state planning bodies	Medium	
	II.3. Develop a marine spatial planning and management framework	II.3.1. Determine the geographic scope of the MSP	Medium	MSP Steering Committee
		II.3.2. Define national MSP goals and guiding principles	Medium	
		II.3.3. Detail legal analysis and recommendations for legislative changes (results from Objective II.1.)	Medium	
		II.3.4. Create a roadmap for how the marine spatial plans will be developed and implemented	Medium	
	II.4. Develop a Long-term Strategic Action Plan for MSP	II.4.1. Determine measurable objectives for MSP	Medium	MSP Steering Committee
		II.4.2. Share lessons learnt from the development of the draft pilot area spatial management plan that will inform the SAP	Medium	
		II.4.3. Develop guidance regarding the development of a national information management system that will inform the SAP	Medium	
		II.4.4. Convene workshop/s with MSP state planning bodies to determine an MSP implementation plan for Myanmar	Medium	

III. Data Knowledge Strengthening	III.1. Establish a National Marine Spatial Database	III.1.1. Establish a database management authority	Medium	MSP Steering Committee
		III.1.1.2. Establish data management protocols, which should be harmonized with other current national databases	Medium	External consultant managed by database management authority
	III.1.3. Compile historical and baseline data and information at the regional (and national) level	Long		
	III.1.4. Create an open source platform to make the data available	Long		
	III.2. Identify nationally priority data gaps and fill them in	III.2.1. Conduct decision support analyses based on defined MSP goals to identify data gaps nationally	Medium	External consultant managed by database management authority
		III.2.2. Promote (natural science and social science) research and monitoring programs both in local research institutions and through private-public partnerships	Long	MSP Steering Committee

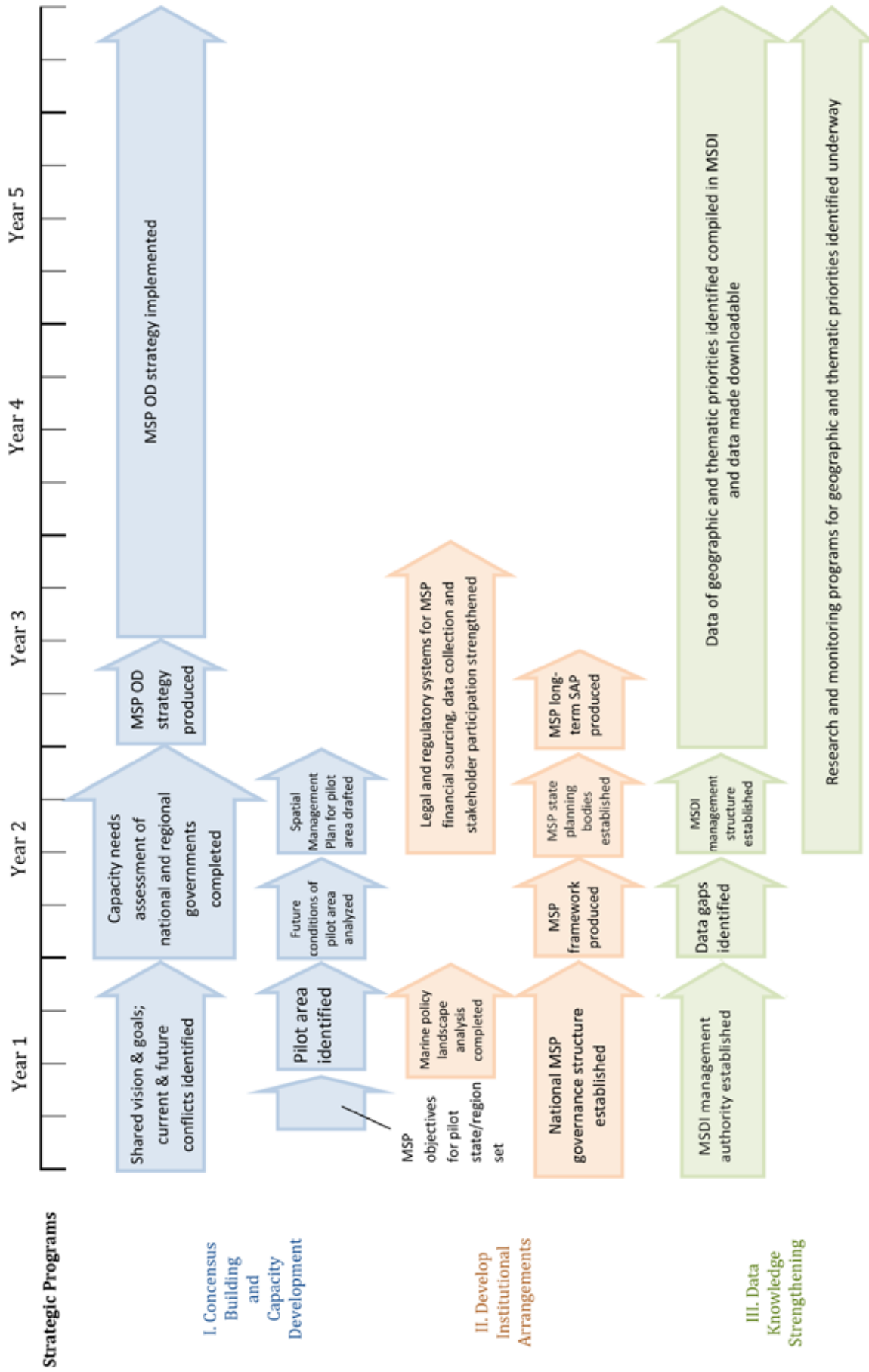


Figure 6. Roadmap to Marine Spatial Planning in Myanmar. OD = Organization Development; MSDI = Marine Spatial Database Infrastructure



STAKEHOLDERS

The following list of potential priority stakeholders in the MSP process were identified based on an initial list of identified stakeholders. Additions were made through recommendations during stakeholder consultations of these initial interviewees and further desktop research.

GOVERNMENT AGENCIES

Ministry of Agriculture, Livestock and Irrigation (MALI)

Department of Fisheries (DoF)

DoF is responsible for the management of Myanmar's fisheries and coastal resources and has a number of directorates including Capture Fisheries, Aquaculture, Research and Development and Administration. It performs the role of Myanmar's scientific authority for aquatic species for CITES. They also oversee and manage the marine component of some conservation areas such as the Thamihla Kyun Wildlife Sanctuary and the Khaing Thauung Island Reserve Forest and are the management authority for two Shark Protected Areas.

Department of Rural Development (DRD)

The DRD implements the National Rural Development and Poverty Alleviation Program which aims to improve socio-economic life of Myanmar's rural population and to narrow the development gap between urban and rural areas. It also has a mandate to preserve Myanmar's rural cultures.

Ministry of Natural Resources and Environmental Conservation (MONREC)

Environment and Conservation Department (ECD)

ECD is responsible for implementing Myanmar's environmental conservation policies. It designs and implements monitoring programmes, prescribes environmental quality standards and conducts activities relating to waste management. It also oversees Environ-

mental Impact Assessments (EIAs).

Forest Department (FD)

FD is responsible for the management of forests, including mangrove forests, through some mangroves are ceded to the DoF for possible aquaculture development. The Forest Department is the key implementing agency for the designation and management of protected areas in the country.

Department of Mining

The Department of Mining oversees all exploration and production of mineral resources and is responsible for regulating the environmental impact of the mining sector.

Ministry of Defense

The Navy conducts at-sea patrolling and policing efforts exclusively targeting offshore fisheries operations. The Maritime Police is Myanmar's maritime law enforcement authority and together with the Coast Guard, it is also gradually taking on fisheries patrol duties.

The naval branch of Myanmar's armed forces patrols Myanmar's water and enforces maritime laws for the country. The navy is mandated to enforce various marine fisheries laws, in particular those relating to offshore fishing.

Ministry of Transportation and Communication

Department of Marine Administration (DMA)

Maritime Safety, Security and Environmental Protection Division of the Department of Marine Administration is Myanmar's representative to the International Maritime Organization (IMO) and the implementing body of MARPOL in Myanmar. Other responsibilities include being in-charge of Myanmar's international shipping register.

Myanmar Port Authority

The Myanmar Port Authority is in-charge of all matters including marine

pollution and navigation within port limits. It is also involved in SEZ planning in the instance that ports are being developed.

Ministry of Electrical Power and Energy

National Energy Management Committee (NEMC)

NEMC was formed in 2013 to formulate the National Energy Policy, which was released in 2016, and is responsible for “exploring environmental impact and social impact assessments ahead of the implementation and to release information the people should be informed of.”

Energy Development Committee (EDC)

EDC is tasked with “laying down the energy development policy and plans of the National Energy Management Committee.”

Myanma Oil and Gas Enterprise (MOGE)

MOGE is a state-owned corporation that has the exclusive right to carry out all oil and gas operations with private contractors. MOGE holds the contractual rights to receive payment of royalties, bonuses, profits, etc. The legal nature, powers and duties of MOGE are unclear from publicly available information. It has a role both as a business partner in operations and as a regulator.

Ministry of Hotels and Tourism

The Ministry of Hotels and Tourism (MoHT) oversees and legislates aspects of Myanmar’s burgeoning tourism sector, including giving the directives for coastal beach areas. MoHT has worked with NGOs, such as WCS and Istituto OIKOS, on developing ecotourism in certain parts of Myanmar. MoHT’s responsibilities include developing hotel zones and giving approval to hotel development proposals, issuing tourism-related business licenses and reviewing the directives of the Myanmar Hotel and Tourism Law, among others.

Tourism Development Central Committee

The Tourism Development Central Committee was formed in April 2014 to plan and coordinate the tourism sector. It chaired by the Vice-president, and comprises the ministers from the follow-

ing ministries (names from before April 2016):

- Hotels and Tourism
- Home Affairs
- Foreign Affairs
- Cooperatives
- Communication and Information Technology
- Transport
- Environmental Conservation and Forestry (MOECAF)
- Immigration and Population
- Culture
- Finance
- National Planning and Economic Development
- Rail Transportation

It also comprises Region/State Chief Ministers and officials from the Myanmar Tourism Federation and the Republic of the Union of Myanmar Federation of Chambers of Commerce and Industry.

Ministry of Planning and Finance (MPF)

MPF formulates long term, medium term and annual development plans in accordance with national economic policies. It analyzes production, services, trade and investment activities in line with the market economic system for socio-economic development and oversees Myanmar’s human resource development and employment opportunities. It is the coordinating ministry for cooperation on national development matters with UN agencies, international organizations, INGO’s and regional organizations and evaluates the progress of ministries and private organizations to the state.

MPF also formulates and implements national monetary and financial policies.

Internal Revenue Department

IRD oversees the collection of all tax revenues including commercial tax, income tax, stamp duty and lottery collections.

Planning Department

The Planning Department coordinates with the respective ministries and regional authorities to collect information for plan formulation. It also collaborates with international organization in carry-



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ing out human resource development.

Myanmar Investment Commission (MIC)

MIC is the main administrative body for the granting of investment permits under the 2015 Investment Law. The MIC also determines or oversees restricted or prohibited activities, work permits; minimum foreign capital requirements; minimum requirements in relation to the employment of skilled local workers; guarantees against nationalization; land leases; and tax exemptions and relief. It monitors active investments and imposes administrative penalties.

Ministry of Home Affairs

General Administration Department (GAD)

The GAD acts as the civil service for the new state and region governments and provides the administration for the country's districts and townships. The GAD has an official mandate to ensure the rule of law as well as the peace and prosperity down to the level of every village in the country, regional development, and people's welfare. The GAD reports relevant information back to Nay Pyi Taw. These include population movements, security incidents, and basic demographic data.

OneMap

OneMap Myanmar is an open-access spatial database related to land, mandated and managed under the auspices of the recently formed Central Committee for the Land Resource Management, under the President's office. This committee is co-chaired by MONREC and the project is funded by the Swiss Agency for Development and Cooperation (SDC). The work of OneMap Myanmar aims to support the draft land policy consultation and finalization process.

National Environmental Conservation Committee (NECC)*

In 2011, the GoM set up NECC with the aim of overseeing the balance between economic development and environmental conservation across multiple sectors [9]. NECC is chaired by the MONREC Minister, and its members include deputy ministers from related ministries (see Appendix I, Table I2 for NECC composition). There are Special Task Forces under the NECC that cover 1) land use; 2) rivers, streams and wetlands; 3) industrial projects, large industries and urban and rural areas; 3) environmental policy, law and procedures; and 4) environmental education and awareness; and climate change. There is none specific to the marine realm.

REGIONAL BODIES

Mangroves for the Future

Mangroves for the Future is a partnership-based initiative that aims to strengthen the environmental sustainability of coastal development and promote sound investments in coastal ecosystem management, as a means of enhancing resilience and supporting local livelihoods throughout the Indian Ocean Region. MFF provides a regional collaborative platform for concerted action in support of Integrated Coastal Management (ICM) and allow member countries to share experiences and knowledge for effectively managing their coastal areas, using mangroves as the entry point. Supported by the Myanmar Environment Rehabilitation-Conservation Network (MERN) and Pyoe Pin, a Mangroves for the Future National Coordinating Body (NCB) was formed in 2014. The NCB composition matrix comprises of both government and civil society members, including the private sector, NGOs, academic and research institutes and it is working towards establishing a National ICM Arrangement for Myanmar.

Food and Agriculture Organization of the United Nations (FAO) in Myanmar

FAO is the main agency providing technical and policy advice to the food and agriculture sector which includes fisheries. Myanmar became a member of FAO on 11 September 1947. The FAO Representation was established in 1978, when the first FAO Representative was appointed. FAO is the implementing body of Myanmar's main fisheries stock assessment the EAF-Nansen project "Strengthening the Knowledge Base for and Implementing an Ecosystem Approach to Marine Fisheries in Developing Countries" which were carried out in 1979 and 1980, and another two in 2013 and 2015 respectively.

Bay of Bengal Large Marine Ecosystem (BOBLME) Project

The BOBLME Project involves eight countries surrounding the Bay of Bengal – Bangladesh, India, Indonesia, Malaysia, Maldives, Myanmar, Sri Lanka and

Thailand. The project aims to better the lives of the coastal populations through improved regional management of the Bay of Bengal environment and its fisheries. Phase I of the BOBLME Project began in April 2009 and ran until December 2015. There are 13 projects that were identified by BOBLME to be carried out for Phase II of the BOBLME Project, however it is unclear how BOBLME will be involved in the coordination of these as projects are to be implemented by various organizations and there is no official channel of communications with BOBLME. None of these 13 projects mention marine spatial planning or related topics.

Myanmar Information Management Unit (MIMU)

MIMU is a service to the UN Country Team and Humanitarian Country Team that started operating in late 2007, under the management of the UN Resident and Humanitarian Coordinator but is not funded by UN. Its purpose is to improve the capacity for analysis and decision making by a wide variety of stakeholders - including the United Nations, the Humanitarian Country Team, non-governmental organizations, donors and other actors, both inside and outside of Myanmar, through strengthening the coordination, collection, processing, analysis and dissemination of information. MIMU provides mapping services as well as training (regular twice a year QGIS workshops and by request); it provides technical support to OneMap through capacity building and standardization.

INTERNATIONAL NGOs

Wildlife Conservation Society (WCS)

With a presence in Myanmar since 1993, WCS was the first international organization to initiate a long-term conservation program in the country. WCS' marine program aims to create a sustainable marine economy for Myanmar through four strategic themes: marine spatial planning, sustainable fisheries management, protecting endangered marine

species (e.g. sharks and rays, marine mammals); and, strengthening environmental safeguards. WCS leverages its international status and range of partners to bring expertise to Myanmar. Efforts also focus on supporting capacity building of local collaborators and crafting partnerships with the private sector to secure shared-value.

Flora and Fauna International (FFI)

FFI is the world's first international conservation organization. The FFI marine program is designed to increase marine conservation capacity in Myanmar, with the aim of achieving effective establishment and management of Marine Protected Areas in the country. It currently works in two priority marine sites in Myanmar: Meinmahla Kyun (an ASEAN Heritage Site), and the Myeik archipelago (a priority site for coral reef conservation in Myanmar). FFI is pursuing a ridge-to-reef conservation programme for the Tanintharyi area.

Helvetas Swiss Intercooperation (Myanmar)*

HELVETAS Swiss Intercooperation is a development organization based in Switzerland. It started working in Myanmar in 2012, focusing mainly on the livelihoods sector, addressing challenges related to improving on and off farm productivity, skills development, employment, and income options for rural men, women and youth, with special attention given to disadvantaged, at risk and vulnerable groups. Helvetas is currently part of the consortium implementing the Community-led Coastal Management in the Gulf of Mottama Project.

International Union for the Conservation of Nature (IUCN)

IUCN is the world's largest global environmental organization that focuses on valuing and conserving nature, ensuring effective and equitable governance of its use, and deploying nature-based solutions to global challenges in climate, food and development. IUCN does this by supporting scientific research, manages field projects all over the world, and bringing governments, NGOs, the UN and companies together to develop

policy, laws and best practice. Since 2013, IUCN in Myanmar has worked on a Myanmar Environmental Rehabilitation-conservation Network (MERN) small grants program, BOBLME-funded Myeik Conservation Coalition Mangroves for the Future-funded outreach activities and a Community-led Coastal Management in the Gulf of Mottama Project implemented by a consortium with Swiss NGO Helvetas and local NGO Network Activities Group (NAG) which covers Mon state, Bago state and Yangon region: IUCN is pushing for Ramsar site designation for special habitats of the project area.

Istituto OIKOS

Istituto OIKOS is an Italy-based NGO with operations in Myanmar since 2006. OIKOS' marine work in Myanmar focuses on Lampi Island in the Tanintharyi Region. Oikos developed an ecotourism plan for Lampi which is the first ecotourism plan to be piloted in Myanmar. It is currently seeking funding for the marine zoning of Lampi Island.

WorldFish

WorldFish is an international research organization that harnesses fisheries & aquaculture to reduce hunger & poverty. It currently focuses on freshwater fisheries conducted for the Danish International Development Agency (DANIDA) and is currently exploring opportunities for co-management of the coastal fisheries sector in North Rakhine, South Rakhine and a part of the Myeik Archipelago.

Environmental Defense Fund (EDF)

Environmental Defense Fund or EDF is a United States-based nonprofit environmental advocacy group. It working with WCS on a sustainable marine fisheries project that aims to build a network of institutions aligned behind sustainable fisheries and protecting critical habitat based on principals of marine spatial planning, secure tenure, and ensuring Myanmar fisheries sector, its fishers and fishworkers capture the benefits of sustainably managed fisheries.

LOCAL NGOS

Green Economy Green Growth (GEGG)

GEGG is a not-for profit group that promotes a green economy for Myanmar through providing inputs for policies, promoting hands-on applications; capacity building and training; facilitating national and international, public, private, academia cooperation. Since 2011, through its annual Green Economy Green Growth Forum, GEGG has been supporting the GOM in engaging with eminent thinkers and practitioners from both public and private sectors around the world, to explore ways and mechanisms to achieve a sustainable path for Myanmar's development.

Network Activities Group (NAG)

NAG runs livelihood improvement programs through food security and food management. It facilitates and coordinates activities that create networks for development efforts, and works with partners to promote governance among relevant stakeholders at the national and sub-national levels. NAG's delta and coastal program began in the Ayeyarwaddy delta region in 2009 through its Improving Fishery Governance System (IFGS) Project to organize and strengthen fishing communities so they can claim their fishing rights and gain economic development. It has since started fisheries governance work in Rakhine and is currently working on The Gulf of Mottama project where the main objective is to ensure that the benefits of sustainable fisheries management are shared through effective value chains and equitable market access.

Pyoe Pin

Pyoe Pin is a program of the British Council. Through establishing coalitions of interest, Pyoe Pin undertakes a range of activities that contribute to furthering the basis for democratic and accountable governance within Myanmar. Pyoe Pin is currently partnering with WCS Myanmar, Rakhine Coastal Association and Rakhine Fisheries Partnership in a three-year marine fisheries co-management project in Thandwe District, Rakhine. This project aims to support

fishing communities and government authorities establish a co-management plan for Thandwe District coastline in Myanmar which will improve governance and sustainability of inshore fisheries by introducing practices that recover stocks, increase income and food security, while mitigating threatened species bycatch.

Biodiversity and Nature Conservation Association (BANCA)

BANCA conducts a range of projects relating to nature including surveys, watershed development, establishing forest plantations and access to drinking water. It is BirdLife International's Myanmar Partner and previously worked on a capacity building project in the Gulf of Mottama for the conservation of the Spoon-billed Sandpiper, with local conservation groups. It is currently supporting IUCN in the Community-led Coastal Management in the Gulf of Mottama Project in its push to designate an area as a RAMSAR site. BANCA also partnered with Europe Conservation Switzerland (ECoSwiss) for a series of terrestrial surveys on Lampi Island and previously partnered FFI in its coral surveys in the Myeik Archipelago.

Myanmar Environment Rehabilitation-conservation Network (MERN)

MERN is an umbrella organization of local environmental NGOs with a focus on environmental rehabilitation and conservation activities that are linked to the development of local communities for their livelihood and food security. It was pivotal to setting up the Mangroves for the Future National Coordinating Body in 2014.

Marine Science Association Myanmar (MSAM)

MSAM is a registered society and LNGO in Myanmar since 2013. Its members are mainly graduates of marine science in Myanmar. MSAM's work focuses on research, conservation and the sustainable development of coastal areas. MSAM collaborates with Marine Science Departments at Mawlamyine, Patheingyi and Myeik Universities along with marine science alumni.



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RESEARCH INSTITUTES

Smithsonian Institute

Smithsonian Institute is the research arm of Smithsonian, the world's largest museum and research complex based in Washington DC, USA. It embarked on marine projects since 2015. Smithsonian Institute previously partnered with FFI on a inshore fisheries research project to find out type of fish catch in the Myeik archipelago. Currently, Smithsonian Institute is continuing this project with under an MOU with MLFRD for the next 3 years.

Universities

There are four local universities with marine biology departments or programs:

- University of Mawlamyine
- Patheingyi University
- Myeik University
- Yangon University

The country's first Marine Biology pro-

gramme was established in the University of Mawlamyine at Mon State in 1973. The university has a field station Setse. Patheingyi University has a field station on the Rakhine Coast while Myeik University has a large Marine Science Museum. Yangon is the oldest university in the country and is home to the Diamond Jubilee Hall that hosts the national depository of PhD Theses.

PRIVATE SECTOR

Oil and Gas Companies

The offshore oil and gas companies currently leading operations in the waters of Myanmar include TOTAL, Petronas, PTTEP and Daewoo. Other offshore oil and gas companies are leading exploration or seismic activities. These include Woodside, Royal Dutch Shell, Chevron, Ophir, StatOil, Oil India, TAP Oil, Berlanga Holding, Transcontinental Group, Reliance Industries and ENI.

Myanmar Centre for Responsible Business (MCRB)

Myanmar Centre for Responsible Business (MCRB) was established in 2013 by the Institute for Human Rights and Business (IHRB) and the Danish Institute for Human Rights (DIHR). It aims to provide a trusted and impartial platform for the creation of knowledge, capacity, and dialogue amongst businesses, civil society organisations and governments to encourage responsible business conduct throughout Myanmar. MCRB also chairs the Thilawa SEZ Multistakeholder Advisory Group, which advises on the implementation of the Thilawa SEZ Phase 1 project and in particular the resettlement programme.

Myanmar Fisheries Federation (MFF)

MFF was founded in 1989 and is a national business organization that is an autonomous umbrella body of fisheries associations from the private sector. It aims to promote the development of the fisheries sector, increase fish production, encourage expansion of marine and freshwater aquaculture, upgrade the socio-economic status of fisheries communities and conserve the fishery resources and the environment.

Myanmar Tourism Federation

Myanmar Tourism Federation was established in 2012 to facilitate communication between the government and the private sector about tourism sector-related challenges. Its official mission is to promote Myanmar as a tourist destination, support sustainable tourism development, welcome and assist investors, and develop human

resources for tourism-related industries.

Myanmar Business Forum

The Myanmar Business Forum was established by the International Finance Corporation and Union of Myanmar Federation of Chambers of Commerce and Industry to:

- promote communication, cooperation and ongoing dialogue between the private sector and the government;
- represent, express and advance the opinions of the private sector on matters of common interest, to stimulate domestic and foreign investments business performance, and also to encourage investment;
- stimulate and facilitate initiatives of both the government and the private sector on policy issues concerning private sector development; and
- promote the interests of the national and international business community in Myanmar

UN Global Compact Local Network

The UN Global Compact is the world's largest corporate sustainability initiative which aims to support companies to do business responsibly by aligning their strategies and operations with Ten Principles on human rights, labour, environment and anti-corruption; and to take strategic actions to advance broader societal goals, such as the UN Sustainable Development Goals, with an emphasis on collaboration and innovation.

PRIMARY STAKEHOLDERS

A stakeholder analysis was conducted to identify the following list of primary stakeholders based on their level of influence: stakeholders whose actions have a strong impact on the MSP process and implementation. Nonetheless, this list is not exhaustive; stakeholder analysis should remain an ongoing process as more is known in Myanmar's shifting political landscape, as stakeholders and their positions may change over the course of negotiations and analyses.

Primary stakeholders include but are not limited to:

Government Agencies

- Department of Fisheries (DoF), Ministry of Agriculture, Livestock and Irrigation (MALI)
- Environment and Conservation Department (ECD), Ministry of Natural Resources and Environmental Conservation (MONREC)
- Forest Department (FD), MONREC
- The Navy, Ministry of Defense
- Department of Marine Administration (DMA), Ministry of Transportation and Communication
- Myanmar Port Authority, Ministry of Transportation and Communication
- National Energy Management Committee (NEMC), Ministry of Electrical Power and Energy
- Myanmar Oil and Gas Enterprise (MOGE)
- Ministry of Hotels and Tourism
- Tourism Development Central Committee
- Ministry of Planning and Finance (MPF)

- General Administration Department (GAD), Ministry of Home Affairs
- OneMap

Regional Bodies

- Mangroves for the Future
- FAO

International NGOs

- WCS
- FFI
- Helvetas
- IUCN
- Istituto OIKOS
- EDF

Local NGOs

- Green Economy Green Growth (GEGG)
- NAG
- Pyoe Pin
- Biodiversity and Nature Conservation Association (BANCA)
- Myanmar Environment Rehabilitation-conservation Network (MERN)

Research Institutes

- Smithsonian Institute
- University of Mawlamyine
- Patheingyi University
- Myeik University
- Yangon University

Private Sector

- Various oil and gas companies
- Myanmar Centre for Responsible Business (MCRB)
- Myanmar Fisheries Federation (MFF)



REFERENCES

1. Ehler, C. N. & Douvère, F. Marine Spatial Planning: A Step-by-step Approach toward Ecosystem-based Management. *IOC Manuals Guid.* **53**, 99 (2009).
2. UNEP & GEF-STAP. *Marine Spatial Planning in Practice – Transitioning from Planning to Implementation.* (2014).
3. Douvère, F. The importance of marine spatial planning in advancing ecosystem-based sea use management. *Mar. Policy* **32**, 762–771 (2008).
4. Ehler, C. N. *What is Marine Spatial Planning? A presentation made at the Technion Israel Institute of Technology* (2014).
5. Ehler, C. N. *Coral Triangle Initiative: An Introduction to Marine Spatial Planning.* (2013).
6. Stamoulis, K. A. & Delevaux, J. M. S. Data requirements and tools to operationalize marine spatial planning in the United States. *Ocean Coast. Manag.* **116**, 214–223 (2015).
7. Forest Department (Ministry of Environmental Conservation and Forestry). *National Biodiversity Strategy and Action Plan 2015 - 2020.* (2015).
8. Myanmar Fisheries Partnership. *Policy Brief No 2. Offshore Fisheries: Transforming Offshore Fisheries Governance.* (2016).
9. Greater Mekong Subregion Core Environment Programme. Safeguarding Myanmar's Future: Environmental Impact Assessment. Available at: <http://www.gms-eoc.org/news/safeguarding-myanmar-s-future-environmental-impact-assessment>. (Accessed: 21st April 2016)
10. Aung Kyaw Htoo. *Myanmar Petroleum Sector Future Pathways and Prospect.* (2014).
11. Wildlife Conservation Society. *Myanmar Biodiversity Investment Conservation Vision.* (2013).
12. Matsui, M. Chinese company to build oil refinery near Dawei SEZ in Myanmar. *Nikkei Asian Review* (2016). Available at: <http://asia.nikkei.com/Politics-Economy/International-Relations/Chinese-company-to-build-oil-refinery-near-Dawei-SEZ-in-Myanmar?page=1>. (Accessed: 30th April 2016)
13. Sathisan, V. & Maria, B. S. Myanmar: New government inherits problems and promise of special economic zones. *Business and Human Rights Resource Centre* (2016). Available at: <http://business-humanrights.org/en/myanmar-new-government-inherits-problems-and-promise-of-special-economic-zones>. (Accessed: 30th April 2016)
14. MCRB. *Tourism Sector-Wide Impact Assessment.* (2015).
15. Aung, H. U. Myanmar Tourism Master Plan 2013-2020. *Myanmar Minist. Hotel. Tour.* 1–83 (2013).
16. Krakstad, J.-O., Krafft, B., Alvheim, O., Thein, H. & Psomadakis, P. *Cruise Report 'Dr. Fridtjof Nansen' Myanmar Ecosystem Survey.* (2015).
17. Schmidt, U. & Soe, K. M. *Myanmar Fisheries Sector Identification/Scoping Mission.* (2015).
18. Holmes, K. E. *et al. Marine Conservation in Myanmar - Current knowledge and research recommendations.* (2014).
19. Ministry of Environmental Conservation and Forestry Myanmar. *Fifth National report to the CBD.* (2014).
20. Richards, D. R. & Friess, D. A. Rates and drivers of mangrove deforestation in Southeast Asia, 2000–2012. *Proc. Natl. Acad. Sci.* 201510272 (2015). doi:10.1073/pnas.1510272113

21. Zöckler, C., Delany, S. & Barber, J. Sustainable Coastal Zone Management in Myanmar. *Arc-Cona Ecol. Consult. Flora Fauna Int.* 60 (2013).
22. Hosch, G. National Plan of Action to Combat, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (Draft). (2016).
23. PacMARA & Center for Ocean Solutions. *Selecting decision support tools for marine spatial planning. Decision Guide* (2011).